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Sherry Robinson, Editor
Penn State University

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The manuscripts contained in this volume have been double blind refereed. The acceptance rate for manuscripts in this issue, 25%, conforms to our editorial policies.

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A MODEL FOR BUILDING INNOVATION CAPABILITIES IN SMALL ENTREPRENEURIAL FIRMS

Falih M. Alsaaty, Bowie State University

ABSTRACT

The purpose of this paper is to present a model for building innovation capabilities in small firms. The United States is a country of opportunities, political stability, and economic growth that spurs the formation of a significant number of business ventures annually. The contribution of the firms to the country's employment and output is impressive. Many entrepreneurial firms are highly creative, productive, and prosperous. The majority of firms are, however, mediocre in performance and growth prospect. The model proposed in this paper consists of three key components: (a) creating the firm's overall innovation strategy as well as mini functional innovation strategies, (b) managing resources creatively, and (c) augmenting internal competencies through training and educational programs. The success of innovative efforts requires visionary leadership, team work, and employees' devotion.

INTRODUCTION

The U.S. economy is increasingly becoming a small business economy, as the role of small firms[1] is rapidly growing and their influence mounting. According to the Small Business Administration, there were 5.9 million firms in 2006 each of which employed less than 100 individuals[2]. The firms accounted for more than 98 percent of total firms in the county. In the same year, these firms employed 42.7 million individuals or 35.6 percent of total employment by all firms combined. The role of small firms in the economy extends far beyond just providing employment. It includes increased investment, output, income, productivity, and exports. The firms' contributions to the nation's wealth and economic progress, however, can greatly be amplified if many more of them are active participants in innovation. Although entrepreneurial firms are often considered innovative organizations, this is not the case with small firms in general.

Innovation is a broad concept that refers to "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005, p. 33). As the definition indicates, the scope of innovative activities is wide and includes organizational creativity in such areas as product/service design, creation, promotion, and delivery as well as managing resources, recognizing opportunities, crafting strategies, and serving customers. Innovation is a viable growth strategy in the business world. It is interesting

to note that as more firms come to realize the importance of innovation to their survival, the demand for individuals to serve in a capacity of chief innovation executive (CIO) has in recent years increased significantly (Pennington, 2008). The purpose of this paper is to highlight the benefits of innovation to small firms, explain the sources of innovative ideas, and discuss the requirements for building innovative capabilities.

BENEFITS OF INNOVATIONS

Innovation, unlike invention, is a lengthy, orderly process that involves a series of coordinated activities, beginning with the inception of an idea, to appraisal, to acceptance, to adoption, to diffusion, and finally to commercialization. The activities require planning, initiatives, skills, cooperation, knowledge, information, and funds. As Pavitt (1991) points out, innovations are firm specific, highly differentiated, uncertain, and involve intensive collaboration amongst professionally and functionally specialized groups. The spirit of innovation should be incorporated into the firm's culture, because the benefits of innovation are immense. Innovation should also be considered a continuous process, and not a once-in-a-lifetime-event. As Williams (1992, p. 29) points out "Innovation can give a company a competitive advantage and profits, but nothing lasts forever. Success brings imitators, who respond with superior features, lower prices, or some new way to draw customers away".

Innovation, particularly pioneering innovation (i.e., first in the industry) can entail enormous risk and disappointment. An innovative product, for example, might be rejected by target consumers, a situation that could lead to substantial investment loss for the firm concerned. Likewise, a major organizational policy/strategy innovation might be resisted by employees and cause internal conflict and resentment. In the majority of cases, however, innovations are worthwhile and financially rewarding, as evidenced by market leadership of such innovative organizations[3] as Apple Inc. and Nvidia Corporation.

A recent trend in the field of innovation (i.e., green operations) is articulated by Nidumolu, Prahalad, and Rangaswami (2009, p. 58) by saying that "Sustainability isn't the burden on bottom lines that many executives believe to be. In fact, becoming environment-friendly can lower your costs and increases your revenues. That's why sustainability should be a touchstone for all innovation". Indeed, the move toward environmentally-friendly production can have far reaching ramifications for small firms: it will create vast business opportunities; but it will also require huge capital outlays, especially for industrial operations, that many firms lack.

The firms' orientation toward innovation is viewed in the literature from three perspectives (Renko, Carsrud, and Brännback, 2009): (i) market orientation (customers are the focus of the firm for its innovative activities), (ii) technological capability (the firm's emphasis is on knowledge, patents, and R&D activities), and (iii) entrepreneurial orientation (the firm's emphasis is on aggressive and pioneering innovation as well as on risky projects). Because of resource limitation and its need to achieve growth, the small firm's orientation should always be

concerned with the target market (i.e., market orientation). In any case, innovations are often realized as a result of management commitment, employees' dedication, as well as resource availability. Benefits of innovations include the following:

Organizational renewal. Innovations give rise to added motivation, vigor, and task fulfillment to employees, because of a sense of accomplishment and anticipated success.

Financial reward. Product/service innovations enable the business enterprise to increase its revenue and improve its balance sheet, because of increased demand. Research shows (e.g., Berwig et al., 2009) that innovative firms outperform their competitors not only during economic prosperity but also during periods of economic downturns. Undoubtedly, innovations in such areas as marketing, finance, strategy, and organizational design, can also enhance the firm's performance.

Productivity gain. Innovation efforts can help increase the firm's productivity and reduce its costs.

Market dominance. Many innovative firms are dominant in their industries and are major players in the market, thereby influencing consumers' tastes and buying habits.

Securing resources. Innovative firms can easily secure external resources (De Clercq and Voronov, 2009).

Exploiting opportunities. Innovations assist firms in exploiting economic opportunities (Smith, Mattbews, and Schenkel, 2009).

Stock price. The stock price of firms that introduce new products or services is expected to increase substantially (Srinivasan et al., 2009).

Organizational competitiveness. For the reasons cited above, innovative firms can grow rapidly and gain competitive advantage.

SOURCES OF INNOVATIVE IDEAS

What are the sources of information about market opportunities that entice firms to come up with innovations? How do firms generate creative ideas for new products, services, processes, strategies, and so on? There are two sources of information that can assist firms in their innovative efforts: external (i.e., outsiders) and internal (i.e., insiders), as explained below:

EXTERNAL SOURCES

The external sources of information for innovation are events, trends, organizations, and individuals. Outsiders can provide important indications or signals concerning existing or potential opportunities that encourage the firm to pursue innovative activities. To benefit from

outsiders, the firm must be in a position ready to gain access to information. This requires the creation of a systematic process by which the firm monitors and analyzes its industry environment to identify attractive opportunities. It also requires the firm to establish strategic relationships with potential contributors such as consumers, suppliers and other firms. In this respect, research shows (e.g., Freel and Harrison, 2006) that such cooperative arrangements are becoming important strategic initiatives for an increasing number of large firms. As an example, Jusko (2008) reports that Kraft Foods has adopted "open innovation" by working with external innovation partners to speed up the process of new products development and introduction. The author indicates that the company has multiple avenues of engaging with its partners (e.g., suppliers), including the deployment of the so-called supplier relationship segmentation assessment. As another example, Nambisan (2009) indicates that the Rockefeller Foundation had a question: "How can you turn a solar-powered flashlight into all purpose room light?" At the time, no one knew the answer. The desired invention/innovation was intended to be used in poor, rural developing countries that lack electricity. The Foundation, then, paired with InnoCentive, a private innovation intermediary company, to ask 160,000 independent inventors worldwide how they could transform the flashlight. The author points out that the inventors were part of a Web-based network of "solvers" that the company has established. An engineer in New Zealand finally came up with a solution for a much powerful flashlight that utilizes the solar battery and LEDs. Likewise, customers can be an important source of creative ideas for the firm. Manjoo (2009) indicates that Twitter instituted its system known as @replies only after Twitterers invented it. The author points out that the users of MySpace have also been a source for the company's innovation efforts.

INTERNAL SOURCES

By instituting proper communication and information gathering systems, firms can receive brilliant ideas form their own employees (e.g., managers, skilled workers). The suggestions might involve both gradual (incremental) and radical (novel, disruptive, pioneering) innovations. Employees have long been recognized as the most important assets for the firm, because they are the source of output and profit. They are indeed an indispensable source for new ideas about goods and services, as well as other organizational innovations. Employees should be encouraged by means of incentives (financial and nonfinancial) to participate in the initiation, diffusion, and adoption of changes through innovation. Incentives can influence the behavior of employees to become more productive, cooperative, and creative. As Rock (2009, p. 62) indicates, "Neuroscience has discovered that the brain is highly elastic. Even the most entrenched behaviors can be modified". Robertson and Hjuler (2009) points out that LEGO Group – toys and games manufacturer –established a leading team called the Executive Innovation Governance Group to guide and strategize the company's innovation efforts. The team divided the responsibilities for innovation across four areas: (a) the functional groups (to

create core business processes), (b) the concept lab (to develop new products), (c) product and marketing development (to develop the next generation of existing products), and (d) community, education, and direct (to support customers and tap them for new ideas). The author says that the creation of the company-wide team has resulted in many benefits for the firm. India's Tata Group, a conglomerate organization that controls 15 large businesses, incorporates innovation as one of nine categories on which employees are evaluated (Scanlon, 2009). The company provides employees with training programs on creative thinking, so that they might think and act like innovators. As the author indicates, the company formed the so called Tata Group Innovation Forum, a 12-member panel of senior executives who oversee the conglomerate's overall innovation efforts.

INNOVATION AND INVENTION

According to Webster's New World dictionary (2006, p, 751) invention is "something thought up or mentally fabricated". As the definition implies, invention is a concept, model, theory, or idea that has not been operationalized (i.e., put commercially into use). As Rossi (2005) says, inventions are meant to appeal to end-users; some solve problems, others improve ways of doing things, still others promise a better life style. There are probably millions of inventions worldwide that are in the pipeline pending their transformation into economically valuable products. Some inventions could take years to become commercially viable. Many inventions, however, may not ever be translated into practice for a number of reasons, including their impracticability or cost consideration. For example, in the field of energy generation, Morse (2009) points out that an invention to produce green crude, that is, to engineer algae to create a "biocrude', cannot yet be economically done. Other inventions that the author mentions in the field of alternative energy that are desired to be translated into innovations are (a) next wave (wave-motion energy), (b) star power (nuclear-fusion), (c) deep heat (enhanced geothermal systems), and (d) eternal Sunshine (orbiting solar cells to capture the Sun's energy). Quite a few inventions have happened accidently. Jones (1991) discusses 40 familiar inventions that came about without prior planning. They include Coca-Cola, chocolate chip cookies, aspirin, penicillin, and x-rays. Eisen (1999) maintains that some inventions and discoveries are suppressed by government agencies, corporations, and the scientific community, because they threaten the dominance of entrenched interest groups. Among the examples the author provides are alternative medical treatment of cancer, Alzheimer's, and other diseases.

As compared to invention, innovation, as indicated earlier, is a process that results in some economically useful output or outcome. Both innovation and invention are essential activities for achieving rapid growth particularly in high-technology fields, as is the case in biotechnology, pharmaceutical, petrochemical, engineering, food processing, and the Internet. Renko, Carsrud, and Brännback (2009, p. 332) point out that "Innovation is the lifeblood of virtually every successful technology-based business". In the high-technology, innovations are

often the translation of inventions. This is not the case for many other organizational innovations, say, in marketing, finance, management, and strategy. Similarly, in low-technology firms, such as insurance, home building, and retailing sectors, innovations are crucial for the business firm but not inventions. Although high technology firms are expected to produce inventions internally on their own, inventions, like innovations, can be outsourced, that is, can be bought or licensed from other organizations or individuals. In some cases, firms arrive at inventions through close cooperation arrangements with outsiders, as is the case with Kraft Foods mentioned earlier.

Some innovations are made popular because of the existence of other innovations or inventions. For example, the car-sharing service called Zipcar is made increasingly desirable for many people (a) with the use of the iPhone or the Internet to enable the company's community members to make reservation, (b) the use of the iPhone to locate the car in a parking lot, and (c) the use of the iPhone or the Zipcard to open the car's door. As Keegan (2009) points out, the Zipcar community consists of 324,000 members as of August 2009, and the innovation, because of its success throughout the United States, is attracting imitators such as car rental companies.

For many products, the relationship between invention, innovation, and market adaptability is inextricably linked. To succeed, innovation must be workable, adaptable, and profitable. Lilienthal – the German builder of gliders who lived during the 1848-1896 period, said "To invent an airplane is nothing. To build one is something. But to fly it is everything", as quoted by Caillavet (2009).

TYPES OF INNOVATIONS

The process of innovation is not uniform across all industries and economic sectors. It differs from industry to industry and from firm to firm. This is partly due to the fact that the outcomes of creative ideas vary among industries, and partly because organizations follow different paths in pursuing innovations. For example, the outcomes of innovations in the pharmaceutical field are medical drugs, while the outcomes in the Internet arena are often software. Moreover, the methods, procedures, and resources required for innovations differ in both industries. Because of differences of outcomes as well as approaches employed, it is imperative for the forward looking small firms to understand (a) the business they are in, (b) the market they serve, (c) the attractiveness of opportunities, (d) the kinds of innovations needed, and (e) best innovation practices.

Innovations are typically classified into categories mainly to assess the contribution of each type to the firm's performance. Two widely used classifications are indicated below. First, Damanpour and Evan (1984) distinguish among three groups of innovations:

Technological innovations (resulting from the use of technology);
Technical innovations (related to the primary function of the organization); and
Administrative innovations (that take place in the social system of the organization).

Second, the OECD (2005) classifies innovations into four groups:

Product innovations (significant change in goods or services' capabilities);
Process innovations (significant changes in production or delivery methods);
Marketing innovations (implementation of new marketing methods); and
Organizational innovations (implementation of new organizational methods).

The classification of innovations into different categories is a useful scheme particularly for the purpose of developing strategies for individual organizational functions. For instance, management might want to craft a strategy for product/service innovation, a strategy for marketing innovation, and so on. To simplify the discussion, however, no distinction is made in this paper among the different categories referred to above. The term 'organizational innovation' is used here to indicate all kinds of innovative activities that take place within the business enterprise. This is because it is difficult, if not impossible, to precisely calculate the impact of each kind of innovation on the performance of the enterprise. After all, internal innovations are interrelated and intertwined activities.

WHEN AND WHAT TO INNOVATE

In general, creative efforts of small firms should be directed toward gradual rather than radical innovations during the early stage of formation. The reasons for a cautious approach to innovation are the following:

- The great majority of small firms are constrained by limited funds, skills, experience, as well as market horizon.
- The cost of innovation failure, especially for a new product introduction, can be prohibitive and demoralizing to the firm.
- Radical innovations can jeopardize the firm's success, because it will divert critical resources, including management attention, from the more immediate and urgent tasks.
- Radical innovations usually come about as a result of a lengthy process of learning, networking, information gathering, and knowledge creation. Many newly established firms are yet to go through the cycle of building organizational creativity, competency, and devotion

What type of innovation should a small firm pursue? What should the innovation priority be? Let us point out first that some firms are born to be doomed soon after birth. According to the U.S. Department of Commerce (2009, p. 492), the number of 'firms death' was 565,700 firms during the 2004/2005 period, as compared to 553,300 firms during 2000/2001, an increase

of 2.2 percent. This means that about 1,550 firms went out of business every day of the week during the 2004/2005 period. The low survival rate implies the absence of innovation practices for a large number of small firms. Some of these firms could have survived had they become proactive in the sense of being forward-looking, opportunity-seekers, and acting in anticipation of future demand (Rauch, Wiklund, Lumpkin, and Frese, 2009).

In addition to the lack of innovations, the disappearance of firms from the marketplace can also be attributed to the following reasons:

Lack of funds;
Intensity of competition;
Poor planning;
Unsuitable products or services; and
Mismanagement of resources.

To clarify the call for a cautious approach to radical innovations, it is worthwhile to refer to the five stages model of small business growth introduced by Churchill and Lewis (1983). In this model, the authors believe that small firms go through five states:

Existence (owners' emphasis is on creating customers and delivering the product);
Survival (emphasis is on the relationship between revenue and spending);
Success (emphasis is on growth);
Take off (emphasis is on financing rapid growth); and
Resource maturity (a company with such advantages as size, managerial talents, and financial strength).

Within the framework of this model, it would be a good idea for the firm to begin its (gradual) innovative efforts during the survival stage (i.e., the second stage) in order to increase its chances of staying in business. As the firm moves toward the third stage (i.e., success), gradual innovations should be an essential component of its strategic initiatives. In the final stage, (i.e., resource maturity), radical innovations could occupy a central stage in the firm's overall strategy.

Now, which aspect of the firm's functions should be the subject of innovation? How are resources to be allocated among day-to-day tasks and those functions that need to be substantially improved? It is recognized in the literature that, for small firms, owner's intentions play the dominant role in his/her innovation strategy. Owner's intentions refer to the individual's "states of mind that direct attention, experience, and action toward a business concept" (Bird, 1988, p. 442). It is crucial that owner's intentions be guided by a systematic approach as indicated below (also depicted in figure 1):

First, analyze the firm's internal strategic resources (e.g., skills, technology) and its industrial environment (e.g., competition, consumer demand). The purpose of the analysis is to identify the firm's strengths, weaknesses, and market opportunities (e.g., David, 2009).

Second, develop vision, mission, and major goals for the firm. The aim is to define the firm's business, outlook, market niche, and target market (e.g., Thompson, Strickland, and Gamble, 2010). This and the previous step can guide businesses in formulating innovations strategies.

Third, create a business strategy to plot, among other things, the firm's innovation path. The plan should be designed on the basis of:

The strengths/weaknesses of the firm;
The firm's market position relative to major competitors;
Intermediate goals (i.e., one to two years into future);
Planned actions to reach the goals;
Detailed resource requirements for the plan;
An inventory of resource imbalance (i.e., the gap between existing and needed resources);
Resource settlement (e.g., sources of funds to be obtained, talents to be acquired); and
A timetable for translating the plan into action.

Fourth, on the basis of the firm's overall innovation strategy, develop 'mini' innovation strategies for key aspects of the business: product/service, human resources, marketing, organizational structure, and so on. Adopt at least one quantifiable objective for each mini strategy to gauge performance. Mini strategies can be developed in stages, as resources permit.

Fifth, prioritize the implementation of mini strategies. A useful criterion for prioritizing mini strategies is the anticipated influence of the strategy on the firm's performance, say, in terms of increased sales, output, market share, or productivity.

Sixth, allocate a reasonable portion of available resources to the implementation of the chosen mini strategy. More resources can be added as they become available, and as more mini strategies are selected.

Seventh, estimate periodically the influence of innovative efforts on the firm's performance. Appropriate actions can be taken in light of the estimation.

Among the ingredients in organizational innovation is an understanding of the kinds of strategic resources needed by the firm, and measures necessary to eliminate the resource imbalance, if any. As the imbalance is eliminated or considerably reduced, the next move is to generate, assess, diffuse, and adopt innovations as prioritized. Clearly, it is unreasonable to expect employees to bring forth creative ideas, and translate them into practice, while they are under tight work schedules and strict deadlines. As indicated earlier, knowledge accumulation is a vital input for innovation, and it comes with the passage of time through experience,

acquisition of talents, collaborative efforts, and learning. The firm can engage in ambitious innovative projects as its strategic resources grow and become more robust.

A question might be asked: How much does it cost a small firm to innovate? It is difficult to address the question because the cost depends on a number of factors, including, the type of innovation (e.g., incremental versus radical), the firm's industry, and the source of innovation (internal, external, or cooperative). Nevertheless, Evangelista et al. (1999) provide an insight into the distribution of cost for product and process innovation for European firms of different sizes, as indicated below:

50% of innovation expenditures were spent on the adoption and diffusion of technologies such as machinery and equipment;
20% of innovation expenditures were directed toward R&D activities;
10% of innovation expenditures were absorbed be design activities;
11% of innovation expenditures were spent on trial production; and
9% of innovation expenditures were absorbed by miscellaneous activities.

Figure 1
Generating Innovation Strategies

MANAGING RESOURCES CREATIVELY

The purpose of innovation is to improve the firm's performance via superior competitive advantage. Innovation is therefore need-driven, customer-focused process (Moscynski, 2009). An important aspect of this process is the efficient deployment of resources. Innovative firms manage their resources wisely, and creatively. Guiding principles for resource management include the following:

Resources are acquired on the basis of their anticipated contribution to the firm's innovative efforts, and not only because of immediate needs for them. The rule of thumb is that an acquired resource is expected to add strategic value to the firm's existing resources.
Division of labor should be based on a broad array of functional specialization, rather than razor sharp specialty.
Professional interaction, cooperation, team work, and communication ought to be nurtured in the context of a flat, flexible organization structure.
The firm must espouse beliefs in professional development, collegiality, trust, honesty, customer service, and excellence.
Networking relationships with outsiders such as customers and suppliers should be encouraged and treasured.
Employees should enjoy an enviable work environment to be motivated and committed.
Job promotion should be from within and on the basis of merit as an incentive for increased employees commitment and productivity.

AUGMENTING COMPETENCIES

The road to organizational excellence for the small firm is to build its own innovative competencies gradually. Innovations are typically introduced, adopted, and carried out by individuals within organizational settings (Shane and Ulrich, 2004; Moscynski, 2009). It is imperative, therefore, that managerial decisions concerning the firm's competencies are directed toward promoting employees' abilities. This of course does not imply a minor role for technology in innovation. Methods to augment internal competencies include the following courses of action:

Hold idea generating meetings.
Assist employees in improving their strategic thinking.
Form goal-oriented teams.
Idea generating meetings

Soliciting employees' ideas is perhaps one of the most effective methods for engendering innovations. Idea generating techniques could be carried out within the framework of de Bono's (1985) six thinking hats. This framework appears to be fruitful, time saving, and keep the discussion in meetings focused on important issues. Areas of idea generation in meetings among managers, supervisors, and others might focus on the following:

New or improved output;
Productivity, revenue, and performance measures;
Approaches to capture market opportunities;
The firm's structure, policies, procedures, and beliefs; and
Management style.

According to de Bono (1985, p. 2), "the six thinking hats is a concept that allows thinkers to do one thing at a time. He/she will be able to separate emotion from logic, creativity from information, and so on". The thinking hats have six distinct colors:

White hat – the assessment or thinking is neutral and objective in dealing with issue under consideration;
Red hat – the assessment is characterized by anger, rage and emotions;
Black hat – assessment is negative by pointing out, for instance, the drawbacks or risks associated with the issue;
Yellow hat – the assessment is positive and optimistic;
Green hat – the assessment is creative and full of new ideas; and
Blue hat – indicates the organization of thinking and control.

On the basis of the six thinking hats, and in discussing possible innovative efforts, participants can switch in and out of different hats, as directed by the group leader. For example, he/she might ask participants to put on the white hat (e.g., dealing with facts and figures of the issue under discussion), or the black hat (e.g., providing reasons for saying it cannot be done), or the red hat (e.g., participants' hunches, intuitions, and emotions), and so forth. In this way, creative ideas can be generated in a logical, orderly manner.

STRATEGIC THINKING

Strategic thinking is a mental self-empowerment that helps individuals to develop their own ability to analyze situations, solve problems, and make decisions. Strategic thinkers are creative people who can assist their firms by providing invaluable suggestions for new and improved goods and services, as well as other ideas for organizational innovation. The benefits of strategic thinking to business firms are widely recognized in the literature. For example,

Graetz (2002, p. 456) points out that "Strategic thinking is seen as central to creating and sustaining competitive advantage". Methods to enhance strategic thinking of organizational members include the following (Alsaaty, 2006, p. 16):

Engage in reflective thinking;
Let your imagination run freely;
Avoid recycling the same solutions for different situations or problems;
Assess relevant issues and assumptions;
Prioritize goals, tasks, and strategies;
Look at surroundings for different perspectives;
Know the situational forces.

In the context of strategic thinking, de Bono (1967, p.7) believes that "The long years of education are mostly concerned with knowledge. Fact is piled upon fact and little if any time is spent with basic techniques of thinking". The author also makes a distinction between 'vertical thinking', that is, digging the same hole deeper, and 'lateral (i.e., strategic) thinking', that is, thinking in a variety of paths to generate a new or better approach to the problem under consideration. In order to improve the thinking process, de Bono recommends the utilization of a number of techniques, including (a) simplifying method – looking at the problem in different ways, (b) staging method – solving problems stage-by-stage, and (c) chance method – solving problems through trial-and-error. Other techniques that help individuals to improve their thinking power include brainstorming, blocking, what iffing, attitude analysis, morphological analysis, reversal, analogy, and trigger concepts (Harris, 2000). Indeed, the individual's ability at problem solving and decision making can greatly be increased by learning some of these techniques. The firm can assist its employees to boost their thinking capabilities through training programs and formal education designed for this purpose.

GOAL-ORIENTED TEAMS

As mentioned earlier, innovative activities are largely team efforts in the business world. Goal-oriented, well-organized, teams are believed to be highly effective in the inception, assessment, introduction, and adoption of innovations. The effectiveness of such teams comes about as a result of their ability to identify opportunities, share information, collaborate, and develop creative ways to problem solving (LaFasto and Larson, 2002). Formal teams do not exist accidently; they must be created by managerial decisions. Team formation can be facilitated if the firm's cultural environment is conducive to team building and group efforts. Management can strengthen team performance by implementing the following guidelines (Hackman, 2002):

Assemble a team that possesses the necessary skills for the task;
Set a clear and challenging goal in carrying out an innovative task;
Ensure organizational support for the team; and
Provide appropriate coaching and resources for the team.

As the firm grows in size, it may also need to utilize social networking software and other means to facilitate collaboration and exchange of ideas among team members as well as between the firm and outsiders. The social networking software is being increasingly employed especially by mid-and large-sized companies, because of its utility and efficiency. As an example, Lamont (2009) points out that Cisco Systems, Inc. used Brightidea, a hosted service, to manage ideas submitted for its I-Prize competition. Ideas submission, discussions, and meeting were all done on the Website. Jouret (2009) provides interesting details about the I-Prize competition that owners of small firms might want to review. The author indicates that the competition called for an idea to be compatible with Cisco's Internet technology strategy. The purpose was to build a new billion-dollar business around the winning idea. The competition attracted about 2,500 individuals from 104 countries who submitted more than 1,200 ideas. In the final analysis, the idea to create a "smart" electricity grid won the contest. Its owner received $250,000 in prize money. Resorting to external sources of innovation could be a rewarding experience for the firm.

Recent years have witnessed the emergence of an increasing number of social networking sites that firms as well as individuals can use for a variety of purposes. Keely (2009) mentions some of the popular sites and says that many CPAs firms, for instance, are using Facebook for recruitment purposes. The author also discusses other Websites such as Twitter, MySpace, Meetup, Affluence, and Yelp, as means to reach out to outsiders. Reklaitis (2009), moreover, points out that analysts believe that Starbucks is a leader in getting ideas from customers via its MyStarbucksIdeas.com. As of August 2009, the company had received 80,000 suggestions about its service operations, according to the author.

Not all of the firm's innovative projects are adopted and diffused. An innovation must be subject to a rigorous test of relevance, endurance, and profitability. This is because product innovation in particular are time consuming to introduce, and costly to produce. For instance, at Whirlpool, the world's largest appliance-maker, an innovation must withstand three-pronged definition (Scanlon, 2009): it should meet consumers' need, it should have the breadth to become a platform for related future products, and it should contribute to the company's earnings. In addition to assessing innovations prior to adoption, many firms also assess the impact on the organization of innovations that were already undertaken. This is done often by the use of some sort of "scorecards" measures. Mankin (2007) summarizes the most popular sets of factors included in scoreboard, as follows:

The number of new ideas that resulted in resource commitment in the firm;
Return on investment for innovations;
The number of senior executives who implemented new ideas that created value; and
Long-term customer of adoption the firm's innovations.

In a survey conducted by R&D Magazine about the criteria that organizations ought to use to measure innovation success, the respondents came up with fourteen factors, the most important of which are the following (Studt, 2005):

Ability of new products to solve customer's problems;
Commercial success of new products introduced;
Competitiveness of new products;
Technological capabilities of new products;
Profitability of the organization;
Ability to create new markets;
Number of new products introduced; and
Market share of the organization's new products.

BIRD'S-EYE VIEW OF SOME RECENT INNOVATIONS

Realizing that students seek flexibility and convenience in learning, Creative Tutors –a small tutoring enterprise in Texas – adopted an innovative approach to tutoring whereby tutors meet students at their homes, libraries, sports facilities, and other public places to accommodate clients' busy schedules. The enterprise also offers online tutoring (Genn and Kestenbaum, 2008).

Atal (2009) says that, OpenTable – the online reservation service company – went public on the Nasdaq stock market in May 2009. The company's innovative business model is that, for a monthly fee of $199, restaurants can rent a computer terminal and network connection in addition to paying $1 per diner seated via the company's website. Real-time map of the restaurant's floor is provided showing how many tables are free and when other tables will be available. The initial public offering helped the company receive $60 million.

The Economist (2009), in an article about the ubiquitous use of cellular telephones worldwide, points out that there are about three billion mobile phones utilized in developing countries. The devices compensate for inadequate infrastructure, help transmit critical information, and make business transactions possible. The widespread use of the devices has opened new market opportunity for innovative firms in these countries. According to the Economist, the opportunity is mobile money, whereby cash can travel as quickly as text messages. In this business model, small retailers across a country act as like bank branches; they took cash from individuals and, by sending a text message, credit it to the individuals' mobile money account. The individual then can transfer the money (again via text message) to other

registered users who can withdraw it by visiting their own corner shop. The most innovative firm in developing countries that takes advantage of this market opportunity is M-PESA – a subsidiary of Safaricom of Kenya. It has about 7 million subscribers in a country of 38 million people. The company's service is used to pay for many cash transactions, including taxi fare, college tuition, and money transfer to relatives.

The practice of generating innovative products, services, and tools with the help of outsiders (e.g., customers, inventors, etc.) has become a standard policy of many growth-oriented firms. For example, Netflix – the movie rental e-tailer – awarded in 2009 $1 million prize to a group of mathematicians and statisticians for their contribution in developing a digital tool to improve the movie recommendations that the company make to its more than 10 million customers (Copeland, 2009).

In order to survive 'cut-throat' competition, some small-and mid-sized firms must come up with innovative business models. This is exactly the case with ARM, a British designer of microchip for cellular telephones and other devices. According to Fortt (2009), Intel Corporation – a formidable competitor to ARM – designs and builds all its own chips. Moreover, it uses its market dominance to influence how PCs function. Unlike Intel, ARM's business model is to license it blueprints to manufacturers of cellphones and other producers and encourage them to build whatever they desire. This kind of flexibility, coupled with quality chip design, has made the company profitable and successful.

CONCLUSION

The United States is a fertile land for millions of small firms. Entrepreneurial ventures from different countries, including China, India, the United Kingdom, and Nigeria are also enticed by the domestic market, and its high growth prospects. The county's business environment is attractive, opportunities are plentiful, and national resources are abundant. The business environment is conducive and receptive. As a result, the contribution of small firms to the nation's employment and output is impressive, and rapidly rising. Some of the firms (i.e., entrepreneurial ventures) are highly innovative, growth-oriented, and successful. They are active participants in the introduction of new or improved goods and services. The majority of firms are, however, mediocre exhibiting a lack of innovative products and organizational excellence.

Innovation is essential for business firms of all sizes. As Brown (2009) elaborates, the center of economic activity in the United States has shifted from manufacturing to knowledge creation and service delivery, innovation therefore has become a survival strategy. New ideas are the source of innovation. Encouraging employees to generate ideas to improve the performance of the firm is of critical importance. Of course, ideas need to be carefully screened and selected. For instance, a few thousands new equipment ideas and procedures were tested at McDonald's Innovative Center in 2006, but only 15 were adopted for deployment throughout the chain (Penttila, 2007).

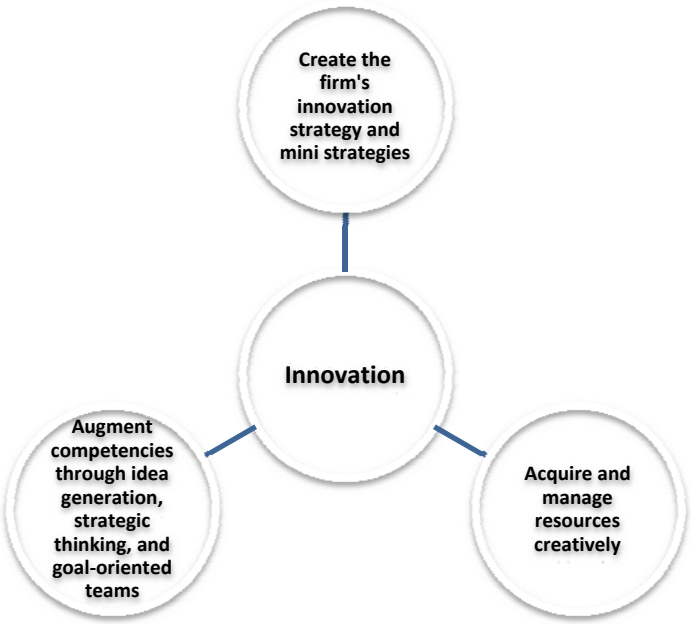
Contrary to popular views, innovation is not confined to large, multinational organizations; it is open to all firms, industries, and economic sectors worldwide. As Studt (2004) indicates, for example, a study by Microsoft Corp. shows that the leading source of software innovation in the world is Chinese small firms. Successful innovative efforts demand a dedicated managerial leadership with a vision to transform the workplace into a team of committed, productive, and creative employees. The task is daunting because innovation is a long-term systematic process that necessitates planning, learning, and funding. In this paper, an attempt is made to build up a model that shows the basic requirements for building innovation capabilities for small firms. The model, which is also summarized in figure 2 below, consists of three main components:

Designing a broad innovation strategy for the firm as well as mini innovation strategies for its functions;

Acquiring and managing resources creatively; and

Creating internal competencies for organizational members by utilizing such techniques as idea generation and espousing values that support innovation, in addition to implementing training and professional development measures.

Figure 2
A Model for Building Innovation Capabilities in Small Firms



NOTES

In this paper, no distinction is made between small business firms and entrepreneurial firms, because of lack of statistical data in this regard.

The data provided by the United States Small Business Administration/Office of Advocacy for 2006 show that the number of firms with employment of less than 100 individuals was 5,913,496; while total firms in the economy was 6,022,127. On the other hand, employment by firms with less than 100 employees was 42, 686,395 individuals, while total employment by all firms was 119,917,165 individuals. See, www.sba.gov/advo/research

Some scholars believe that a few ostensibly beneficial innovations turn out to be very harmful to society. Peter Cebon (2009), for instance, contends that innovations in the financial sector (e.g., new ways of lending money and security creation) played a key role in the financial crisis that swept the United Stated and the world in recent years.

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THE WHOOP CURVE: PREDICTING ENTREPRENEURIAL AND FINANCIAL OPPORTUNITIES IN THE PERFORMING ARTS

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ABSTRACT

Success in the performing arts is measured, like all industries, financially. And, because of the financial motivation, prediction of talent's success is a large endeavor throughout the industry. The authors introduce an approach for the prediction of success of an entrepreneurial endeavor known as the "whoop curve." Based on constructs, the curve measures consumer's emotional preferences in order to identify artistic entrepreneurial opportunities and financial profits. The constructs are weighted to form an efficient "probability forecast" or "whoop curve." The proposed weights are related to the correlations based on how quickly or slowly the acts and their recordings are able to gain rankings given the strength of emotional connections consumers have to the act. Finally, an example implementation of the approach is applied using Microsoft Excel.

> *"If I were not a physicist, I would probably be a musician. I often think in music. I live my daydreams in music. I see my life in terms of music."*
>
> Albert Einstein (Songwriters Resource Network, 2010)

> "*If we do our job...Music's not black or white, it's green."*
>
> Jim Caparro, PGD (Knab, 2001)

> *"The music business is a cruel and shallow money trench, a long plastic hallway where thieves and pimps run free and good men die like dogs. There's also a negative side."*
>
> Hunter S. Thompson (Rudolph, 2010)

INTRODUCTION

A performance art product such as a film, sculpture, painting, musical recording or live concert emulates what we are often thinking, our hearts are feeling and our souls are judging. We often express, through our selection of artistic products, our introspective emotional thoughts

by laughing, crying, feeling heartbreak, love, sadness, longing and other emotions we can sense or feel. Determining demand for performance art is thus complicated; it is based on emotions. One person may experience a film, computer game, recording or a live performance as positive and exciting, while another may find it revolting and still others may not even notice. It's the same for those who create, own, and manage the acts, recordings, videos, films, computer games, cell phone applications and songs we love, hate and ignore.

While preference formation is complicated, there is a financial motivation for its prediction. The entrepreneurs behind the artists or the entrepreneurial artists themselves are financially motivated to create entertainment products that satisfy consumer wants and needs (emotions). Additionally, they are encouraged to economize on products that have a high probability of not satisfying consumers. Towards this end, the authors develop a framework for entrepreneurial evaluation of entertainment products. The framework which we label "the whoop curve" represents an estimate of the ex-ante probability of success of the entertainment product. By whoop curve, we mean to say a relationship that predicts the current and future *enthusiasm* of an entrepreneurial product. We illustrate that these probabilities can be derived by considering the revealed strength of the emotional connections consumers have to the act.

The whoop curve model has two beneficial characteristics. First, the actual measure of success is a probability that some defined benchmark outcome will be achieved at a future specified date. The benefit of this feature is that probabilities are easily understood. Second, the benchmark of success can be modified to fit the entrepreneurial activity. In our example, we adapt the model to the music industry where success might be measured by unit sales at some future date. However, it can be adapted to include ticket sales, tour dates and other measures of success.

The technique used to derive the whoop curve is not new. Called *duration analysis* in other fields (i.e. engineering, economics and sociology), this method is a time honored and well established statistical technique (Hosmer & Lemeshow, 1999; Hald, 1990; Lancaster, 1997; Van den Berg, 2001). Our contribution is to develop, at an introductory level, the technique and concepts of duration analysis applied to an entrepreneurial problem in the music industry. Following Genc's (2004) duration modeling for introductory econometrics, an example problem is worked out using Microsoft Excel; a software program accessible to entrepreneurial students and music industry practitioners. Our choice of the whoop curve terminology (as opposed to duration analysis) is intended to signal that the topic can be easily incorporated into undergraduate entrepreneurial curriculum.

The paper is structured as follows. The next section develops the entrepreneurial problem. Section 3 introduces the whoop curve. An example of the derivation of the whoop curve employing Microsoft Excel is developed in Section 4 and Section 5 concludes.

THE ENTREPRENEURIAL PROBLEM

The traditional entertainment and performance arts industries are large and complex. They are a collection of artists, entertainment conglomerates, film companies, record labels, consumers, the mass media (radio, television and print), cell phone networks, and Internet portals that together form the industry. There are local, regional, national and world markets. The artists are typically composed of songwriters, musicians, producers, recording artists, singers, audio engineers, graphic artists, actors, film directors, union members, and computer technicians.

For the purpose of this paper, we consider the entrepreneurial problem of *record labels*. They have to find and sign artists to their labels and songs to their publishing companies. They provide hundreds of thousands of dollars to recording artists to pay for advances, producers, musicians, audio engineers, background singers and studio rental time. Additionally, they provide money to market the recordings to various types of consumers through promotion, publicity and distribution to retail outlets. Labels range in size from worldwide distribution companies (entertainment conglomerates), such as *Bertelsmann, Disney, Sony, Universal, and TimeWarner* to the one-person operation that offers digital downloads over the Internet.

According to the *Bureau of Economic Analysis' Survey of Current Business* (2010), personal consumption spending on entertainment and recreation is a large part of the U.S. economy representing $929.3 billion real dollars in 2009. This is approximately 7% of our $12.9 trillion dollar U.S. economy when adjusted for inflation as measured by the Gross Domestic Product (GDP). During the same time period, the Recording Industry Association of America (2010) reports that the music industry accounts for $7.7 billion dollars or about 1 percent (0.06%) of the U.S. economy.

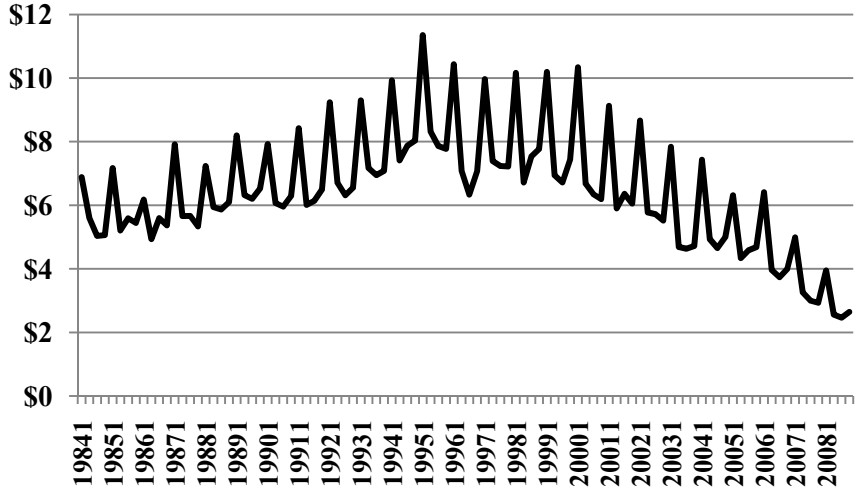
Figure 1 illustrates *U.S. Bureau of Labor Statistics' Consumer Expenditure Survey* (2010) data of mean quarterly household consumption spending on physical platforms (records, CDs, audio tapes), 1984-2008. We see that since 2000 the households in the sample have dramatically reduced their consumption of physical platforms. Presumably, the lost revenue has gone to online streaming, downloaded files, and piracy. In fact, research appears to support this conclusion (Andersen & Frenz, 2008; Bhattacharijee, et. al., 2005; Dejean, 2009; IIPA, 2010; McKenzie, 2009; Peitz & Waelbroeck, 2004; Stevans & Sessions, 2005; Zetner, 2006).

The large size of the entertainment and music industries and the impact of technological innovation suggest two main points. First, there exists a financial motivation for predicting talent success; a small proportion of a large market results in high revenues. Second, while technological innovation has negatively impacted revenues, it has also created a means to better track consumer preferences and thus their emotional connections to the act.

There are several examples of how technology can allow entrepreneurs to estimate consumer preferences. For example, data collected from per-to-per (P2P) search queries, Billboard charts, Nielson SoundScan, website hits, and social networking sites represent revealed consumer choices. Some recent examples of the use of these data in various studies include

Andersen & Frenz (2008), Bhattacharjee, et. al. (2005), Bradlow & Fader (2001), Koenigstein, Shavitt & Zilberman (2009), Liebowitz (2007), Oberholzer-Gee & Strumpf (2007), and Stevans & Sessions (2005).

Figure 1
Mean Household Spending on Physical Platforms, 1984-2008



Source: United States Department of Labor, Bureau of Labor Statistics, Division of Consumer Expenditure Surveys, 1984-2008 (2010).

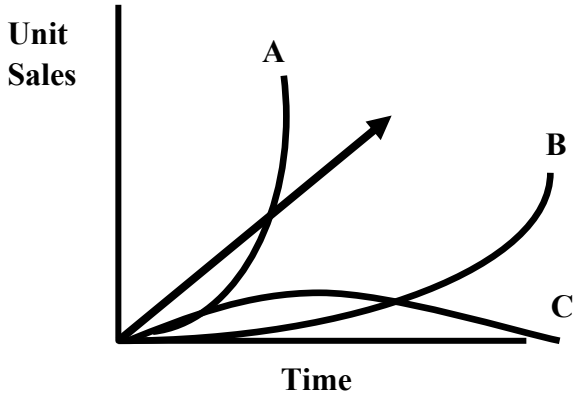
Traditional ways of identifying talent include tracking consumer trends through demographic and psychographic research. Demographic research is an analysis of comparison based on gender, age, income, and education. Psychographic research is a deeper analysis that groups individuals by their lifestyles tied to zip codes. The results are used by labels to market tours, corporate sponsorships and merchandise. However, shouldn't there be a way to predict success for labels *before* they sign an act and spend the money? And, once they are signed, what is the likelihood that they will be successful in a given time period?

The tools of economics and access to new data (i.e. P2P search queries, SoundScan, social networking sites) can be used to help answer the prediction of success problem. While it may be difficult to predict emotional responses to performance arts presentations and products, consumer preferences for those products and services are revealed in terms of units sold, tickets purchased, or venue attendance. These revealed preferences can be proxied by web page hits, air play, online streaming, social network hits and publicity hits, for example. Therefore, applying the tools of economics and utilizing accessible consumer data, the authors are able to predict the preferences illustrated in the whoop curve model in the following section.

THE "WHOOP CURVE"

Figure 2 illustrates the essential prediction problem: possible artist outcomes. The vertical line displays the success of the artist that can be measured in a variety of ways (the example utilizes unit sales). The horizontal line indicates time. The 45 degree line represents the investment project line. A curve extending above the 45 degree line indicates acceptance of the entertainment products. A curve extending below the 45 degree line indicates rejection over time. To be more specific, Line A illustrates a type of powerful emotional response by consumers. This of course, indicates the act is already being noticed and accepted by consumers. Artist development time, marketing and promotion will be shorter and potential profits are greater. Line B illustrates that the act is becoming successful yet it has taken far too long and lies below the investment project line. Thus, the act is being noticed, yet it is still not popular enough to be signed, as the label cannot make any profits. Sadly, Line C illustrates the act had some emotional connection to consumers, yet it quickly faded and would not even be considered.

Figure 2
Possible Artist Outcomes



The tension for the entrepreneur is that the success curves are not known before the endeavor is undertaken. That is, it is unknown which curve the artist will eventually be on. Over time the artist's success (or lack thereof) will be revealed. However, as previously stated, industry pressures make prior prediction of the direction essential. For the prediction problem, the authors suggest using variables to explain the likelihood of success and thus develop "the whoop curve". Much like *Forbes Magazine* uses to determine their Celebrity 100 List, our approach is similar in spirit. For example, the Forbes list includes salary, TV/radio, press rank, web rank and social rank. Our procedure uses conceptual benchmarks such as past units sold, web page responses, publicity hits in local or national media, events, tours or shows, social websites and broadcasts or digital streaming as predictive variables. These data are available

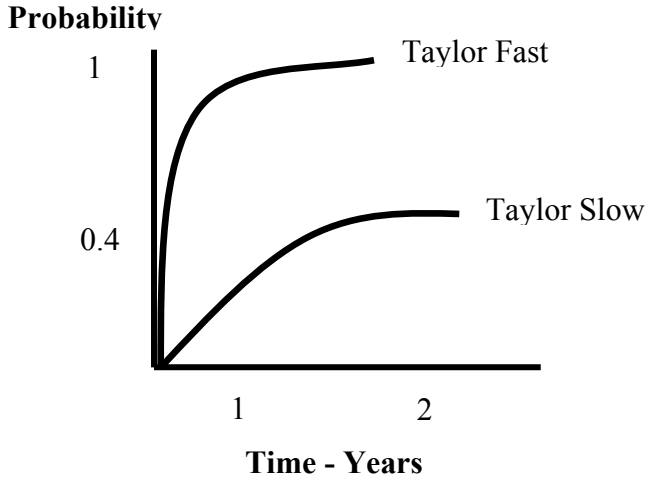
through such sources as Nielson SoundScan, Broadcast Data Services (BDS/The Monitor), Billboard Charts and Big Champaign.

Unlike the Forbes ranking, however, the whoop curve probabilistically weights the predictive variables by correlations based on how quickly or slowly (weeks or months) the acts and their recordings are able to gain rankings based on the strength of the emotional connections consumers have to the act (displayed by the purchasing, using or stealing of the acts products).

To demonstrate the predictive problem, consider the release of a recording by two previously unknown artists - Taylor Fast and Taylor Slow. Initially, Taylor Fast has 25,000 social network hits on her website from individuals interested in her music. Alternatively, Taylor Slow has only 250 network hits. Based on this information the label (large conglomerate or one-man show) is trying to determine how successful each will be within two years. Success is defined as unit sales exceeding 500,000 by two years. The probabilities of their successfully achieving the goal of 500,000 unit sales within one and two years are plotted against time in Figure 3.

Based upon the example, Taylor Fast gains consumer acceptance quickly; the probability that she will achieve the entrepreneurial goal is almost 100% after one month. Taylor Fast's unit sales are represented by Line A in Figure 2. Taylor Slow never really gains consumer acceptance. As such, Taylor Slow's unit sales look more like Line C in Figure 2. Figure 3 is indeed the whoop curve; the probabilistic weights of success. If you are entrepreneurial, who would you be more "whooped" about after 1 month? Who would you be more "whooped" about after a year? Which artist would you be more likely to spend your time and resources on?

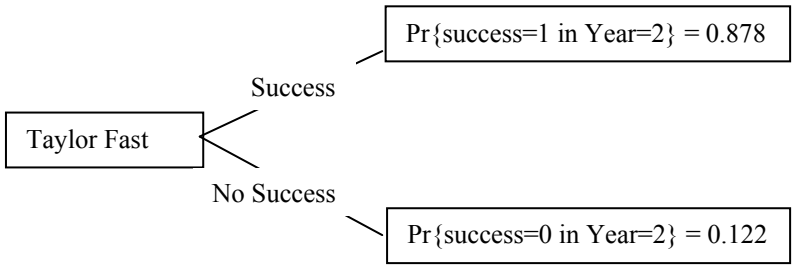
Figure 3
Probability of Meeting Unit Sales Goal:
The "Whoop Curve"



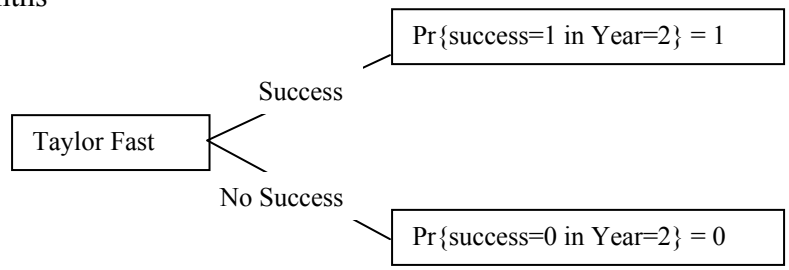
Because the whoop curve measures probabilities over time, the curve can be illustrated in other intuitive ways – perfect for classroom illustration. One method that illustrates the essence of the whoop curve is decision tree analysis. Figures 4A and 4B illustrate the decision tree representation for the probability of success (in terms of consumer acceptance) in 1 month, 12 months and 2 years for Taylor Fast and Taylor Slow, respectively. Like the whoop curve, decision tree analysis provides a basis of comparison between the two artists. Taylor Fast's probability of success rises with each time period more rapidly than Taylor Slow's probability of success. In fact, within 1 month Taylor Fast is highly likely to reach the goal of 500,000 units sold while Taylor Slow is likely to never reach that goal. Obviously the keys to Figures 4A and 4B are the probabilities.

Figure 4A
Decision Tree Analysis for Taylor Fast

1 Month



12 Months



2 Years

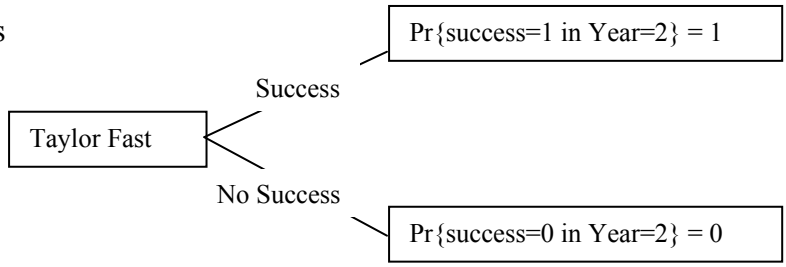
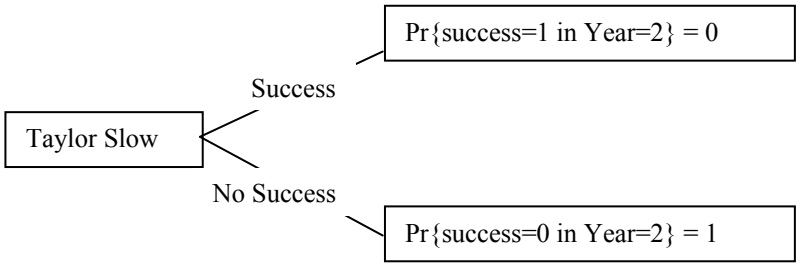
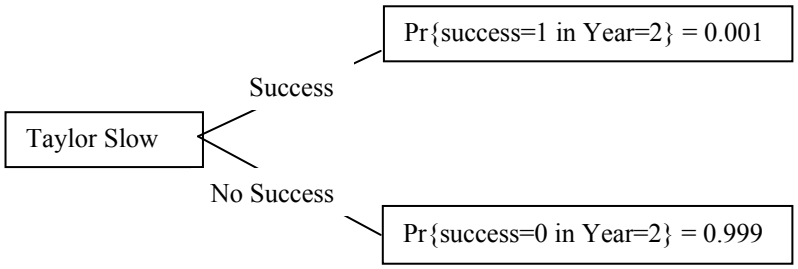


Figure 4B
Decision Tree Analysis for Taylor Slow

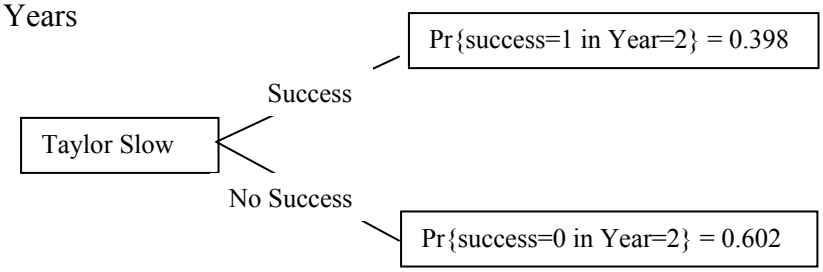
1 Month



12 Months



2 Years



By applying the predictions of the whoop curve, entrepreneurial efforts could shift from using costly traditional marketing, promotion, and publicity campaigns to help consumers *discover* new acts towards a more favorable decision making process of artist selection. Thus, industry leaders improve their decision making ability and ultimately improve their profit margins. The next section illustrates how to estimate the probabilities, and thus the whoop curve, so that if you are an entrepreneur, you can determine who to be "whooped" about.

DERIVING THE WHOOP CURVE USING MICROSOFT EXCEL: AN EXAMPLE

To illustrate how the whoop curve is derived, the authors construct a hypothetical example using the data presented in Figure 5. The columns within Figure 5 represent previous artists (Taylor A through Taylor M), the length of time to achieve the goal of 500,000 units sold, whether the goal was reached within 24 months, and the number of social website hits. The table shows that the artists with the majority of social website hits, on average, successfully and rapidly attained the goal within the specified period of time.

Figure 5
Hypothetical Data Set

A1 f_x The Data

	A	B	C	D
1	The Data			
2		Months to	Attained	Social Web
3	Name	500,000	Goal	Hits (thsands)
4	Taylor A	1	1	25
5	Taylor B	2	1	15
6	Taylor C	3	1	16
7	Taylor D	7	1	10
8	Taylor E	10	1	6
9	Taylor F	12	1	5
10	Taylor G	14	1	4
11	Taylor H	19	1	3
12	Taylor I	20	1	3
13	Taylor J	22	1	2
14	Taylor K	23	1	1
15	Taylor L	24	0	0.5
16	Taylor M	24	0	0.25
17				

The correlations between the explanatory variable (social website hits) and the attainment of the goal can be exploited to derive the whoop curve via the theory of maximum likelihood. In this case, the likelihood function is known in other fields of science as a Weibull distribution (Lancaster, 1997). The log-likelihood function defined on the Weibull distribution to be maximized is given in equation (1):

$$L = \sum_{i=1}^{N} \log f\left(t_i \left| social_i, \alpha, \beta, c\right.\right)^{d_i} \left[1 - F\left(t_i \left| social_i, \alpha, \beta, c\right.\right)\right]^{1-d_i} \qquad (1)$$

Here the functions f and F are the probability and cumulative density functions for the Weibull random variable. The variables t_i, $social_i$, and d_i are, for each artist i, the number of

months needed to achieve the goal, the number of social website hits, and attainment goal indicator. The parameters to be estimated are α, β, and *c*.

Statistically, the parameter β represents the correlation between the probability of goal attainment within 24 months and social website hits. In the example, β is most likely positive. The parameter *c* represents how likely the goal will be achieved holding social website hits constant at zero. The parameter can be positive or negative. The parameter α measures the influence of time on the probability of goal attainment. In our example, it appears that the goal is more likely to be achieved as time passes. It is expected that α will be greater than one (α < 1 implies time negatively effects the probability). The specific formula for the Weibull density is given in equation (2):

$$f\left(t_i \left| social_i, \alpha, \beta, c\right.\right) = \exp\left(c + \beta social_i\right) \alpha t_i^{\alpha-1} \exp\left(-\exp(c + social_i) t_i^{\alpha}\right) \quad (2)$$

while the cumulative density is defined by (3):

$$1 - \exp\left(-\exp(c + \beta social_i) t_i^{\alpha}\right) \quad (3)$$

New variables and, hence correlations, can be added to the formula to strengthen the predictability of the model. Figure 6 specifically documents how the likelihood is constructed in Microsoft Excel given the hypothetical data set found in Figure 5.

Figure 7 illustrates how the likelihood function is maximized by choice of α, β, and *c* using Microsoft Excel solver. The maximization reveals three parameters given in Rows 19-21 of Column B. The most relevant parameter estimate, defined as β, is the effect of social website hits on the probability of goal attainment. The estimate of 1.2881 indicates that an increase in social website hits will positively influence goal attainment.

Figure 8 is the whoop curve that was defined by the previous parameter estimates and equation (3). In this case, we ask two hypothetical questions. First, suppose that a talent had 25,000 social website hits (Taylor Fast), what would we expect her whoop curve to look like over time? Second, suppose a competing talent (Taylor Slow) had 250 social website hits, what would her whoop curve look like over time? Figure 8 depicts the results whereby Taylor Fast is highly likely (87.8% chance) to obtain the entrepreneurial goal within one month while Taylor Slow is unlikely to fulfill the goal attainment (probability of attainment is never above 39.8% in the example). A conclusion can be determined from this analysis. Based on past correlations of this example, artists with high social website hits are more likely to attain goals. Therefore, entrepreneurs would have a vested interest in identifying talent with this attribute.

Figure 6
Formula Construction of the Likelihood

A19 fx alpha

	A	B
19	alpha	1
20	constant	-20
21	beta	1
22		
23	Name	Likelihood
24	Taylor A	=C4*LOG(EXP(B$20+B$21*D4)*B$19*B4^(B$19-1)*EXP(-EXP(B$20+B$21*D4)*B4^(B$19)))+(1-C4)*LOG(EXP(-EXP(B$20+B$21*D4)*B4^(B$19)))
25	Taylor B	=C5*LOG(EXP(B$20+B$21*D5)*B$19*B5^(B$19-1)*EXP(-EXP(B$20+B$21*D5)*B5^(B$19)))+(1-C5)*LOG(EXP(-EXP(B$20+B$21*D5)*B5^(B$19)))
26	Taylor C	=C6*LOG(EXP(B$20+B$21*D6)*B$19*B6^(B$19-1)*EXP(-EXP(B$20+B$21*D6)*B6^(B$19)))+(1-C6)*LOG(EXP(-EXP(B$20+B$21*D6)*B6^(B$19)))
27	Taylor D	=C7*LOG(EXP(B$20+B$21*D7)*B$19*B7^(B$19-1)*EXP(-EXP(B$20+B$21*D7)*B7^(B$19)))+(1-C7)*LOG(EXP(-EXP(B$20+B$21*D7)*B7^(B$19)))
28	Taylor E	=C8*LOG(EXP(B$20+B$21*D8)*B$19*B8^(B$19-1)*EXP(-EXP(B$20+B$21*D8)*B8^(B$19)))+(1-C8)*LOG(EXP(-EXP(B$20+B$21*D8)*B8^(B$19)))
29	Taylor F	=C9*LOG(EXP(B$20+B$21*D9)*B$19*B9^(B$19-1)*EXP(-EXP(B$20+B$21*D9)*B9^(B$19)))+(1-C9)*LOG(EXP(-EXP(B$20+B$21*D9)*B9^(B$19)))
30	Taylor G	=C10*LOG(EXP(B$20+B$21*D10)*B$19*B10^(B$19-1)*EXP(-EXP(B$20+B$21*D10)*B10^(B$19)))+(1-C10)*LOG(EXP(-EXP(B$20+B$21*D10)*B10^(B$19)))
31	Taylor H	=C11*LOG(EXP(B$20+B$21*D11)*B$19*B11^(B$19-1)*EXP(-EXP(B$20+B$21*D11)*B11^(B$19)))+(1-C11)*LOG(EXP(-EXP(B$20+B$21*D11)*B11^(B$19)))
32	Taylor I	=C12*LOG(EXP(B$20+B$21*D12)*B$19*B12^(B$19-1)*EXP(-EXP(B$20+B$21*D12)*B12^(B$19)))+(1-C12)*LOG(EXP(-EXP(B$20+B$21*D12)*B12^(B$19)))
33	Taylor J	=C13*LOG(EXP(B$20+B$21*D13)*B$19*B13^(B$19-1)*EXP(-EXP(B$20+B$21*D13)*B13^(B$19)))+(1-C13)*LOG(EXP(-EXP(B$20+B$21*D13)*B13^(B$19)))
34	Taylor K	=C14*LOG(EXP(B$20+B$21*D14)*B$19*B14^(B$19-1)*EXP(-EXP(B$20+B$21*D14)*B14^(B$19)))+(1-C14)*LOG(EXP(-EXP(B$20+B$21*D14)*B14^(B$19)))
35	Taylor L	=C15*LOG(EXP(B$20+B$21*D15)*B$19*B15^(B$19-1)*EXP(-EXP(B$20+B$21*D15)*B15^(B$19)))+(1-C15)*LOG(EXP(-EXP(B$20+B$21*D15)*B15^(B$19)))
36	Taylor M	=C16*LOG(EXP(B$20+B$21*D16)*B$19*B16^(B$19-1)*EXP(-EXP(B$20+B$21*D16)*B16^(B$19)))+(1-C16)*LOG(EXP(-EXP(B$20+B$21*D16)*B16^(B$19)))
37		=SUM(B24:B36)
38		

Figure 7
Maximizing the Likelihood Using Solver

B37 fx =SUM(B24:B36)

	A	B	C	D	E	F	G
19	alpha	9.483104561					
20	constant	-31.4595952					
21	beta	1.288103922					
22							
23	Name	Likelihood					
24	Taylor A	0.3866					
25	Taylor B	-1.742					
26	Taylor C	0.0303					
27	Taylor D	-0.305					
28	Taylor E	-0.91					
29	Taylor F	-0.835					
30	Taylor G	-0.846					
31	Taylor H	-0.76					
32	Taylor I	-0.950					
33	Taylor J	-0.846					
34	Taylor K	-0.855					
35	Taylor L	-0.220					
36	Taylor M	-0.15980757					
37		-8.01832085					

Solver Parameters

Set Target Cell: $B$37 — Solve

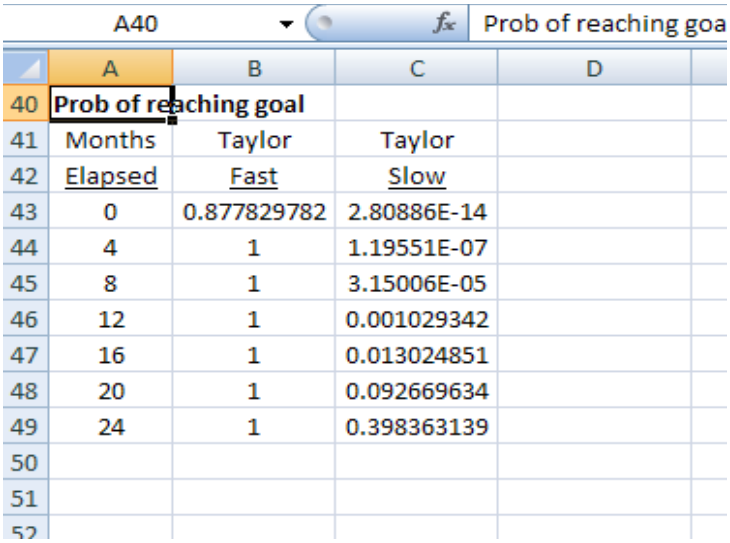
Equal To: Max Min Value of: 0 — Close

By Changing Cells: $B$19:$B$21 — Guess

Subject to the Constraints: — Add, Change, Delete

Options, Reset A, Help

Figure 8
Whoop Curve Results for Taylors Fast and Slow



A40 | Prob of reaching goa

	A	B	C	D
40	Prob of reaching goal			
41	Months	Taylor	Taylor	
42	Elapsed	Fast	Slow	
43	0	0.877829782	2.80886E-14	
44	4	1	1.19551E-07	
45	8	1	3.15006E-05	
46	12	1	0.001029342	
47	16	1	0.013024851	
48	20	1	0.092669634	
49	24	1	0.398363139	
50				
51				
52				

CONCLUSIONS

Given the large size of the entertainment and performance arts industries and the pressure to identify successful acts, the authors have shown that a basic whoop curve can provide creative artists and entertainment industry entrepreneurs with a powerful, yet inexpensive process to predict financial success. Utilizing industry constructs, the whoop curve probabilistically weights the predictive variables by correlations based on how quickly or slowly the acts are able to gain rankings given the strength of emotional connections consumers have to the acts. As a result, the predictive problem of success encountered in the industry is addressed enabling entrepreneurs to spend their time and resources more efficiently on acts most likely to satisfy consumer desires. Thus, industry leaders improve their decision making ability and ultimately improve their financial success.

Because the whoop curve model measures success in probabilities, the model is easily understood. This enables educators the opportunity to motivate their students in the decision making process while incorporating tools that are applied in the industry. As a result both industry leaders and students (future industry leaders) benefit by learning the whoop curve methodology.

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INVENTIONS AND INNOVATIONS: DOES STAGE OF DEVELOPMENT MATTER IN ASSESSMENTS OF MARKET ATTRACTIVENESS?

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ABSTRACT

The purpose of this study is to determine whether market attractiveness is affected by the product's developmental stage—specifically, invention vs. innovation. Two databases were combined for this study to assess prototype or market-ready products (innovations) and ideas submitted by inventors and manufacturers (inventions). On average, invention stage products were more attractive to evaluators than were innovation stage products; however, one critical factor – the ability to create a new venture from the product – was significantly higher for innovations. In addition, overall market readiness was on average more than 10 percent higher for innovation stage products than those at the invention stage. Stepwise regression results indicate that stage of development and new venture likelihood are more critical than other factors in deciding the market viability of a product.

INTRODUCTION

Both invention and innovation are vital to a country's economic growth; however, their meaning and overall role in the innovation process differ. Invention is generally defined as the development of a new and useful product, while innovation refers to the ability to commercialize the invention based on a successful business model (Schoen, Mason, Kline, & Bunch, 2005; Attridge, 2007). Invention and innovation are important steps in new product development, but other steps exist in the innovation process which determine the type of invention created and the success of the innovation. A linear explanation suggests that basic research occurs first, leading to new knowledge or a better understanding of how something works. This knowledge is then applied to create an invention. Once the invention is produced or marketed, it becomes an innovation. Finally, when customers first use the product, this is known as acceptance or diffusion (Godin, 2005).

Conventional wisdom would suggest that as products progress through the innovation process they become more functionally sound and commercially viable. However, we are not aware of any research that test this belief using large databases of retail products at different stages of development—specifically, invention and innovation. Therefore, we compare which

factors make products more attractive to the marketplace at these two stages. For this study, products in the invention stage were submitted by independent inventors to an evaluation firm for assessment regarding their feasibility. Products in the innovation stage were submitted by small manufacturing firms to Wal-Mart as part of a mass retailer screening program. Both groups of products were assessed using the same evaluation instrument. The remainder of the paper describes the concepts of invention, innovation, and market attractiveness in more detail, followed by a discussion of our methodology, results and conclusions.

LITERATURE REVIEW

INVENTION VS. INNOVATION

An early perspective on the relationship between invention and innovation was based on the views of Joseph Schumpeter. Schumpeter (1939) regarded inventions as simply "acts of intellectual creativity with little importance for economic analysis". Innovation, on the other hand, was seen as a key factor in the economy and considered to be independent of invention. Innovation could occur without invention (Godin, 2005).

Later views on invention and innovation presented the concepts as more connected and linear in nature. For example, Maclaurin (1953) identified a five step sequence focused on research, invention, innovation, financing, and acceptance. Unlike Schumpeter, he noted that when innovations occurred, they were the result of commercially introduced inventions. Redwood's (1987) "investment-innovation" cycle showed a similar sequential process. His model suggested that inventions led to patents and then product innovations, also known as saleable products. These innovations, once trademarked and branded, became commercialized products that eventually produced revenues for the firm.

A more recent explanation of the innovation process focuses on a non-linear approach. Schoen et al. (2005) suggested that previous sequential models were not realistic. While the authors recognized the role of basic research, invention, and innovation in the development of a commercialized product, they argued that the innovation process did not occur in order. Instead, the innovation cycle model proposed that the path from invention to innovation was more random in nature. An invention could result from either basic research or from market needs, and delays could occur at any stage—research, invention, or innovation—making the time to market longer than anticipated. The innovation cycle model also emphasized the importance of a business model for product commercialization.

MARKET ATTRACTIVENESS

According to Schoen et al. (2005), the outcome of invention is a useful product, while the goal of innovation is to bring a product to market that has strong customer appeal. In the retail

marketplace, producing a saleable product is only half of the commercialization equation. Products still have to be accepted by retailers in order for consumers to purchase them, and retail product acceptance depends greatly upon product attractiveness (Swift & Gruben, 2000). Kaufman, Jayachandran, and Rose (2006) broadly define product attractiveness as any differentiating characteristic, such as product features, market demand, or promotional strategy that gives a new product a competitive advantage over an existing product. In this paper, we use the term "market attractiveness" as an indicator of product attractiveness at the retail level.

Prior research has identified product acceptance criteria for firms wanting to supply the retail market. For example, St. John and Heriot (1993) reported price, quality, and uniqueness as attractive features. Research by Pearson and Ellram (1995), Piercy and Cravens (1997), and Verma and Pullman (1998) echoed these findings. Retail buyers expected quality products and fair prices from those individuals or organizations who wanted to do business with them. In the mass retail market, Kim, Jones, and Knotts (2005) found that other factors including demand stability, amount of product testing, and promotional requirements increased the overall attractiveness of the product, which in turn, influenced the product's mass merchandising potential or market readiness.

For some buyers, firm characteristics were more important in their product acceptance decisions. Piercy and Cravens (1997) and Verma and Pullman (1998) identified trust, communication, delivery reliability, and flexibility as essential criteria for product acceptance. Trustworthiness and speed of development were factors that were also used by small business executives in their decision making process (Park and Krishnan, 2001). In the mass merchandising market, Kim et al. (2005) found that management experience and support for R&D were necessary to introduce new products that would satisfy consumers' diverse and ever-changing tastes, thereby making them more attractive to consumers and market ready.

The purpose of this study is to determine whether market attractiveness is affected by the product's developmental stage. It seems that products further along in the innovation process would be more appealing to retailers looking for a commercial product. If this is the case, which factors make a difference in market attractiveness for products at the invention and innovation stages?

THE STUDY

The sample firms for this study were participants in one of two separate projects undertaken by the Innovation Institute. The first program evaluated small U. S. manufacturing firms in the 1990s that participated in a mass merchandising screening program developed at a regional Midwest university. The screening program consisted of two assessments: an external review of the firm's submitted product and a self-appraisal of the firm's management practices. For the purpose of the paper, only the product evaluation measure will be examined. Each product was either rejected from the program or sent on to the mass merchandiser for buyer

review based upon the results of these evaluations. The final decision as to whether the forwarded product was placed on-shelf was left entirely to the retailer.

All of the participating firms in this first program were independently-owned manufacturers who wanted to be suppliers for Wal-Mart. Out of 2113 potential suppliers, 1729 firms (81.8 percent) completed the entire evaluation process. These participants were from all states, and none were dominant in the industry. The products ranged in suggested retail price from inexpensive and/or point-of-purchase to major purchase levels. No racial, ethnic, or other minority data were kept as part of the main database. Of these 1729 firms, 795 (46.0 percent) of the firms submitted products that were already on the market at retail. These products are not part of this study. The 934 products submitted that were at the prototype or market-ready level but not yet on the market are part of this study. These prototype or market-ready products were part of the innovation stage.

An argument could be made that the prototype and market-ready levels are not the same, and, technically, this is true. However, both of these levels require that a party have an actual, functioning product, and this level of development is critical to an evaluator or buyer assessing the actual viability of the product on the market. If a functioning version of the idea is not yet developed, many hurdles still face the inventor or innovator. Riquelme and Watson (2002) suggested that venture capitalists are looking for a working product before making a decision, and Richardson (1995) asserted that a facilitated innovative community develops the prototype (and subsequently a market-ready version) after several levels of idea evaluation have already been passed. Auerswald and Branscomb (2003) placed the two levels together at the fourth stage (of five) of their product development model. However, one study (Clarysse, Wright, Lockett, Mustar & Knockaert, 2007) tested the differences in venture capital interest at various stages of the development process and found that market-ready versions did in fact attract more funds than prototypes, however their analysis was done on 135 European academic spin-offs and not on retail-bound inventions and innovations. It is probably true that the distinction between prototype and market-ready products is potentially significant, but for the purposes of this study we do not distinguish between these product levels.

The second program evaluated product ideas from independent inventors and manufacturers that wished for an external, third-party review of the idea before attempting to take the product through further development. These projects were not yet under manufacture and were at the idea level only (invention stage). Some 2297 ideas were submitted for review between 1997 and 2005. As with the first program, these products were largely intended for consumer use.

METHODOLOGY

These two separate but related databases were combined for this study: the earlier program evaluating existing firms with a prototype or market-ready product (innovations) and

the later program evaluating product ideas submitted by inventors and manufacturers (inventions). The first program required that firms have at least a functioning prototype of the product because the aim of the program was to screen potential suppliers to an existing retail base. The second program did not require this level of development and was, instead, a screening process to encourage market-worthy ideas for further development. Products and ideas that were evaluated as having questionable future market interest were given feedback that encouraged further development only with extreme caution or were generally discouraged from further development. Those receiving more positive feedback were educated in how to best proceed with future development for the market.

This study examines the evaluation results for products in both programs. Conventional wisdom suggests that products that are better developed will be more attractive to the marketplace, but, to our knowledge, no studies using large databases of products at these two stages (invention vs. innovation) have addressed this question. Therefore, we assess market attractiveness for both groups of products using the measure described below.

The market attractiveness measure for both programs consisted of items based on the Product Innovation Evaluation System (PIES) developed at the University of Oregon (Udell, O'Neill, and Baker, 1977). Product areas included societal impact, business risk, demand analysis, market acceptance, competitive capabilities, and experience and strategy. An independent, trained evaluator completed this portion of the assessment process. The independent evaluator was typically a current or former retail buyer or an experienced small firm owner with a retail background whose role was to assess the mass market potential of the product.

Products were judged on a five-point ordinal scale using specific achievement levels rather than a sliding subjective scale. The three-point (or middle) response was the minimum performance level acceptable to retail buyers. The independent evaluators rated each product using items like the one below:

> Functional Feasibility. In terms of its intended functions, will it do what it is intended to do? This product:
>
> (1) is not sound; cannot be made to work.
> (2) won't work now, but might be modified.
> (3) will work, but major changes might be needed.
> (4) will work, but minor changes might be needed.
> (5) will work; no changes necessary.

Additionally, an overall rating on a 0-to-100 point scale was given by the evaluator for the project. A rating of at least 40 was needed to receive a positive assessment for further market development.

Not Recommended	(00 - 29)
Should Be Very Limited And Cautious	(30 - 34)
Should Be Limited And Cautious	(35 - 39)
Recommended But Need To Resolve Unknowns	(40 - 41)
Recommended For Limited Development/Commercialization	(42 - 43)
Recommended For Moderate Development/Commercialization	(44 - 45)
Recommended For Significant Development/Commercialization	(46 +)

A full listing of the individual items used for this evaluation can be found in Table 1.

RESULTS

Table 1 shows the results of a series of Mann-Whitney tests done on the individual evaluation items across development stages. We compared the mean rank independent evaluator results for each item for the invention stage (INV) versus the developed but not on market cases—innovation stage (INNOV). We chose the Mann-Whitney non-parametric tests for this data because of the nature of the responses themselves (ordinal instead of scale). Products with higher evaluations scored higher on the item scales. The bolded figures indicate which product stage had the higher mean rank for each item. The table also includes the mean rating for each stage and the level of significance of statistical difference between the stages when one exists.

It is interesting to note that the results were nearly evenly split. On average, invention stage products were more attractive to evaluators than were innovation stage products on 18 of the 39 items in the study (four items were not significantly different between the two stages). Three of the competitive factors and one societal factor were not significantly different between the development stages. Generally, business risk and demand analysis factors were judged more favorably for the innovation stage products, while the inventions were more favorably viewed with respect to experience and strategy. However, one critical experience and strategy factor – the ability to create a new venture from the product – was significantly higher for innovations. And the evaluator's overall assessment item of market attractiveness was on average more than 10 percent higher for innovation stage products than those at the invention stage (39.72 vs. 35.66).

A stepwise linear regression analysis was then run using the overall evaluator assessment rating (market attractiveness) as the dependent variable and the individual assessment items as independent variables in the model. The stage of development (0 = invention stage; 1 = innovation stage) was also entered into the model. The intent of this process was to determine if, in the minds of evaluators, certain assessment factors were more critical than others in deciding the market viability of a project.

Table 1
Mann-Whitney Variable Mean Ranks Test for Invention Stage vs. Innovation Stage Cases

	Mean Rank		Mean		Std Dev		
Variable Name	Inv	Innov	Inv	Innov	Inv	Innov	Signif.
N =	2297	934	2297	934	2297	934	
Societal - Legality	1556.38	1651.91	4.53	4.63	0.68	0.59	0.01
Societal - Safety	1583.10	1577.38	3.91	3.91	0.56	0.47	NS
Societal - Environmental Impact	1685.26	1318.73	4.00	3.75	0.38	0.54	0.001
Societal - Societal Impact	1672.74	1352.40	4.08	3.85	0.46	0.50	0.001
Business Risk - Functional Feasibility	1403.73	1981.08	4.23	4.66	0.62	0.50	0.001
Business Risk - Production Feasibility	1897.15	769.85	4.93	4.18	0.32	0.50	0.001
Business Risk - Commercialization Stg	1314.80	2251.13	2.44	3.91	1.36	0.74	0.001
Business Risk - Investment Costs	1421.07	2006.10	3.76	4.23	0.63	0.71	0.001
Business Risk - Payback Period	1621.10	1486.14	3.64	3.55	0.62	0.63	0.001
Business Risk - Profitability	1451.30	1921.43	3.47	3.82	0.61	0.64	0.001
Business Risk - Marketing Research	1517.16	1762.23	3.56	3.73	0.61	0.66	0.001
Business Risk - Research & Development	1440.39	1943.17	4.18	4.57	0.67	0.67	0.001
Demand Analysis - Potential Market	1704.95	1274.45	3.58	3.09	0.86	0.85	0.001
Demand Analysis - Potential Sales	1542.21	1691.93	2.60	2.73	0.57	0.70	0.001
Demand Analysis - Trend of Demand	1448.69	b	3.05	3.42	0.51	0.58	0.001
Demand Analysis - Stability of Demand	1547.28	1691.51	2.80	2.95	0.52	0.75	0.001
Demand Analysis - Product Life Cycle	1555.02	1669.82	2.44	2.65	0.67	1.13	0.001
Demand Analysis - Product Line Potential	1480.53	1860.77	1.97	2.28	0.52	0.74	0.001
Market Acceptance - Use Pattern Compatibility	1462.11	1904.59	2.85	3.21	0.64	0.56	0.001
Market Acceptance - Learning	1636.72	1453.05	3.97	3.80	0.59	0.81	0.001
Market Acceptance - Need	1605.87	1538.14	2.87	2.79	0.70	0.88	0.05
Market Acceptance - Dependence	1736.98	1194.78	3.81	3.17	0.82	1.05	0.001
Market Acceptance - Visibility	1674.30	1356.22	3.78	3.49	0.68	0.70	0.001
Market Acceptance - Promotion	1453.35	1928.65	2.60	2.99	0.52	0.67	0.001
Market Acceptance - Distribution	1439.81	1963.61	2.71	3.12	0.49	0.62	0.001
Market Acceptance - Service	1380.68	1292.07	4.53	4.45	0.69	0.73	0.001
Competitive - Appearance	1558.33	1583.93	3.14	3.14	0.50	0.54	NS
Competitive - Function	1616.80	1464.08	3.42	3.33	0.56	0.55	0.001
Competitive - Durability	1463.73	1614.85	3.04	3.16	0.33	0.46	0.001
Competitive - Price	1552.72	1541.02	2.83	2.83	0.67	0.75	NS
Competitive - Existing Competition	1667.77	1367.31	2.92	2.62	0.97	0.96	0.001
Competitive - New Competition	1598.79	1551.19	2.90	2.86	0.75	0.76	NS
Competitive - Protection	1318.54	981.87	3.36	2.63	1.32	1.31	0.001
Experience & Strategy - Marketing Experience	1658.94	1397.00	2.97	2.78	0.40	0.58	0.001
Experience & Strategy - Technical Experience	1882.89	817.91	4.38	3.37	0.73	0.61	0.001
Experience & Strategy - Financial Experience & Resources	1785.02	1052.36	3.44	2.88	0.59	0.53	0.001
Experience & Strategy - Management / Production Experience	1757.00	1134.74	3.58	3.13	0.63	0.46	0.001
Experience & Strategy - Technical Experience	1745.08	1162.82	2.69	2.02	0.95	1.01	0.001
Experience & Strategy - New Venture	1372.96	2096.32	2.62	3.28	0.76	0.68	0.001
Overall Rating	1386.06	2156.42	35.66	39.72	4.91	3.70	0.001

NOTE: INV = Invention Stage Case INNOV = Innovation Stage Case

The results are shown in Table 2. While the overall model contains ten variables and explains 20.1 percent of the variation in the overall rating, the first two variables entered account

for 17.8 percent of the total variation (nearly 90 percent of that explained by the model). The stage of development and new venture likelihood variables both have a positive coefficient in the model and favor those projects in which the innovator has a developed product. Three of the coefficients are negative in the model, and the variables associated with those coefficients are ones which are more highly assessed by evaluators for invention stage projects.

Table 2
Regression Analysis (Dependent: Evaluator Overall Rating)

Variable Entered	MW Result	R-Sq Change	Sig. F Change	Coeff.
Constant			0.000	34.544
Stage of Development	INNOV	0.161	0.000	1.899
Experience & Strategy - New Venture	INNOV	0.017	0.000	0.605
Business Risk - Payback Period	INV	0.005	0.001	-0.91
Business Risk - Profitability		0.005	0.000	0.503
Societal - Societal Impact	INV	0.004	0.003	-0.832
Business Risk - Investment Costs	INNOV	0.003	0.005	0.646
Market Acceptance - Need	INV	0.003	0.006	0.365
Demand Analysis - Potential Sales	INNOV	0.002	0.016	0.439
Competitive - Appearance		0.002	0.019	0.458
Experience & Strategy - Management / Production Experience	INV	0.002	0.048	-0.375
	NOTE:	INV = Invention stage case		
		INNOV = Innovation stage case		

DISCUSSION

The results of the statistical tests seem to indicate that evaluators (including retail buyers and those trained to behave like them) prefer cases in which the inventor or innovator has a more fully developed product. This should not be a surprise since both conventional wisdom and emerging research would seem to support it. However, the results of the Mann-Whitney tests are interesting in that they do not clearly favor the innovation stage products over the invention stage products. While the reasons behind this are not completely clear, it is likely that the value of the product to the market (consumer demand) is not linked directly to any one specific criterion. Even poorly developed ideas can often be embraced by the marketplace if they meet a demand that is not already being satisfied by another product or service. However, products that are better developed and which hold a better prospect for creating a new venture seem to be more

attractive to evaluators and, by proxy, to potential investors. Having a good idea but no way to get that idea into the marketplace would seem to inhibit investor interest.

Evaluators appeared to more favorably assess innovations with regard to both business risk and demand analysis, and business risk was the most common factor grouping in the model. It would make sense that the downside of investing and of accepting a product for retail sales would be the chance of the business failing. Both buyers and investors are keenly aware that the health of the business that produces the good they are associating with can have immediate effects on the success of their own investments. While the invention stage projects may have been better prepared in the experience and strategy criteria, the perceived new venture weakness may have been a critical factor for evaluators.

CONCLUSION

Does stage of development matter in assessments of market attractiveness? The answer appears to be yes. Stepwise regression results indicate that stage of development and new venture likelihood are more critical than other factors in deciding the market feasibility of a product. While the overall model explained about twenty percent of the variation in market attractiveness, these two variables accounted for nearly 90 percent of the variance explained by the model. This finding supports the work of Schoen et al. (2005) who emphasized the importance of a business model in order for a product to progress from invention to innovation.

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DEVELOPING BUSINESS POLICY TO ENHANCE RURAL SMALL BUSINESS COMPETITIVENESS

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ABSTRACT

Small businesses in rural areas need affordable access to broadband technology in order to build and run more competitive businesses. Our conclusion is based upon findings from two main research questions. First, we explore the current state of rural U.S. small businesses with regard to broadband support and suggest that the U.S. government could do more to help. Second, responses from a survey of rural small business owners are analyzed to determine whether they would accept and integrate broadband technology into their operations. The results of the survey, based on the Technological Acceptance Model (TAM), indicate that rural small business owners would indeed be receptive to this technology upgrade. Our findings suggest that in order for U.S. rural small businesses to be competitive and have equal access to opportunities, they must be provided the same basic resources that are available to their larger, more urban counterparts. In addition, our research findings suggest the relationship between ease of use and intention to use is fully mediated by the perceived usefulness of the technology. Hence, while government policies, such as the creation of economic incentives, should be used to level the playing field between rural and urban America, these initiatives will likely have more impact when the rural population is educated to the technology's potential usefulness.

INTRODUCTION

Small businesses play a vital role in our economy, creating most of the new net jobs and accounting for almost half of the non-farm private sector jobs. Further, small businesses produce 13 times as many patents per employee than do large businesses, and employ 40 percent of all high tech workers (SBA, 2009). Unfortunately, many of our small businesses are sometimes at a competitive disadvantage to larger businesses. One example of this competitive disadvantage is the lack of broadband Internet connection for rural populations, sometimes referred to as the "digital divide." In regards to our nation's rural small businesses, they appear to be trapped in the "digital divide," often without adequate access and unable to compete in one of the fastest growing segments of our economy: e-commerce (Snowe, 2007). The Appalachian region, in particular, has been cited as one of four underserved target areas for broadband support (Federal Communications Commission, 2006).

The Internet is an increasingly important part of the U.S. economy. A lack of broadband accessibility to the Internet places firms at a disadvantage relative to other firms, as the Internet has become a necessary component of business activity. We argue that unless our rural small businesses acquire and use broadband technologies, they will be at a severe disadvantage in our new economy. In turn, this digital divide will have disastrous effect on the survival rate of our nation's rural small businesses; and thus, our nation's economy. To present our argument and findings, we will first detail the importance of small businesses to the U.S. economy. From this, we point out the growing importance of e-commerce to small business owners and, more crucial, the growing need for broadband support. We then explain how differential treatment causes harm to our nation's rural small businesses, and highlight the movement in Washington, D. C. to correct this malady. Of course, no technology is useful if it is not accepted. To that end, we surveyed Appalachian small business owners regarding their acceptance of this technology. Lastly, we discuss our conclusions and the implications of our findings.

RURAL SMALL BUSINESSES AND THE DIGITAL DIVIDE

Small businesses are an integral part of the U.S. economy. They constitute 99.7 percent of all employer firms, employ over half of all private sector jobs, and generate more than 50 percent of the U.S. non-farm gross domestic product (Small Business Administration, 2009). An often overlooked aspect of small businesses is the cultural impact they create. The number one reason individuals start small businesses is to obtain independence, or to be one's own boss (Virarelli, 1991). As a nation founded on personal freedoms, small businesses and the U.S. seem to go hand-in-hand. These findings suggest that the success and continued contributions of our nation's small businesses are critical to the long term viability of the U.S. economy.

Due to technological changes, our nation's small businesses are experiencing an increase in both opportunities and challenges. In particular, the rise of e-commerce as an inexpensive mechanism from which to improve operations and provide customer service has proven to be an important opportunity for small business owners. As such, more and more practitioner oriented articles are advocating the use of e-commerce for small businesses (Lohr, 2006; Ossinger, 2006). The impetus for these calls are the many business functions that can be accomplished more economically via e-commerce; such as on-line advertising, email marketing campaigns, and back-office support programs. Using broadband technologies, small businesses can vie for businesses and consumers previously available only to large corporations. Thus, e-commerce may lead to higher growth and wealth creation for small businesses as they are able to economically reach larger markets (Lohr, 2006).

Due to the many opportunities created through the Internet and e-commerce, many small business owners are integrating e-commerce activities into their operations. A 2007 poll conducted by the National Small Business Association found that 74 percent of small business owners are "highly reliant" on the Internet to conduct their operations. This includes Internet

banking, financial exchanges, and e-commerce activities. Seventy-eight percent of the polled firms indicated that they had increased the amount of business they conducted via the Internet in the past year (National Small Business Association, 2007a). Similarly, over the past decade, the number of firms having their own website has doubled, to 60 percent (National Small Business Association, 2007b), with many small businesses becoming more reliant on and engaged in e-commerce. This leads us to our first proposition:

P1: E-Commerce, and its vehicle, the Internet, is becoming an integral tool for business success.

However, not all small business owners seem interested or able to engage in e-commerce. A 2005 poll conducted by the National Federation of Independent Businesses found that 16 percent of those small business owners surveyed indicated that they try to avoid technology (National Federation of Independent Businesses, 2005). A slightly different type of story seems to be occurring in our rural areas. Our nation's rural areas tend to be less affluent and have faced a century of employment erosion due to technology and employment migration (Johnson, 2001; Rowe, 2003). Further, because of their location, rural areas tend to be more expensive to serve (Rowe, 2003). One implication of this added expense is a lack of investment in broadband connection capability for rural populations: sometimes referred to as the "digital divide" (Snowe, 2007). The consequence may be that rural areas may have a more difficult time supporting small businesses (Pociask, 2005).

Access to broadband Internet connections provides substantial benefits: economic productivity, output, increased market access, and jobs (Federal Communications Commission, 2006; Pociask, 2005). For small business owners, the lack of broadband support has caused them to be at a disadvantage to their more asset-capable urban competitors: both large and small. Instead of e-commerce leveling the playing field with big business (Grandon & Peterson, 2004), a lack of access to broadband e-commerce has forced rural firms to become more reliant on the services of asset-capable firms. These actions have created more concentrated industries, giving more power to other businesses (Pfeffer & Salancik, 1978), thereby making it more difficult for rural small businesses to compete effectively (Porter, 1985).

For small rural firms to be more competitive, and thus maximize their power, they must have the tools to compete (Pfeffer, 1982). From a resource dependence perspective, power cannot be realized as these small businesses do not possess the same resources as their external counterparts. As e-commerce has become more engrained into our society, it has become an essential tool to conduct business. Further, by its very nature, e-commerce can tear down barriers between rural and urban areas and allow rural small business owners to compete more effectively against their larger counterparts (Grandon & Peterson, 2004, Pociask, 2005). By granting access and allowing rural small businesses to acquire these resources, they can become less dependent on local communities for support and make headway into markets located in distant geographic areas which were previously unreachable.

> *While there is universal agreement that broadband holds the promise of technological innovation and better communications, fulfilling this charge (improved broadband for small businesses) is imperative if small businesses, particularly those in rural areas, are to have affordable access to the information superhighway and compete successfully in the global marketplace…what is becoming equally visible is the so-called 'digital divide' between those who have tremendous access and those that do not.*
>
> Senator Olympia J. Snowe (ME). October 2, 2007

In turn, better connectivity can provide an economic stimulus to poorer, underserved regions. In fact, the Internet has in some cases reduced the importance of proximity. Hence, a once disruptive force on rural America, technology, can be the force that helps save rural America (Johnson, 2001). Building on these points, we posit:

P2: Affordable access to broadband technologies is crucial for rural economic well-being.

Organizations were once thought to be closed systems (Scott, 2003). While this made studying and analyzing firms easier, as we needed only to study transformation of inputs into outputs (c.u. Taylor, 1914), today it is generally recognized that firms operate within an open environment, and adjust their strategies and structure in reflection of this fact (Chandler, 1977; Covin & Slevin, 1989; Lawrence & Lorsch, 1967). External factors, such as those conditions that deter growth or development, may stifle entrepreneurship activity (Gnyawali & Fogel, 1994). With industries becoming more concentrated due to unequal power distribution (Pfeffer & Salancik, 1978), business opportunities in rural America decrease (Buzzell & Gale, 1987; Biggadike, 1979). Likewise, Gnyawali and Fogel (1994) argue that governments should adopt policies and procedures that increase opportunities for potential entrepreneurs. More specifically, the authors suggest that governments can effectively encourage entrepreneurial development through programs, protections, and minimization of entry barriers (Gnyawali & Fogel, 1994). Hence, government influence has been found by Bruno and Tyebjee (1982) to influence entrepreneurial activities.

The power of these influences is well known to many politicians. Senator Snowe of Maine recommends a market-based approach to increase broadband support to small, rural businesses (2007). Pociask (2005) cites several studies and concludes that broadband investment would have a multiplier effect above and beyond the cost of the needed investment. One such investment project currently in place is that of the Federal Communications Commission's "Lands of Opportunity" program. A key goal for the program is to encourage e-commerce in rural areas. To accomplish this, the program has identified four target areas that are currently underserved by broadband access: such as Appalachia (Federal Communications Commission, 2006), to create jobs and provide access to larger markets for rural small business owners.

Current legislation has begun to target broadband access. The momentum for improved broadband seems to be on the rise, as evidenced by HR 3919, S 1492 (Kroepsch, 2008); this bill

is intended to analyze rural broadband service. Growing interest from our politicians may suggest that their constituents are also becoming aware of the need for better broadband support in rural areas. Considering the evidence of its effectiveness and its relative potential impact, our final proposition is as follows:

P3: U.S. government policy should support and increase programs that offer affordable access to broadband connectivity in rural America.

SMALL BUSINESS OWNERS' ACCEPTANCE OF BROADBAND TECHNOLOGY

Whether or not rural small business owners would take advantage of available broadband support is an unanswered question to this point. The intent is to predict the likelihood that this population would use and benefit from better broadband access initiatives. Why are we creating policy for our rural small businesses without asking them questions? How can we design proper interventions for rural small businesses when we have not taken time to better understand them? Additionally, how do we know we are spending our taxpayer money properly when we do not ask the right questions? We find this interesting because by addressing the questions asked in this paper, policy makers can be better assured that they will be creating more effective policy that would result from collaborating with the very population the government is attempting to serve. The inclusion of the end-user in this technology decision process will enhance the acceptance of the technology (Whitten, Bentley, & Dittman, 2001). System users must be included early enough to buy into the value of the system. If the end users are ignored at this critical point the acceptance of the technology may be jeopardized. Therefore, the answers to these questions means saving the government money and helping develop more effective interventions and implementation.

Here, we begin to ask important questions about an underserved population: Appalachian small business owners. Even in small business research this is a very unique and often difficult group from which to identify and collect data. The most pertinent research question to attempt to answer at this point is, "Will rural small businesses owners accept broadband if it is available?" To answer this research question, we seek out a model to apply which, once tested, will help us better understand rural small business owners. We utilize an adaptation of the Technological Acceptance Model (TAM) for that task.

TECHNOLOGY ACCEPTANCE MODEL

Since the introduction of the original Technology Acceptance Model (TAM) (Davis, 1986; Davis, 1989; Davis et al., 1992) it has become one of the most widely recognized and tested concepts in management of information systems literature and is often heralded as the best predictor of technology adoption (Davis, 1993; Hendrickson & Latta, 1996; Mathieson, 1991;

Moore & Benbasat, 1991). The Technology Acceptance Model was developed by Davis (1986) to assist in explaining computer usage and the behavioral intentions attached to adoption or rejection of any given hardware or software. The theoretical foundation of the Technology Acceptance Model was an amalgamation of Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) in its original state and Ajzen's (1985) Theory of Planned Behavior (TPB) after a number of modifications. From this model, we may conclude that intentions to use a technology have a strong positive relationship with actual future usage.

Researchers contend that in the TAM, behavioral intentions to use technology are primarily the result of a rational analysis of its desirable outcomes, namely perceived usefulness (PU; i.e. to what extent does the user believe the technology or application will enhance their job performance) and perceived ease of use (EU; i.e. to what extent does the user believe the technology or application will be free of effort) (Agarwal & Karahanna, 2000; Gefen & Straub, 1997; Gefen & Straub, 2000; Koufaris, 2002; and Wu & Farn, 1999). Igabaria, Zinatelli, Cragg, and Cavaye (1997) found that the perceived ease of use, perceived usefulness, and system usage constructs were dependable and relevant to small firms. The authors also found that exogenous variables such as management support and external support influence both perceived ease of use and perceived usefulness. Further, the importance of external support lends credence to our earlier proposition that government influence would be a positive factor for broadband deployment.

In most cases, the literature on TAM focuses on explaining the acceptance of information technology from the individual's standpoint (Davis, Bagozzi, & Warshaw, 1989; Hu, Chau, & Sheng, 1999; Hubona & Geitz, 1997; Mead & Fisk, 1998; Taylor & Todd, 1995; Venkatesh & Morris, 2000). Attitude toward use has usually been conceived as a construct based on a subject's belief perceptions and evaluations of the consequences of engaging in some behavior (Hubona & Geitz, 1997). This individual frame of reference fits nicely with small business research in as much as small business decision making is highly centralized in the owner/operator. Similarly, Barnard (1938) argued that it is top management's responsibility to match distinctive competence with business opportunities.

While a centralized decision process ensures alignment of direction and command, it can sometimes come at a cost. In particular, due to bounded rationality (Simon, 1997), small business owners are sometimes overwhelmed by the many variables in need of attention. As a result, some areas of operations either get ignored or inadequate implementation. For the rural small business owner, this may mean that possible technological gains and the accompanying wealth of advantages will not be achieved if an owner feels that the use of the technology is too difficult or time consuming to pursue. Therefore, we posit that the business owner must perceive the technology to be easy to use. Stated formally in our first tested hypothesis, we predict:

H1: Perceived ease of use is positively related to intention to use.

However, just because a technology is easy to use, does not mean that people will use it. Technology deployed by rural small business owners can be viewed as a combination of resource availability and the owner's ability to use it in a way that creates an advantage (Grant, 1991). It appears that small business owners may need appropriate training and education to more fully engage broadband benefits. Hence, when small business owners perceive that e-commerce will be helpful to their firms' bottom lines, then one would expect an increase in the involvement between the user and the technology. So, while ease of use may be necessary for intended usage, it may not be sufficient without perceived benefits. This leads us to our second tested hypothesis:

H2: The perceived usefulness of technology intervenes, or mediates, the relationship between ease of use and intention to use.

METHODS

Because of the unique setting and sample of Appalachian firms, we opted to pilot test our survey instrument: a four-page survey instrument consisting of 35 items, based primarily upon selected sections of the Technology Acceptance Model (Shore, 2004). To test, we assembled a focus group to assess, evaluate, and offer feedback regarding the survey instrument. This focus group consisted of 13 information technology users, trainers, and practitioners from the local area who were not part of the follow-up study. We ensured that the focus group was representative of the broader target population (Gilner & Morgan, 2000). Specifically, this focus group provided insight into clarity of the instrument, the wording and education level required to navigate the instrument, the appropriateness of the survey format, and the length of time needed to complete the survey instrument (Fink, 1995). Several suggestions were incorporated into the pilot draft of the survey instrument.

This draft was then circulated to a pilot test group of approximately fifty participants randomly chosen from our full database by selecting every tenth name on the list until fifty names were collected. Twenty surveys from the pilot group were returned and declared usable as they were returned in a timely manner and had no missing values. While we understand that both the stability and confidence surrounding Cronbach alphas are at least partially affected by sample size, we were nonetheless encouraged by the feedback and Cronbach alpha scores for our scales, which were all significantly above the prescribed 0.70 (Nunnally, 1978).

The final data tested for this study was gathered through a self-reporting mail survey of small and medium sized enterprises found among ten counties spanning two Mid-Atlantic States recognized by state and federal governments as Appalachian counties (SBA, 2007). Our sample was drawn from Chamber of Commerce membership lists, telephone directories, and business directories within these ten counties. As firm size was not initially clear, surveys were sent to all business and firm size was controlled for post-hoc. Our survey was mailed out and achieved

9.4% response rate resulting in a sample of 188 small and medium sized Appalachian small business owners.

VARIABLES

INDEPENDENT VARIABLES

For each independent variable, respondents were asked to report their agreement based on a traditional seven-point Likert scale. Measures were based upon Davis's (1986) original survey and included:

(1) Perceived Ease of Use. This item measured perceptions regarding the ease or simplicity of use of internal technologies. Sample items include "I find websites easy to use" and "I find websites easy to use for information" The Cronbach alpha for this five question scale was 0.916.
(2) Perceived Usefulness of the Technology. This item measured perceptions regarding the usefulness and general efficacy of internal technologies. Sample items include "Doing business via websites would improve my company's performance" and "Using a website would make it easier to do business outside my present market area." The Cronbach alpha for this eight question scale was 0.928.

DEPENDENT VARIABLE -- INTENTION TO USE.

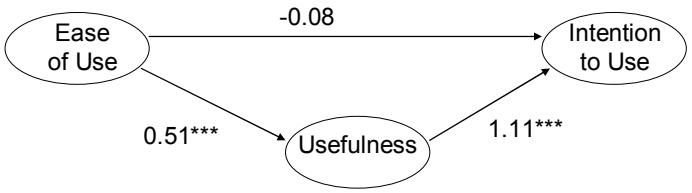
Given our prior argument that actual use can be estimated from behavioral intentions, our dependent variable was Intention to Use which we assessed via three items offered in a seven point Likert Scale. This Likert Scale ranged from "extremely frequently" to "extremely infrequently." The Cronbach alpha for this item was 0.930.

CONTROL VARIABLES

After a review of the literature, three control variables were utilized in this study. First, the type and nature of small businesses may affect its global and tactical orientations towards technology (Porter, 1980). Thus, we captured, identified, and controlled for type of business by creating dummy variables to indicate type as service, manufacturing, retail, wholesale, or technology. Second, there is considerable theoretical and empirical research suggesting that the age of a given firm or business affects both its technology strategy and day-to-day operations (Barnett, 1990; Hannan & Freeman, 1989). We controlled for temporal effects with the Business Longevity variable. Finally, recognizing both resource constraints and scale related competitive

advantages that impact both the choice and use of technology (Chandler, 1990); we captured annual revenues as an additional control variable. Our model for testing is presented in Figure 1.

Figure 1
Hypothesized Relationships of Constructs and Resulting Model



RESULTS

Table 1 presents the basic descriptive statistics and Pearson correlation coefficients for our variables under study. Of note, wholesale firms had a positive correlation with ease of use. Perhaps previous automation tools in this industry have created learning effects and a greater ease with Internet technologies. Interestingly, we found a negative relationship between revenues and intention to use. Perhaps the small rural business owner's most handicapped from a lack of access are already seeing declines in profitability, and are eager to try and level the playing field.

To test our hypotheses, we used Ordinary Least Squares (OLS) regression analysis. To evaluate the marginal contribution above and beyond the predictive power of the control variables, we pursued a step-wise approach (Pedhazur & Schmelkin, 1991). Related to issues surrounding multicollinearity of both the control and independent variables along with the modest sample size, we chose to examine the effects of each predictor variable in a separate regression model. Consequently and as suggested by Pedhazur and Schmelkin (1991), we adopted a conservative approach to test our hypotheses. Therefore, any explanatory contribution of the independent variables was only after the first three control variables were entered into the regression equation.

Table 2 presents the results of these analyses. To test Hypotheses 1, ***Perceived ease of use is positively related to intention to use*****,** we regressed Intention to Use onto our variable Perceived Ease of Use. Our results indicate that Ease of Use is a highly significant factor in determining the Intention to Use Technology. Therefore, we find support for our first hypothesis. The results are presented in Model 2 on Table 2.

Table 1.
Descriptive Statistics for Variables Used in the Study (N=188) and Pearson Correlation Coefficients (columns 1-11)

	Variable	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Service Firm	0.45	0.50	1.00										
2	Mfg Firm	0.11	0.31	-0.31***	1.00									
3	Retail Firm	0.20	0.19	-0.45***	-0.17*	1.00								
4	Wholesale Firm	0.37	0.19	-0.18*	-0.07	-0.10	1.00							
5	Technology Firm	0.01	0.10	-0.09	-0.04	-0.05	-0.02	1.00						
6	Other Firm	0.20	0.40	-0.45***	-0.17*	-0.25***	-0.10	-0.05	1.00					
7	Business Longevity	5.03	1.86	-0.03	0.00	0.09	-0.00	-0.11	-0.02	1.00				
8	Revenues	3.73	1.83	-0.09	0.23***	-0.02	0.03	0.04	-0.08	0.26***	1.00			
9	IV- Ease of Use	2.49	0.94	-0.02	0.00	0.04	0.15*	-0.04	-0.08	0.06	-0.07	1.00		
10	MV Usefulness of Tech	2.76	1.15	0.05	-0.03	0.00	-0.05	-0.12	0.02	0.04	-0.12	0.41***	1.00	
11	DV Intention to Use Tech	3.19	1.84	-0.01	0.01	0.02	0.01	-0.12	0.01	0.04	-0.21***	0.27***	0.70***	1.00

*** Correlation is significant at the 0.001 level (2-tailed test)
** Correlation is significant at the 0.01 level (2-tailed test)
* Correlation is significant at the 0.05 level (2-tailed test)

Table 2
Models 1-4: DV= Intention to Use Technology
Model 5: DV= Usefulness of Technology

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Manufacturing Firm	0.38	0.33	0.46	0.47	-0.13
Retail Firm	0.10	0.06	0.17	0.18	-0.11
Wholesale Firm	0.17	-0.20	0.55	0.62	-0.73
Technology Firm	-1.76	-1.65	-0.41	-0.39	-1.13
Other Firm	0.04	0.10	0.08	0.07	0.03
Business Longevity	0.09	0.07	0.05	0.05	0.01
Revenues	-0.25**	-0.22**	-0.16**	-0.17**	-0.05
Ease of Use		0.49***		-0.08	0.51***
Usefulness of Technology			1.09***	1.11***	
Intention to Use Technology					

***p<0.001; **p<0.01; *p<.05 (all two-tailed tests). Service Firm was used as our comparison group

To test our second hypothesis, ***Perceived usefulness of a technology acts as a mediator in the relationship between perceived ease of use and intention to use a technology*****,** we followed Baron and Kenny's (1986) prescriptive account of mediation testing. For this mediation testing, we ran four independent regression analyses:

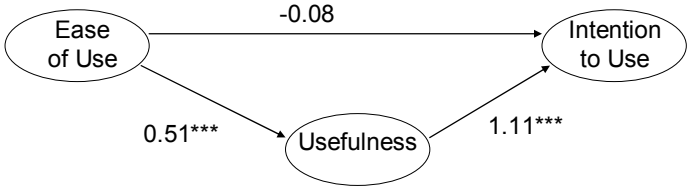
The independent variable should be significantly related to the dependent variable
The independent variable should be significantly related to the proposed mediating variable
The mediating variable should be significantly related to the dependent variable
The independently variable is not significantly different than 0 when the mediating variable is introduced as control in the relationship with the dependent variable

As a first step, and as performed in hypothesis 1, we determined if our independent variable, Ease of Use, was significantly related to our dependent variable, Intention to Use (Model 2 – Table A2). We did find a highly significant relationship.

Next, we determined that our proposed mediating variable, Perceived Usefulness of Technology, was significantly related to our independent variable Ease of Use (Model 5 – Table A2). For step three, we regressed the dependent variable, Intention to Use, onto the proposed mediating variable, Perceived Usefulness of Technology and found a highly significant relationship (Model 3 – Table A2). For the final step, we regressed the dependent variable on both the independent variable and the proposed mediating variable (see Model 4 – Table A2). When this model was tested, our independent variable, Ease of Use, dropped out of the equation and only Usefulness was significant with Intention to Use.

Having met the conditions set forth by Baron and Kenny (2006), we accept our second hypothesis and find that Perceived Usefulness of a Technology acts as a mediator in the relationship between Perceived Ease of Use and Intention to Use a technology. Our final model is presented in Figure 1.

Figure 1
Hypothesized Relationships of Constructs and Resulting Model



DISCUSSION AND IMPLICATIONS

In this research, we examined the consequences of the lack of broadband support available to small business owners in rural Appalachia. We concluded that rural small business owners must be given the tools they need to effectively compete in today's information society. Further, government, through the creation of economic incentives that offset the added expense of serving rural areas, is the ideal driver of such change. Of course, broadband support will not matter much if small business owners will not use it. A survey of rural Appalachia small business owners found that they would indeed embrace such technology as moderated by the overall usefulness of the technology. In other words, perceptions of ease of use of a technology would indeed increase the probability that rural small business owners would use new technology, but only if they perceived the technology to be useful.

This study makes several important contributions to both research literature and to future policy decisions. For decades, the Appalachia region of the United States has been described as under-researched and under-served (Federal Communications Commission, 2006; Pociask, 2005; Snowe, 2007). Our research works against this trend by informing both academics and policy decision-makers about the unique business and economic context that surrounds Appalachia. Although our research is exploratory and emerging, it appears that resources, alone, do not drive technology usage. This is important since many of the more recent technology policy decisions regarding Appalachia focus on either access or infrastructure (c.f. Federal Communications Commission, 2006). In particular, conventional policy is often crafted in a manner which suggests that by increasing computers, tying into optical fiber, and providing computing workshops, it is enough to spark technology usage and economic development in many rural parts of this nation (Rasiej & Sifry, 2007).

However, our results indicate that "policy selling" and careful attention to selling the benefits of this technology to these small business owners is equally, or maybe even more important than access and infrastructure. Specifically, small business owners and operators must be convinced and perceive that technology is easy to use and useful to create the best opportunity for actual usage and full business parity. Thus, significant government spending on optical fiber outlays may not garner the anticipated returns unless small business owners and operators see the ease and value associated with the technology.

Taken to its natural conclusion, this suggests the need for a marketing and public relations campaign to accompany hard investments such as the laying of optical fiber. Policy makers, from both elected officials and agency administrators, should understand the importance of shaping perceptions to reap the most out of agency and government technology spending. This enhances the effectiveness of tax leveraged dollars.

By building on our conceptual and empirical developments, future research could adopt a more fine-grained and nuanced approach to this phenomenon of technology use in Appalachia. For instance, it is conceivable that there is some path dependency to this phenomenon. In

particular, perceived value could lead to usefulness, which, in turn, contributes to ease of use. Also, moderating variables could be more fully explored: this research paper only investigated main effects. It is plausible that firm size could moderate the relationship between perceptions and actual use. Specifically, bounded rationality may weigh heavily on the smallest of business owners causing them to value ease of use over other technology characteristics. Interestingly, this perception may coincide with a lack of a precious small business resource-time. As discretionary times shrinks, small business owners may overvalue simplicity and ease of use over other variables. Related, role conflict and role overload may also stress the importance of ease of use over other technology attributes.

Regardless, Appalachia provides a unique sample and an even richer setting encompassing variables that oft-overlooked in other samples (i.e., publicly traded firms) and regions. So, in addition to exploring the potential of moderating and mediating variables, qualitative research that stresses fewer cases (or a smaller sample), but more variables may add to the contextual richness of small business research in underserved areas such as Appalachia.

There are limitations with this study, which we highlight here. First, the setting for this study consists of small to mid Appalachian firms. A more robust context in which to draw conclusions regarding this particular sample is to include other small businesses and maybe even larger firms outside our limited boundary conditions for a comparative analysis. It could be that the hypotheses supported here apply to all firms-not just those found in Appalachia. For that reason, the issue of external validity and generalizability may be questioned. Second, this study, like many others, suffers from common method bias. We only use one method, a self-report instrument, to draw our conclusions. As it pertains to convergent validity, it would be interesting and important to distinguish if other methods would result in similar conclusions. Third, our study is cross-sectional as opposed to longitudinal. Without the time lag, the confidence we place on the basic inference of causality is suspect. Specifically, causality could be reversed or opposite than what we predict; actual use could actually cause or influence perceptions regarding value, ease, and usability. Alternatively, causality could be plausibly explained by a non-recursive model. For instance, just as the perceptions and intentions may influence small business technology use, small business technology use could simultaneously cause and reinforce perceptions and intentions. Use of structural equation modeling to test this type of non-recursive model could inform this issue (Bollen & Lennox, 1991).

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MENTOR FUNCTIONS FOR NOVICE ENTREPRENEURS

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ABSTRACT

In the past few years, we have witnessed the birth of new mentoring programs, which consist in twining a novice entrepreneur with an experienced entrepreneur (also known as business mentoring). The literature on mentoring in large organization (where the protégé is an employee in the hierarchy) highlights that the mentor exerts three main categories of functions: psychological, career-related, and role model. This research aims to explore and to validate mentor functions for novice entrepreneurs. At first, a qualitative analysis based on focus groups including 51 mentees and 8 mentors was carried out. The theoretical proposal was then validated by a group of three experts in business mentoring. Finally, confirmatory factor analyses using LISREL were carried out on a sample of 360 mentees taking part in the mentoring program of the Fondation de l'entrepreneurship *network, an organization which has twined more than 3500 novice entrepreneurs since the year 2000. The analyses confirm four psychological functions (reflector, reassurance, motivation, and confidant), four entrepreneurial career-related functions (integration, information support, confrontation, and guide) and a role model function. These results are useful to raise the awareness of volunteer mentors about functions they may likely exert when they are twined with novice entrepreneurs.*

INTRODUCTION

For the past few years, we have implemented programs to support novice entrepreneurs in the years following the starting of their business. One of the processes proposed involves pairing up a novice entrepreneur with an experienced entrepreneur, who provides advice and ways of thinking to help the novice avoid costly and even fatal mistakes (St-Jean et Audet, *Under press;* Sullivan, 2000). For example, the American SCORE[1] program, founded in the seventies and funded by Small Business Administration (SBA), supported more than eight million small business managers through its network of over 12,000 volunteer mentors. In Europe, other similar initiatives exist such as that supported by the Business Link in England, the *Mentor Eget Företag* program in Sweden or France Initiative (in France), with nearly 5,000 volunteer mentors, to name just a few of these programs. Some studies suggest that novice entrepreneurs may benefit from many types of different outcomes, including cognitive learning (new knowledge and skills, improved business vision and opportunity recognition), affective learning (reduced solitude, improved self-efficacy and self-image), new contacts, and even

changes in the SME (increased sales or improved profitability) (Bisk, 2002; Nandram, 2003; St-Jean, 2008; Wikholm *et al.*, 2005). Although outcomes for the novice entrepreneur are better known, mentor roles helping their development are practically unknown to this day.

Yet, scientific literature on mentoring in other contexts has explored mentor roles on numerous occasions, particularly in large organizations where an employee identified as having potential (protégé[2]) is matched with another in a hierarchical position (mentor). These mentor functions even constitute a measure of the mentoring received by the protégé. The present study will attempt to bridge this gap by documenting mentor functions in entrepreneurs within the context of the business mentoring network of the *Fondation de l'entrepreneurship.* To do so, a review of the scientific literature used to define the concept will first be presented. Since this literature has not offered enough details on the study's subject, an exploratory analysis was necessary and will then be exposed. Subsequently, the entire confirmatory study, which proves the empirical validity of mentor functions, will be presented. Finally, results will be discussed as well as avenues for future research.

LITERATURE REVIEW

Mentor functions in large organizations

Kram (1985) suggests that mentors plays two main functions towards the protégé: a career-related function and a psychological function. The first one includes everything touching on career advancement such as sponsorship, publicising/visibility, coaching, protection, and challenge setting. The psychological function includes elements linked to the development of a sense of competency and self-confidence such as role model, acceptance/confirmation, advice giving, and friendship. Many studies have used these function with much success (see for example Noe (1988) or Allen and Eby (2004)). They have been tested more than once and the invariance of these factors between male and female groups has been demonstrated, which confirms that the two-main-function mentor function model posses the same significance for both sexes (Tepper *et al.*, 1996). Also based on Kram's work (1985), Scandura (1992) conducted an exploratory factorial analysis and observed that the role model item in Kram's psychological function is a distinct function from the psychological or career-related function. Other studies confirm the distinct nature of the role model function and propose three main mentor functions (see for example Scandura and Ragins (1993), Scandura and Williams (2001), Pellegrini and Scandura (2005), or Bouquillon *et al.* (2005)).

However, subsequent studies based on Kram's work are all deductive in nature. Yet, in cases where an inductive approach is used, results differ. For example, when Levesque *et al.* (2005) question protégés about functions and ask them to rank mentor behaviours according to their perceived importance, protégés consider informational support as a very important mentor behaviour, whereas Kram's functions (1985) ignore this aspect. Still using an inductive

approach, Fowler (2002) obtains seven functions identified by the protégé which are different form Kram's functions. And when mentors are questioned, eight functions are identified. This suggests the need to reassess these functions inductively since, as suggested by the author, context may change with time.

Indisputably, functions identified in entrepreneur mentoring are distinct from those identified in large organizations, since mentees manage their own business (as opposed to being employees) and that mentors have no hierarchal position above them. Moreover, the entrepreneur's role as a business leader and manager significantly changes stakes involved and pushes the mentor to exercise particular functions. To our knowledge, the study by Waters *et al.* (2000) is the only one where the tool used to measure entrepreneur mentor functions was tested empirically. However, the context of the study largely influences the tool's development. Beyond the fact that mentors in their study could play a larger coaching role, which act as a guide in the protégé's business plan implementation, we notice that items selected to develop the construct are based on the very program elements in which the relationships are observed, for example: giving technical and marketing assistance, or financial and legal advice. It is therefore difficult to use these results as a basis for other mentoring systems. It does suggest first using an exploratory and inductive approach before testing a function measuring tool.

The purpose of this part is to answer the following research question: What are the different entrepreneur mentor functions? To answer this question we referred to testimonies from participants in the mentoring program of the *Fondation de l'entrepreneurship*. Before presenting the method used, we will first introduce the studied program, that is, the *Fondation de l'entrepreneurship*'s mentoring network.

The program

In the late 1990's, the *Fondation de l'entrepreneurship*, an organization dedicated to the development and promotion of entrepreneurial culture in the province of Québec (Canada), implemented a support program for novice entrepreneurs. Services are offered throughout the province through various economic development organizations such as *Centres locaux de développement* (CLD), *Sociétés d'aide au développement des collectivités* (SADC), and local chambers of commerce. These organizations see to the development of the program at the local or regional level, while following the mentoring support model developed by the *Fondation*. Specifically, local cell coordinators are responsible for recruiting mentors, organizing mentor training sessions, promoting the program to novice entrepreneurs, pairing participants, and supervising the ensuing relationship. Novice entrepreneurs can enjoy the benefits of mentor support at minimal cost, typically a mere few hundred dollars per year, and sometimes even for free. To guide local development, the *Fondation de l'entrepreneurship* has developed specialised workshops on the mentor-mentee relationship in order to shed light on the specific role mentors must play for the novice entrepreneurs. Based on an intervention code of ethics where

relationship confidentiality is of primary importance, the business mentoring service also implemented a model contract to govern and guide parties in choosing the terms of their relationships and setting objectives. According to the *Fondation's* own estimates, by 2008 more than 2,800 entrepreneurs had benefited from the support of one of the 1,100 program accredited mentors. The present study uses the business mentoring program as its background which is therefore an example of a formal type of mentoring.

One must also note that novice entrepreneurs are not obligated to use the service, as is sometimes the case in exchange for securing a loan. They come of their own accord and out of self-interest. All mentors in the program are volunteers. Their main goal is to help the development of new entrepreneurs, a way for them to give back what they may have received themselves, informally perhaps. Although some mentors possess certain specialised skills, they are not recruited for their technical abilities. First and foremost, they must demonstrate their ability to listen and help the mentee find their own answers. It is a system based on novice entrepreneur learning, a means to help them "make sense" of their own experience.

METHODOLOGY

Sample used

Mentor functions were explored in 2005 and 2007 through mentor and mentee discussion groups. First in 2005, data was collected during discussion groups organized to evaluate the *Fondation* mentoring program. A specialised firm had been given the mandate of organizing these meetings and 40 novice entrepreneurs participated. Then, two discussion groups, for a total of 11 mentees, were set up: One in Montréal, and the other in Québec City. Participants were randomly selected from a list of over 1,000 *Fondation de l'entrepreneurship* mentoring program participants. During the meeting, participants were asked to discuss, among other things, the various roles (i.e. functions) played by their mentor throughout their relationship. Also, a mentor discussion group which included five men and three women (eight participants in all), all of which had been in business before, were mobilized to avoid a bias that would occur should only the point of view of the mentees be considered.

Analytical method

The analysis consisted in inductively determining as many distinct functions as presented, and proposing items for a subsequent measure, while ensuring that they are in accordance with the collected statements from the mentees as well as the mentors. Once this exercise completed the proposal was submitted to an academic expert for comments. Some changes were made. The modified proposal was then submitted to a group of mentoring experts made up of the assistant director of the business mentoring service at the *Fondation de l'entrepreneurship*, a retired

university professor specialised in education and entrepreneurship and mentor in the program, and finally a consultant and trainer to the *Fondation* mentors and a mentor as well in the program. None of these experts had participated in the discussion groups. The expert first received a list of mentor functions with a short definition for each, as well as the list of items used to measure them in random order. They were asked to sort items according to mentor functions and return the form. The correct theoretical proposal was then sent to them for comments regarding item definition, the addition or removal of functions, and so on. This method aims to improve content validity and is greatly based on different methods identified in works by Hinkin (1998). The possibility that experts may comment on the nature of the functions seemed an interesting opportunity since two of the three were mentors themselves and quite aware of the roles they play. Results present four psychological functions, four career-related functions and one role modelling function.

Psychological Functions

Reflector

The mentor gives the mentee feedback on who he is and his business project. The mentor reflects the image the mentee projects to others, somewhat like a mirror does. This function provides the mentee with a kind of personal progress report where strengths to be bank on and weaknesses to be worked on are identified.

Reassurance

The mentor reassures the mentee during difficult times. He acts as a pressure valve enabling the mentee to evacuate accumulated stress and put problems into perspective.

Motivation

The mentor motivates and encourages the mentee. The mentor helps the mentee build self confidence and gives him incentives to persevere.

Confidant

With time, the mentee may confide in the mentor just as he would in a friend. The mentoring relationship may also transform into friendship.

Career-Related Functions

Integration

The mentor facilitates the integration of the mentee in the business community by presenting him to business contacts who may be of need in the future.

Information support

The mentor gives the mentee information. He transfers various types of personal knowledge including on business management, laws to be aware of, useful information on the industry, and so on.

Confrontation

The mentor confronts the mentee's ideas to help further his reflection. This confrontation appears in a problem-solving context where the mentee's beliefs, attitudes, or habits prevent him form reaching his goals and makes him part of the problem rather than the solution.

Guide

When problem solving, the mentor helps the mentee improve problem comprehension, widen problem vision and context. When necessary, the mentor also makes suggestions and gives advice towards a solution.

Role model function

Model

The role model function focuses on the mentor as a person. During meetings, the mentor presents excerpts from his life and the mentee takes what applies to him and learns the lessons that need to be learned according to his particular situation. The mentor may also be a source of inspiration, or at least, of comparison.

Once the proposal based on an inductive approach was elaborated, we tested it deductively.

DEDUCTIVE FRAMEWORK AND VALIDATION OF MENTOR FUNCTIONS

Methodology

Population and sampling

The population used for this study are the mentored entrepreneurs from the business mentoring network of the *Fondation de l'entrepreneurship*, more precisely those registered on the list prepared by the *Fondation* at the end of April 2008. The *Fondation*'s mentoring team was in charge of collecting an email address for each mentee on the list, which represented a total of 1,545 novice entrepreneurs. An online questionnaire was sent to each mentee currently in a mentoring relationship and those whose mentoring relationship had ended, in which case the mentoring relationship had to had lasted at least three meetings. Two reminders were sent to non-respondents. In the end, 158 entrepreneurs indicated not having received enough mentoring to be eligible, 388 email addresses proved false or abandoned and 18 indicated an error on the list. In all, out of 981 valid email addresses, 362 completed the questionnaire which represents a response rate of 36.9%, with a margin of error of 4.4%, 19 times out of 20. We tested non-respondent bias by following Armstrong and Overton's (1977) procedure and no demographic or other variables of interest were significantly different between early and late respondents which leads us to accept the sample's representativeness.

Mentee characteristics from the sample are as follows. The mentee sample contained 165 men (51.6%) and 152 women (48.4%), which represents nearly a perfect men/women split. These novice entrepreneurs were paired with 275 male mentors (81.4%) and only 63 female mentors (18.6%). This situation should be considered "normal" if one considers the higher representation of men among available mentors. Let us also note that most mentors are career entrepreneurs (47.9%) but a strong proportion have been (or still are) managers in private businesses (34.3%). A few have served as civil servants (6.8%) and some mentees did not know their mentor's career (10.9%). At the time of pairing, some mentors were still active (40.8%) while a majority were retired (57.4%). The vast majority (79.6%) of mentors were not involved in the same industry as their mentee, in accordance with guidelines suggested by the network's leaders. This avoids potential conflicts of interest and ensures the mentor remains a generalist rather than becoming a technical specialist.

Mean age of mentees is 39.81 years (standard deviation = 8.97, median=38 years old) and ranged from 23 to 70 years of age. Mentees are quite educated as 55% of them possessed at least one university degree. Nearly all mentees had an active business at the time of pairing (293 out of 314, 93.3%) and the rest were in the process of starting their business. Mentee businesses had few employees, with a mean of 4.48 (standard deviation of 9.69, median of 2). Yearly business turnover was largely under $100,000 (62.8%), 88.9% had a yearly turnover below $500,000, and only 8.6% generated more than $1M a year. Gross profits, including wages and management

bonuses, are just as bleak. The vast majority (68.1%) declared yearly profits under $25,000, 83.5% made less than $50,000, and only 6.3% made more than $100,000. Industrial sectors are varied with a slight concentration in professional services (23.0%), manufacturing (14.4%), and retailing (11.9%). Mentoring relationships last on average 16.06 months (standard deviation: 14.4, median: 13), meetings with the mentor lasted on average 68.52 minutes (standard deviation: 14.4, mean: 67), and meetings occurred a little under once a month with the mean being once a month.

Method

To correctly check the tool's validity, it is essential to consider the unidimensionality of each mentor sub function. A group of items must not refer to only one construct in order to be considered valid (Hattie, 1985). To that effect, literature suggests that a confirmatory factorial analysis is a method superior to others to evaluate construct unidimensionality (Gerbing et Anderson, 1988). It is also suggested that coefficients of internal consistency by divulged during creation or use of latent variables (Shook *et al.*, 2004; Slater et Atuahene-Gima, 2004). Consequently, a confirmatory factorial analysis as well as internal consistency analyses will be conducted.

To ensure measuring instrument reliability, it is suggested to use the "test-retest" and the parallel-forms method (Drucker-Godard *et al.*, 2003). The former consists in conducting the test twice with the same sample on two different occasions. The latter consists in administering two different tests to the same sample of individuals, with the second test being different from the first but supposed to measure the same phenomenon. As opposed to the "test-retest" method, the parallel-forms method reduces the memory effect. For this study, 173 respondents completed the questionnaire's first version, where all of the 35 items representing 9 sub functions were presented in random order, as well as the second version where the 9 sub functions were defined and items sorted accordingly. It is thus not an exact application of the test-retest method since some modifications were brought to the questionnaire's presentation, but it may be considered similar. It is neither an application of the parallel-forms method since the same items were administered, even though their order was different. In sum, it represents an alternative path. Nevertheless, to help judge the tool's reliability, we will present correlations between each sub function answered initially and reused by respondents later. Let us note that the elapsed time between the administration of the initial and revised questionnaire may vary from one respondent to another. Some may have completed the revised questionnaire as early as the next day while others may have been asked more than six (6) weeks later. For software reasons[3], this delay was impossible to measure.

Finally, to ensure construct validity, respondents were asked to indicate the number of persons the mentor introduced them to. The integration function, which consists in verifying the extent to which the mentor played his role by introducing the mentee to other people, should

correlate strongly with the number of persons effectively introduced. This analysis will thus also be conducted. Moreover, it may be considered that mentors having themselves been entrepreneurs may further deploy the role model function. This verification will also be presented. For each function, a confirmatory factorial analysis was conducted with the LISREL software. Since variables used are categorised but ordered (on a seven-point Likert-type scales), it was necessary to use the PRELIS software since it makes it possible to calculate a polychoric correlation matrix. This matrix is judged superior to others to reduce estimation bias, especially since it is not sensitive to the form the marginal distribution takes (Jöreskog et Sörbom, 2002; Tabachnick et Fidell, 2007). Structural equations were built with this type of matrix. As mentioned above, non respondents to at least one item were removed from the analysis, which improved matrix quality (Jöreskog et Sörbom, 2002). In all, 159 respondents were thus used for the analysis. For other analyses, Pearson correlations were calculated.

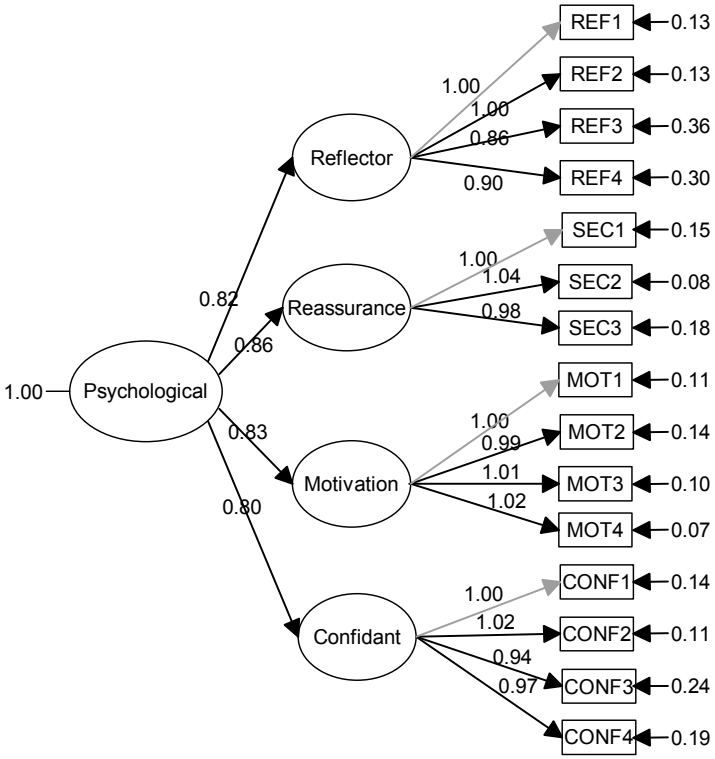
RESULTS

Psychological Functions

The inductive analysis conducted with the discussion groups revealed that psychological functions seemed to correspond to four sub functions: reflector (4 suggested items), reassurance (3 suggested items), motivation (4 suggested items), and confidant (4 suggested items). Table 1 presents arithmetic means, standard deviations, and correlations between the various items of the psychological functions. The model was tested so as to ensure that the psychological function be reflected in the four sub functions which in turn are reflected in the items created in the previous section (see Figure 1). All relationships between manifest and latent variables are significant with $p \leq 0.01$. We notice that most coefficients of error for manifest variables are low, the majority of which are not significant ($p \leq 0.05$).

In the proposed model, χ^2 equals 151.71 for 86 degrees of freedom ($p \leq 0.0000$), RMSEA equals 0.06954, SRMR equals 0.03978, and CFI equals 0.9919. The model is judged quite acceptable and no modifications were required. Analysis of the Cronbach's alpha (α) revealed a result of 0.889 for the reflector function, 0.916 for the reassurance function, 0.953 for the motivation function, and 0.931 for the confidant function. Results for the first questionnaire (items in random order) and second questionnaire (items sorted by sub function) were compared to measure reliability. For this analysis, scores for latent measures were first calculated and then correlated with scores from the other questionnaire (random and sorted). As illustrated in **Table 2**, correlation between the measures for constructs for both questionnaires are very high and all significant with $p \leq 0.001$. This confirms that measures for mentor psychological functions are reliable since, notwithstanding modifications to the questionnaire and time elapsed between both answers, constructs are still strongly correlated.

Figure 1. Results for confirmatory factorial analysis of psychological functions



Career-related functions

The inductive analysis conducted with the discussion groups revealed that career-related functions can be divided into four sub functions: integration function (4 suggested items), information support function (4 suggested items), confrontation function (4 suggested items), and guide function (4 suggested items). **Table 3** presents arithmetic means, standard deviations and correlations between the various items of career-related functions. The model was tested so as to ensure that the career-related function be reflected in the four sub functions which in turn are reflected in the items created in the previous section (see *Figure 2*). All relationships between manifest and latent variables are significant ($p \leq 0.01$). We also notice that most coefficients of error for manifest variables are low, the majority or which are not significant ($p \leq 0.05$). Model fit indices are as follows. a χ^2 of 141.20 for 100 degrees of freedom ($p \leq 0.0042$), RMSEA of 0.05107, SRMR of 0.06053, and CFI of 0.9952. As for psychological functions, the proposed model is judged quite acceptable and no modifications were required. Cronbach's alpha (α) for the integration function equals 0.948, information support obtained 0.899, confrontation obtained 0.882, and the guide function obtained 0.925. Again, it is possible to conclude that results for these measures surpass acceptable norms and

confirm construct validity for career-related functions, both for internal consistency and the factors composing it.

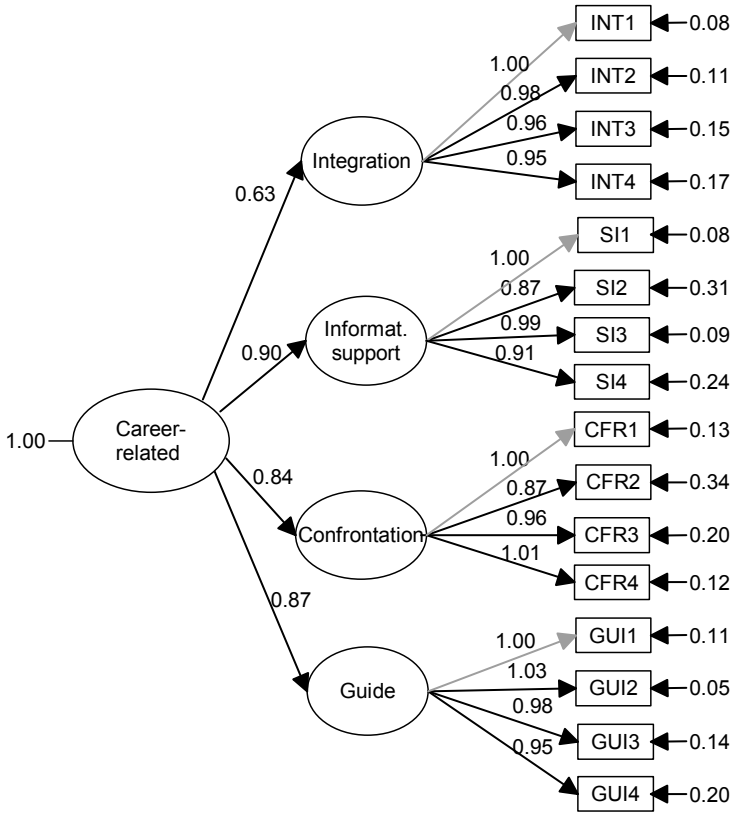
Table 1.Arithmetic means, standard deviations, and correlations between items of psychological functions																
Variable	**AM**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1-REF1	5.38	1.49														
2-REF2	5.39	1.49	.88													
3-REF3	5.08	1.32	.76	.74												
4-REF4	5.73	1.43	.76	.78	.67											
5-REA1	5.02	1.58	.66	.66	.57	.66										
6-REA2	5.21	1.58	.71	.69	.62	.68	.90									
7-REA3	5.57	1.45	.74	.73	.62	.77	.82	.86								
8-MOT2	5.83	1.36	.74	.70	.60	.69	.70	.79	.80							
9-MOT1	5.98	1.38	.71	.70	.64	.62	.69	.74	.72	.84						
10-MOT3	5.98	1.38	.74	.69	.56	.71	.73	.75	.78	.92	.87					
11-MOT4	6.05	1.29	.72	.68	.57	.62	.64	.70	.70	.89	.94	.91				
12-CONF2	5.23	1.70	.59	.68	.60	.63	.73	.72	.74	.67	.67	.64	.63			
13-CONF3	4.74	1.82	.54	.60	.59	.50	.64	.69	.61	.60	.64	.55	.58	.82		
14-CONF1	5.33	1.69	.60	.69	.57	.64	.73	.70	.73	.63	.71	.63	.67	.89	.77	
15-CONF4	5.09	1.80	.58	.61	.63	.57	.68	.71	.69	.63	.62	.62	.62	.83	.85	.83

Table 2. Correlation between psychological functions of first and second questionnaire	
Reflector Function	0.736***
Reassurance Function	0.711***
Motivation Function	0.649***
Confidant Function	0.801***
* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$	

Results from the first and improved questionnaire were compared to check for measure reliability. The same method was used as with the psychological functions. As illustrated in **Table 4**, correlations between the construct measures for both questionnaires are very high and all significant with $p \leq 0.001$. This confirms that measures for mentor career-related functions

are reliable since, notwithstanding modifications to the questionnaire and time elapsed between both answers, constructs are still strongly correlated.

***Figure 2*. Results for confirmatory factorial analysis of career-related functions**



We may consider the hypothesis that a mentor exercising a strong integration function would introduce the mentee to a large number of people and inversely. In consequence, we may check construct validity by analysing the correlation between career-related functions and the number of persons introduced to the mentee. On average, mentees declared having been introduced to 3.44 persons by their mentor (standard deviation of 3.47). As illustrated in **Table 5**, the integration function is the function most strongly correlated to the number of persons introduced, which confirms the construct's validity.

Table 3. Arithmetic means, standard deviations, and correlations between items of career-related functions																	
Variable	**AM**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1-INT1	4.36	1.90															
2-INT2	4.00	1.87	.92														
3-INT3	4.80	1.85	.87	.86													
4-INT4	4.68	1.83	.88	.83	.87												
5-IS4	5.43	1.57	.61	.58	.70	.59											
6-IS3	5.94	1.37	.60	.55	.71	.65	.82										
7-IS2	5.05	1.72	.51	.51	.64	.52	.81	.77									
8-IS1	5.88	1.46	.56	.55	.68	.61	.82	.92	.79								
9-CFR1	5.44	1.39	.45	.47	.58	.44	.73	.76	.64	.78							
10-CFR3	5.26	1.48	.41	.40	.49	.37	.64	.72	.59	.72	.84						
11-CFR4	5.24	1.55	.38	.38	.52	.37	.66	.75	.64	.74	.86	.85					
12-CFR2	5.50	1.53	.29	.29	.39	.28	.57	.63	.54	.68	.76	.69	.79				
13-GUI1	5.60	1.36	.52	.53	.67	.53	.74	.77	.73	.76	.75	.67	.74	.63			
14-GUI2	5.78	1.26	.47	.51	.63	.53	.73	.78	.69	.78	.79	.67	.77	.67	.93		
15-GUI4	5.61	1.34	.46	.48	.57	.47	.78	.76	.68	.78	.78	.71	.75	.63	.87	.86	
16-GUI3	5.79	1.23	.56	.54	.66	.56	.74	.79	.69	.78	.77	.71	.78	.59	.84	.92	.82

Table 4. Correlations between career-related functions of first and second questionnaire	
Integration Function	0.772***
Information Support Function	0.731***
Confrontation Function	0.706***
Guide Function	0.702***
* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$	

Table 5. Correlation between career-related functions and the numbers of persons introduced to the mentee by the mentor	
Integration Function	0.536***
Information Support Function	0.232***
Confrontation Function	0.134*
Guide Function	0.161**
* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$	

Role model function

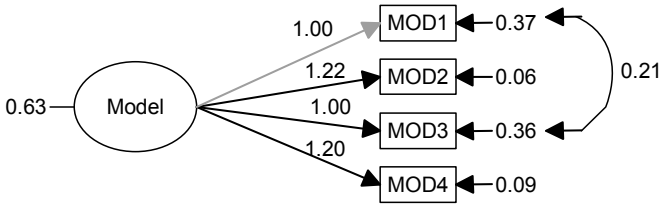
The inductive part of the study suggested 4 items for the role model function. **Table 6** presents arithmetic means, standard deviations and correlations for items of this function.

Table 6. Arithmetic means, standard deviations, and correlations between items of the role model function

Variable	AM	SD	1	2	3
1-MOD1	5.04	1.66			
2-MOD2	5.36	1.69	.77		
3-MOD3	5.41	1.69	.85	.78	
4-MOD4	5.74	1.52	.76	.93	.76

The initial model tested suggested to let correlate errors of measures between MOD1 and MOD3, which was done. Fit indices for the model indicate a χ^2 of 0.3098 for 1 degree of freedom ($p \leq 0.5778$), RMSEA of 0.00, SRMR of 0.002758, and CFI of 1.000. With this modification, the model may be considered quite acceptable. Finally, let us note that Cronbach's alpha is of 0.894, which is also quite acceptable. Like in previous models, it is possible to conclude that results for these measures surpass acceptable norms and confirm construct accuracy for the role model function, regarding both its internal consistency and items that compose it.

***Figure 3*. Results for the final confirmatory factorial analysis of the role model function**



Also, supposing that this model adequately measures this dimension, mentees having been paired with entrepreneur mentors should show increased results. In fact, the role model function includes the following items: 1-He is my role model, 2-He presents his successes and failures to me, 3-He is a good example of an entrepreneur, and 4-He shares his business and life experience with me. Let us note that item 3 directly concerns the mentor's career. Consequently, those having been in business should obtain a better score in their mentee's answers for this item, as opposed to those having been employed as civil servants or managers in a large enterprise. To

add validity to previous analyses, the difference between mentor function results were calculated between mentees with mentors having been in business (n=130) and those who have not (n=139). As shown below, only the role model function is significantly different for both groups of mentors (see **Table 7**). These results suggest that the role model function does indeed measure the intended dimension.

Table 7. Comparison of mentor functions according to mentor career.

Function	Mean for "entrepreneur" mentor	Mean for "other career" mentor	Test *t* (*sig*. 2-*tailed*)
Reflector Function	5.41	5.38	0.858
Reassurance Function	5.34	5.19	0.394
Motivation Function	6.01	5.91	0.515
Confidant Function	5.13	5.05	0.677
Integration Function	4.57	4.34	0.289
Information Support Function	5.49	5.68	0.253
Confrontation Function	5.46	5.26	0.194
Guide Function	5.74	5.67	0.582
Role Model Function	**5.67**	**5.15**	**0.003****

* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

DISCUSSION AND CONCLUSION

The analysis describe above has made it possible to demonstrate the soundness of the theoretical constructs proposed in the inductive part of this study, that is the fact that entrepreneur mentors exercise nine different functions. Four of these functions may be grouped together in the psychological functions category, four others compose the career-related functions category, and the last constitutes the role model function. Although it is sometimes difficult to definitely determine the validity of a new proposed tool, the results obtained lead us to believe that mentor functions possess sufficient scientific validity. Although the nature of the nine functions is based on the inductive analysis of discussion groups, the categories were inspired first by works by Kram (1985), who proposed grouping psychological functions and career-related function and his followers who empirically demonstrated that the role model function was distinct from the previous two (Pellegrini et Scandura, 2005; Scandura, 1992; Scandura et Ragins, 1993). We now know that these categories are adequate and relevant to other contexts, including that of entrepreneur mentoring.

The exploration of entrepreneur mentor functions has been conducted in the past (Waters *et al.*, 2000), but their analysis was certainly not complete. Firstly, the program studied by the above-mentioned authors resembled coaching more than mentoring and solicited specialists (the

"mentors") who had the mandate of supervising the implementation of the novice entrepreneur's business plan by giving advice on marketing, finance, legal, or business issues. Secondly, studies on organizational mentoring sometimes refer to three functions (for example Scandura and Williams (2001)), one of which is the role model function. Surprisingly, none of the items selected by Waters *et al.* (2000) contain this function. It is all the more surprising since even authors who recognise functions similar to Waters *et al.,* base their work on Kram (1985), who clearly describes the role model function played by mentors. This aspect is the object of a larger consensus in scientist in the field of organizational mentoring (Wanberg *et al.*, 2003). Despite the "theoretical" possibility that a mentor who is an entrepreneur acts as a role model for a young entrepreneur, the tool developed by Waters *et al.* totally ignores this important aspect of mentor functions. Results of the mentor function analysis confirm the importance of including the role model function, which in turn demonstrates the limits of the tool proposed by Waters *et al.* (2000) and the relevance of the proposed new tool. It has also been possible to show that items with the best empirical results could very well represent a discretionary model of mentor functions, which could be useful, for example, to measure the comprehensive level of the functions played by the mentor and received by the mentee. Of course, by removing many items from the initial models, each retained item is then less effective in measuring mentor functions as a whole. However, where a discretionary model would be considered useful or necessary, it can be considered as an acceptable proposal.

In regards to the possibility of generalising the tool's use to include other mentoring programs, it is possible to believe that the proposed tool may be adapted to different contexts and not only reserved for the *Fondation de l'entrepreneurship*'s. mentoring network. One must first remember that the *Fondation*'s mentoring network is decentralised in nature. Coordinators have a fair amount of freedom in choosing mentors, dyads, and so forth. If some coordinators share the *Fondation*'s belief that mentors should not give advice and not be management specialists, others pair mentees with mentors who are specialists in a management discipline where the mentee has weaknesses and wishes to improve. This decentralized structure generates wider variety in the directives given to the mentors and less restrictive practices than if all coordinators were employees of the *Fondation.* Knowing that the network represents a diversity of mentors and types of intervention, the spread and variety of mentor functions may have greater diversity. Consequently, the nature of the functions proposed is not implicitly linked to the context of the mentoring program. For example, items of the career-related function do not directly refer to a precise intervention. None of the items mention help with marketing or financial problems. It is rather presented as a guide function, which suggests new options, proposes a different point of view, gives advice concerning problems faced, and helps to clarify the problem. This function could by applied to a variety of contexts, even to managers in a large organization. It is also the case for other career-related functions, as well as psychological functions. In sum, even though the tool is based on the mentoring network of the *Fondation de l'entrepreneurship,* the

possibility of generalizing it to other existing operations remains strong, but still requires validation.

Although the analysis of the nomological network was conducted only partially, in particular by using a method similar to the test-retest method and by verifying the relationship between the integration function and the number of persons introduced to the mentee by the mentor, it is possible that the tool was influenced by other similar concepts. In fact, we noticed that the number of persons introduced also significantly correlated to other career-related functions, even though the correlation was not as strong as with the integration function. This highlights the role played by the mentor as intermediary helping the mentee's integration into the business community. This situation suggests other specific analyses to prove the nomological network of proposed concepts, which in turn open the door to future research. However, it is important to note that the concept of mentor functions has attracted much attention from scientists in the context of mentoring in large organizations and has consequently reinforced the possibility that these constructs correspond to a certain reality observed in entrepreneur mentoring. Also, one may note that the role model function is significantly different when the mentor is an entrepreneur from when he is not. These results give credit to the nomological network, although only partially, and lead us to believe that the mentor functions are quite valid. It is also important to note that even though most construct coefficients of error are not significant, some are and indicate certain weaknesses in item formulation, for example, imprecision regarding the measured concepts. Of course, these weaknesses remain minor since results for fit indices demonstrate the quality of the constructs as a whole. However, for future research, these avenues for tool adjustments may be considered and lead to the refinement of mentor function measures. In particular, new items could be proposed for a discretionary model of mentor functions. In fact, those used for the analysis were developed in a "multi-item" perspective and their formulation could certainly be improved. In spite of these limits, the analyses have furthered knowledge in this field of study. For example, the tool developed may be used to consider the role of certain mentee psychological variables in response to mentor functions, as can the impact of mentor functions on the development of certain mentee outcomes. These analyses constitute avenues for future research.

AUTHOR'S NOTE

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ENDNOTES

[1.] Acronym for Service Corps of Retired Executives. Information at www.score.org.

[2.] The term "protégé" appears in literature pertaining to mentoring in large organizations and refers to sponsorship mentoring. Concerning entrepreneur mentoring, the term "mentee" is most commonly used. This term is preferred by entrepreneurs as it does not evoke the need for protection implied by the term "protégé". Therefore, "mentee" will be used when referring to entrepreneur mentoring.

[3.] The www.surveymonkey.com software does not permit links between the same respondent having been solicited for two different questionnaires. Answers were linked manually, unfortunately it was not possible to calculate dates of completion.

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EXPLORING AGENCY DYNAMICS OF CROWDFUNDING IN START-UP CAPITAL FINANCING

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ABSTRACT

In the last decade venture capital markets around the world have experienced growth both in terms of capital under management and the number of venture capital firms providing finance. Despite this there is growing evidence that a 'funding gap' exists at the earliest stages of new firm development. This paper provides an initial investigation into crowdfunding, identifying how it may be appropriately adopted within the start-up equity-financing context so as to contribute to the aggregated pool of capital available to new (pre-commercial) ventures. An agency theoretical perspective is adopted to investigate the necessary agency-cost control mechanisms unique to emerging crowdfunding models. Given the relational character of the investment process, the venture capitalist's perceptions of agency dynamics in the investor-investee relationship provide an appropriate lens for analysing the likely acceptance of crowdfunding in start-up financing. Data are drawn using a qualitative methodology (convergent interviews) with Australian venture capitalists that provide early stage financing. A total of 11 venture capitalists were interviewed before convergence of common themes was reached. Results suggest that agency dynamics in crowdfunding models in start-up financing comprise a combination of investor specific factors, and ex-ante and ex-post investment factors.

INTRODUCTION

The venture capital industry is a key stakeholder in the market for providing equity finance for new business ventures (Cumming 2006). The provision of equity financing is necessary for new start-up ventures to form, operate and develop their relative contribution to the business innovation process (Cassar 2004). Over the last decade, the market for venture capital in Australia and throughout the world has experienced rapid growth both in terms of capital under management and the number of venture capital firms providing finance (Bivell 2008). Whilst this growth has been substantial, there is growing evidence that the focus and interest of venture capital is moving beyond early stage innovative start-up firms to later-stage investments (Bivell 2008; Osnabrugge 2000). This shift in focus has created a significant 'funding gap' for early stage start-up ventures and has renewed both academic and practitioner interest in possible

methods of promoting the aggregated pool of available capital to early stage start-up enterprises that are pre-revenue and yet to reach commercialisation stages (Cassar 2004; Cumming 2007).

Crowdfunding is an emerging online trend representing a new potential pool of capital as a source of start-up equity financing. A central tenant of crowdfunding is that the crowd funds what the crowd wants. In this context the crowd represents members of online virtual communities and users of social media and social networking sites (SNS). Crowdfunding is derived from another social media phenomenon termed crowdsourcing. Crowdsourcing is defined as the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call (Howe 2006; 2009). Although crowdsourcing (and thus crowdfunding) has not been the subject of prior academic research, previous research in the information technology literature has investigated the development of open source software and distributed computing (Anne and Anurag 2005; Hippel 2001) and the increasing popularity of online virtual communities and SNS (Boyd and Ellison 2008; de Souza and Preece 2004; Ellison et al. 2007; Gerard et al. 2004; Jenny and Diane 2005; Utz 2009). Overall, prior research suggests that SNS may provide access to embedded resources within the online community (Boyd and Ellison 2008) and may actually facilitate in bridging current social capital limitations (Ellison et al. 2007; Utz 2009).

Within the context of start-up capital, there is some suggestion that social networking methods may provide a solution to early stage equity financing gaps resulting from market failure (Shane and Cable 2002; Shane and Stuart 2002; Zhang and Wong 2008). Therefore, crowdfunding, as a vehicle for accessing resources embedded within online social networks, may provide access to a new source of capitalisation for entrepreneurs. We define crowdfunding in the venture capital context as a source of start-up equity capital pooled via small contributions from supporting individuals collaborating through social media. However, to date, the factors influencing crowdfunding adoption in the venture capitalist industry have not been examined. Moreover, venture capitalist perceptions of this equity-financing model have not received attention in the entrepreneurship literature.

Hence, the purpose of this research is to investigate the emergence of crowdfunding and how it might be appropriately adopted within the start-up equity financing context. Given the relational character of start-up venture financing (Dushnitsky and Lenox 2006), venture capitalist's perceptions of agency dynamics in the investor-investee relationship provides an appropriate lens for analysing the likely acceptance of crowdfunding in start-up financing. Thus, this research aims to investigate the agency dynamics relevant to the adoption of crowdfunding investment models in start-up financing from the venture capitalist's perspective.

BACKGROUND

As a major contributor to innovation, start-up firms have been the subject of significant academic interest (McDaniel 2000; Osnabrugge 2000; Timmons and Bygrave 1986). Moreover,

the growth of economies around the world has shown to largely depend upon the contribution of small firms to employment and national Gross Domestic Product (GDP) (Cumming 2007; Gans et al. 2002; Osnabrugge 2000). Given this, the survivability of innovative start-up firms and thus the provision of start-up capital represent an important issue, one which has received considerable attention from academics and practitioners alike.

Previous research suggests that the financing life cycle of a start-up venture closely follows stages of firm development (Cassar 2004). Pre-seed capital and seed capital are types of funding relevant for innovative ideas that have not yet been commercialised. Funding at this early stage tends to be characterised by greater levels of information asymmetries and risk, leading to higher probability of failure and difficulties in liquidating investments (Cumming 2007). Early stage start-up firms have limited options for capitalisation due to high uncertainty and the liability associated with 'newness' and 'smallness' (Cassar 2004; Cumming 2007; Harrison et al. 2004; Zhang and Wong 2008). Widely reported options for early stage start-up capital financing include bootstrapping; friends, families and fools; business angels and pre-seed and seed venture capitalists. Bootstrapping denotes a creative means to resourcing the start-up without engaging in traditional methods of accessing externally sourced capital (Sohl 2003). The next potential source of funds comes from 'friends, family and foolhardy investors' (referred to as the FFF) (O'Gorman and Terjesen 2006, p. 70) who invest in a start-up venture due to their supportive connection with the entrepreneur. Generally, FFF have no grounded perception of liquidity and return (De Noble 2001). Next, 'business angels' represent the informal market for access to start-up capital. By definition, business angels are high net worth individuals that are largely motivated by potential returns attached to their risky investments (Osnabrugge 2000).

Pre-seed and seed venture capital firms represent the final and most structured source of early stage start-up capital. As formal capital, the venture capital market represents experienced investors who often invest institutional money with the goal of receiving the highest possible internal rate of return (Huggins 2008; Mason and Harrison 2002; Osnabrugge 2000). Venture capital is widely considered as 'informed capital' focuses upon screening, monitoring and advising start-up company operations (Kanniainen and Keuschnigg 2004). Therefore, the venture capitalists' perspective offers a more inclusive perspective than those centred upon friends, families and foolhardy investors, or business angels.

The nature of the close working relationship that exists between the venture capitalist and entrepreneurs within their portfolio of companies has been well researched (Arthurs and Busenitz 2003; Bottazzi et al. 2008). Prior research in this field informs some preliminary assumptions regarding likely relationship dynamics within crowdfunding models. For instance, previous research has applied agency theory in investigating and examining the nature of relationships between venture capitalists and entrepreneurs (see Arthurs and Busenitz 2003; Bolton and Scharfstein 1990; Douglas J. Cumming 2005; Norton 1995). In the context of venture capital, the principal-agent relationship develops when an entrepreneur seeks funding from a venture capital firm for their start-up venture (Arthurs and Busenitz 2003; Sahlman 1990). The venture capitalist

(acting as the 'principal'), provides resources to the start-up entrepreneur (acting as an 'agent') with the view that "the agent will be able to successfully develop, produce, and market a product that will lead to an attractive return on the principals' investment," (Norton 1995, p. 23). Therefore, the relationship between the venture capitalist and the entrepreneur may be understood in terms of separation of ownership and control (Jensen and Meckling 1976; Osnabrugge 2000). This perspective suggests that agency theory is a useful lens through which to better understand the relationship aspects between the venture capitalist and entrepreneur (Sohl 1999).

In analysing the characteristics of relationship design, a dual 'ex-ante and ex-post' approach can incorporate mechanisms for controlling agency problems and costs throughout the entire investment process (Fried and Hisrich 1994; Osnabrugge 2000; Sohl 1999). Mitigation strategies used by venture capitalists throughout the investment process include deal flow and initial screening; due diligence; contractual control; post investment monitoring; and exiting (Osnabrugge 2000).

Deal flow refers to the quantity and quality of investment opportunities. Venture capitalists may use an initial screening criterion to identify potential projects for funding resulting in a stronger deal flow that is of higher quality than achievable by a typical informal investor (Osnabrugge 2000). Deal screening may be achieved through structural barriers in the funding application process (Hall and Hofer 1993), limiting funding to a specific domain of interest or expertise (Bygrave 1987; Norton and Tenenbaum 1993), or investing in fewer cold deals by leveraging referral networks (Fried and Hisrich 1994). Next, venture capitalists undertake due diligence measures to ensure the investability of any given venture opportunity. Normally, this process involves comprehensive analysis of a start-up's management team, technology, products and business plan (Davila et al. 2003; Fried and Hisrich 1995; Gorman and Sahlman 1989). A critical element of any investment decision-making is the design of optimal contracts (Casamatta 2003; Kaplan and Strömberg 2003; Trester 1998). Optimal contracts share particular characteristics, including the staging of capital and exiting options, the use of compensation linked to value creation and the controls for the distribution of investment proceeds (Sahlman 1990). Kaplan and Strömberg (2003) suggest descriptive elements of contracts between venture capital firms and the start-up enterprise. These include securities, residual cash flow rights, board and voting rights, liquidation cash flow rights, redemption rights, and other rights including automatic conversions of securities, anti-dilution protections and vesting and non-compete clauses for founders; and finally, contingency clauses for resuming control.

Involvement of the venture capitalist beyond the initial decision to invest includes managerial roles such as providing help to obtain additional capital; strategic planning, recruitment of management; operational planning; providing access to a network of suppliers and customers; and resolving compensation issues (Gorman and Sahlman 1989). Much of this involvement occurs through the contractual right of maintaining a position on the start-up

company's board (Forbes et al. 2009; Kaplan and Strömberg 2003). Venture capitalists consider their strategic ex-post involvement to be an important factor in the overall success of the enterprise (Sapienza et al. 1996).

Exiting is the final stage of the investment process. Researchers have documented that there are a limited number of exits available at the end of an investment period and these potentially include buy backs, secondary sales, trade purchases and Initial Public Offerings (IPO's) (Bascha and Walz 2001). Whilst many of the securities options will be determined within the contract, the venture capitalist needs to liaise with the entrepreneur and the potential new owners to ensure that the most successful exit outcome is achieved (Amit et al. 1998; Douglas J. Cumming and MacIntosh 2003). This includes determining the time of exit, and the determination of an acceptable exit price.

Crowdfunding as a source of capital

Crowdfunding, as an emerging source of capital, differs from traditional venture capital investments in a number of aspects. Theoretical differences between these two sources are apparent when assessing the characteristics of the fund and the characteristics of the investors. Further investigation is warranted given that these apparent theoretical differences are likely to result in a set of agency dynamics unique to crowdfunding situations. That is, crowdfunding models may require a unique set of agency cost control mechanisms. Therefore, this research contributes to the body of knowledge of start-up financing and is the first exploratory investigation of crowdfunding. In addition, this research contributes to the under-researched field of venture capital in Australia, highlighting venture capitalist's perceptions of agency-related cost controls throughout the investment process, the complexities of the principal-agent relationship before (ex-ante) and following (ex-post) the beginning of the investment relationship.

RESEARCH DESIGN

Early stage venture capitalists were interviewed to identify the different agency dynamics throughout the investment process. To minimize extraneous variation in data, this research was limited to a single country (Australia). A venture capitalists' perspective may prove to be more reliable and valid (Patton 1990) given that as investors, they are more active and experienced than alternative early stage start-up capital providers (Gompers et al. 1998; Macmillan et al. 1989). In addition, previous research has shown that venture capitalists may be more accessible to researchers than alternative informal capital providers who may be unknown or unknowable (Wetzel 1983).

A worldview or realism paradigmatic approach was adopted in this research to gain meaningful and holistic insight into real life events through tracking down patterns and

consistencies in respondent data (Mintzberg 1979; Perry 1998; Yin 2003). Although research examining the agency dynamics of venture capital has some theoretical and empirical grounding, the realism paradigm was deemed the most appropriate approach given the lack of research into crowdfunding as a source of start-up equity finance. Thus, a series of convergent interviews was conducted to identify interviewee behaviours and attitudes that are not directly observable in an imperfect reality (Godfrey and Hill 1995; Healy and Perry 2000; Patton 2002). This unstructured method of inquiry encouraged interviewees to divulge responses based upon their own interpretations, enabling greater potential for new insights and perspectives into agency rationales for crowdfunding adoption (Aaker et al. 2001).

Convergent interviews

Convergent interviewing is a cyclical collection, analysis and interpretive technique that uses a limited number of interviews with selected experts in the field (Dick 1990). This process involves a series of in-depth interviews that allows questions to be refined and developed after each interview with the aim of converging issues in a particular area. That is, this exploratory approach encourages a "series of successive approximations" (Dick, 1990, p. 3) leading to a consensus through the development and use of probe questions about important information where interviewee agreement or disagreement is tested. The convergent interviewing approach facilitates the collection of objective information about a particular phenomenon (Carson et al. 2001). Although the unstructured nature of qualitative research may promote the misinterpretation of results (Malhotra et al. 2002), convergent interviewing minimises respondent bias through a positivistic system of analysis and development (Dick 1990). In particular, interviewer preconceptions are (ideally) removed from the information gathering process by allowing respondents to self-identify salient points that can be tested in subsequent interviews. The method follows a complete process at each stage and a series of successive approximations is used to refine and test both points of agreement and disagreement until consensus is attained (Dick 1990).

Sources of bias

The strategies employed to understand and control researcher bias were reflexivity (Johnson 1997) and negative scenario sampling (Dick 1990). During the course of this research, a process of 'critical self reflection' was embarked upon (Johnson 1997, p. 283) in order to gain clarity of vision (Douglas and Moustakas 1984). While it would be unrealistic to suggest that this process resulted in a complete suspension of personal expectations and judgement, it did nevertheless allow the researcher to actively listen and record what respondents were saying. Throughout this process the interviewer was mindful that the full range of agency dynamics relevant to crowdfunding may not have been fully explained by existing theory and the literature

exploring stakeholder dynamics of venture capital (Arthurs and Busenitz 2003). During the interview process, every effort was made to find evidence inconsistent with accepted theory given the theoretical differences observed between traditional venture capital and crowdfunding models. The second method employed in this research to minimize researcher bias was negative case sampling (Johnson 1997). Convergent interviewing techniques incorporate in-built negative case analysis procedures in which the interviewer is prompted to challenge and disprove emerging explanations that are interpreted from the data. Validation becomes the process of investigating and continually checking, questioning and ensuring the defensibility of the findings and theoretical interpretations (Kvale 1989, p. 77).

Research protocol

Telephone interviewing was favoured by the researchers as it offered some of the benefits of in-depth interviewing, such as responsiveness and reflexivity, without the time and financial costs associated with setting up physical meetings with each participant (Gillham 2000). All interviewees agreed to allow the researcher to digitally record the phone conversation on the assurance that their identity and the identity of their firm remained anonymous and that the recordings would be destroyed at a pre-determined period following the completion of the research. Contacting the venture capitalists by telephone encouraged a less threatening interviewing process resulting in greater cooperation and information disclosure by participants (Zikmund 2003). Care was then taken to ensure that the participants had an accurate understanding of the emergence of crowdfunding and why and how this may be applied to early stage start-up financing. In addition, interviewees were told that they could direct discussions and should verbalise any problems that they had with the interview structure, format or content.

Sample

Experienced venture capitalists were sourced from both the Australian Venture Capital guide (Bivell 2008) and recommendations from venture capitalists and academics in the field of entrepreneurship (Riege and Nair 2004). A total of 11 interviews were conducted prior to reaching convergence in identified themes. The interviewees in this research were active venture capitalists who provided capital financing for seed or early stage start-up ventures (See Table 1). Each interview lasted between 20 minutes and one hour in duration and interviews were discontinued when no new ideas or themes emerged. Thus, interview duration was dependent on the convergence of themes and issues (RL Yin 1994). Following each successive interview the researcher summarised each of the issues raised to highlight convergence of identified themes.

Table 1. Profile of venture capital firms											
	Respondent										
	A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***
Type of firm	*Fund*	*Fund*	*Fund*	*Private*	*Fund*	*Fund*	*Private*	*Fund*	*Fund*	*Fund*	*Private*
Professional staff	*< 5*	*< 10*	*< 5*	*< 5*	*< 5*	*< 10*	*< 5*	*< 5*	*< 10*	*< 5*	*< 5*
Total capital raised*	*< 30*	*< 80*	*< 80*	*< 5*	*< 30*	*100+*	*< 10*	*< 30*	*100+*	*100+*	*< 5*
Current portfolio companies	*< 20*	*< 20*	*< 10*	*< 5*	*< 20*	*< 30*	*< 10*	*< 5*	*< 10*	*< 30*	*< 5*
Investment range*	*< 1*	*< .5*	*< 5*	*< 1*	*< 1*	*< 10*	*< .5*	*< .5*	*< 10*	*> 10*	*< .5*
Geographic preferences	*AUS***	*AUS*	*AUS*	*Local*	*AUS*	*AUS*	*Local*	*Local*	*AUS*	*AUS*	*Local*
Industry preferences	*ICT*** *Biotech*	*Any*	*ICT*	*ICT*	*ICT*	*ICT, Biotech*	*Any*	*Any*	*Biotech*	*Biotech*	*ICT*
Board seat required	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Management support available	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Preferred business stage											
Pre-seed stage		*Yes*					*Yes*	*Yes*		*Yes*	*Yes*
Seed stage	*Yes*	*Yes*		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Start-up	*Yes*		*Yes*	*Yes*		*Yes*	*Yes*		*Yes*	*Yes*	
Early stage	*Yes*		*Yes*	*Yes*		*Yes*			*Yes*	*Yes*	
Expansion	*Yes*		*Yes*			*Yes*			*Yes*	*Yes*	
IPO										*Yes*	

*** Millions of dollars (AUD); **Unrestricted nationally within Australia (AUS), ***Information and Communication Technologies (ICT)**
Note: some demographic information presented here has been rounded to absolute value to protect the anonymity of interviewees
Source: developed from the findings of this research

FINDINGS

The research findings are categorised into four sub-sections (investor-specific factors, ex-ante investment factors, ex-post investment factors and the impact of crowdfunding). Each section highlights the agency dynamics at the relevant stage of the investment process, starting with identifying the investor and finishing with identifying the impact of crowdfunding models in start-up financing. The conceptual model of crowdfunding is shown in Figure 1.

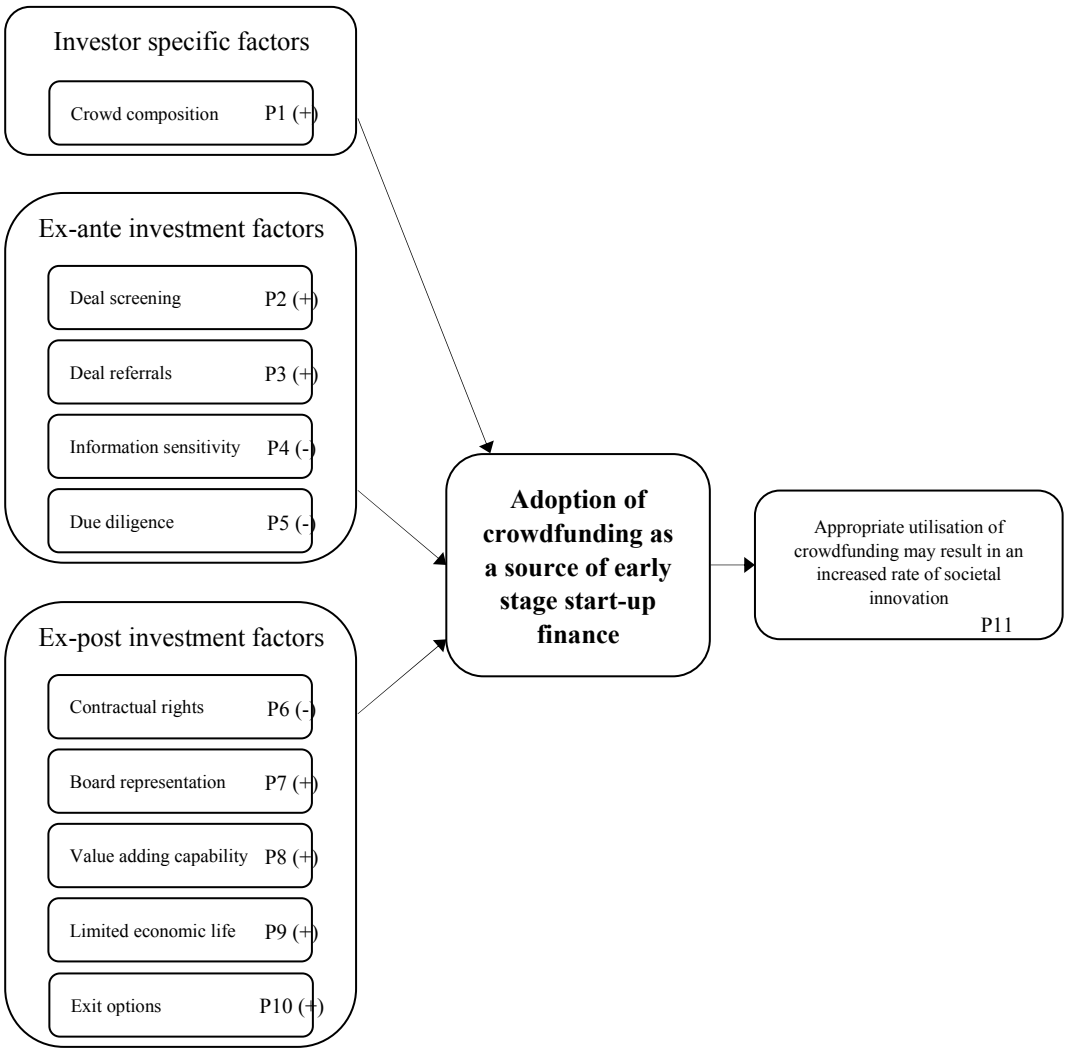

Figure 1 Conceptual model crowdfunding in start-up financing.

Source: developed from the findings of this research

Investor-specific factors

Findings 1: Crowd composition.

All interviewees agreed that the nature of early stage start-up investments would demand that the crowd consist of an informed group of investors. These findings are consistent with previous venture capital research, suggesting that the specialised and informed nature of venture capitalists with domain expertise was associated with a concomitant reduction in an entrepreneur's informational advantage (Arthurs and Busenitz 2003; Norton and Tenenbaum 1993; Osnabrugge 2000). For example one venture capitalist commented:

> The challenge for very early ideas is that you need somebody who has all the heritage and domain expertise to execute well… and understand what building a product that meets the market expectation will require…

A majority of venture capitalists indicated that crowdfunding environments would be highly susceptible to signalling effects from constituent members. Signalling theory is often used in venture capital to explain a vote of confidence in a venture's stability and investability (Davila et al. 2003). In the case of crowdfunding, venture capitalists believed that one investor's decision would likely result in additional like-decisions from the crowd. These signalling effects would result in negative perceptions of the credibility of crowdfunding models. Nine of the venture capitalists commented that venture opportunities with highly rated prospects would generally be funded more credible sources of financing. The following statement is indicative of a majority of responses.

> There is also the argument that if a company can't raise institutional money there's got to be something wrong with it… if they can't there may be a big question mark on their ability and therefore they are really settling for the second-best arena…

Thus the findings support the need for crowdfunds to comprise suitably informed and experienced investors which has some support in previous research showing that online environments foster the formation of highly segmented groups (Anne and Anurag 2005; Boyd and Ellison 2008). Thus, it is proposed that:

P1 *The adoption of crowdfunding in start-up financing is reliant upon a model in which the crowd is composed of suitably informed and experienced investors.*

Ex-ante investment factors

Findings 2: Deal screening.

Venture capitalists stated that an initial deal screening process would help ensure that crowdfunding was appropriately managed. This was generally considered to be due to some start-up projects simply being unsuitable for this model. For example, one interviewee commented that '…from the life sciences sector specifically, I see a number of difficulties because you'd need to raise a lot of money…' In addition, a majority of interviewees nominated that crowdfunding models would require specific deal screening criteria that restricted incumbent access to crowdfunding so as to minimise agency costs associated with adverse selection problems. Within this context adverse selection exists when an entrepreneur has an information advantage and engages in opportunistic behaviour to secure investment (Amit et al. 1998). The value of a crowdfund with specific deal screening criteria was considered in ensuring that the knowledge, skills and/or expertise of crowd members were appropriate to the venture project and would foster the appropriate levels of engagement of the crowd within the venture decision-making process. For instance,

> …the crowd would be best investing in the opportunities that they know more about or that they have had exposure to. If you're going to make the most of this model you're going to need to make the most of what the investors can offer…

Eight of the interviewees agreed that whilst deal screening may serve to assist in controlling for agency problems and costs by ensuring deal flow is consistent with the crowd's investment ability, it would not necessarily guarantee appropriate investment selection due to the likely diverse nature (and associated levels of business experience) of the online crowd (Anne and Anurag 2005; Boyd and Ellison 2008). Therefore, based upon the preceding discussion, the following relationship is proposed.

P2 *The adoption of crowdfunding in start-up financing is reliant upon a model using deal screening specific to the composition of the crowd.*

Findings 3: Deal referrals from knowledgeable and objective sources.

Deals exclusively sourced through referrals may help minimize deal-noise and ensure the crowd is making investment decisions on high quality deal flow (Sorenson and Stuart 2001). This sentiment was confirmed during the course of the interviews with a majority of venture capitalists nominating that the success of crowdfunding models would be reliant upon input from

qualified external investment agents to ensure the selection of suitable investment opportunities. The following statement is typical of most responses:

> There needs to be a way of filtering out the start-ups so that the crowd doesn't just fund anything… This would be important for the crowd in helping guide them in terms of what is good, by having a radar into where all the best deals are…

Due to the potential diversity in skills, knowledge and experience and also the diversity in preferences and crowd motives, which may represent the reason for a crowd referral rather than the crowd referring on the basis of probable returns, most venture capitalists believed that the referral source should be external from the crowd. For instance, one interviewee commented that, 'The downside with a crowd is that they are not necessarily domain experts and don't really know… Its probably the case that I am actually going to get misinformation back…' This appears consistent with previous research in the context of venture capital, suggesting that start-up capital investments that use deal referrals are more likely to facilitate deal flows of high quality (Fried and Hisrich 1994; Shane and Cable 2002; Sorenson and Stuart 2001). Based upon the above discussion, the following relationship is posited.

P3 *The adoption of crowdfunding in start-up financing is reliant upon a model engaging external deal referrals from a trusted network.*

Findings 4: Crowdfunding structure and deal information sensitivity.

All interviewees reported that the crowd would need access to sensitive information regarding a deal in order to conduct adequate due diligence prior to the investment decision. However, a majority of venture capitalists reported that sensitive information is not likely to be available for distribution to a crowd of investors. For example, one interviewee commented that 'The majority of entrepreneurs would be reluctant to share the level of information required to make this workable…' In particular, most agreed that only information that was protected by patents or that which was already publically available would be distributed to a crowd of investors. For example:

> …once you have got the Intellectual Property locked down or the information is public already, then possibly crowdfunding could work… after you have that protection then you could go out and get the funding from a crowd...

Furthermore, venture capitalists stated that information provided to the crowd would be likely result in unauthorised distribution due to difficulties in ensuring confidentiality. For instance:

> If you're sharing with 1000 online investors… even though they have a financial commitment, you could be almost certain that this would leak…

Overall, venture capitalists reported that the online environment of crowdfunding poses a significant risk for start-up firms seeking finance. This appears consistent with previous entrepreneurship research suggesting that the disclosure of sensitive information regarding start-up ventures may be detrimental to the success of an investee company (Fried and Hisrich 1994). Hence, we propose that:

P4 *The adoption of crowdfunding in start-up financing is reliant upon a model where sensitive information is not required or distributed to the crowd of investors.*

Findings 5: Implementation of due diligence provisions in crowdfunding.

As detailed in the previous section, venture capitalists were not of the opinion that crowdfund investors should be permitted to access to the type of information required to undertake adequate levels of due diligence. Nevertheless, was all of the interviewees suggested that the success of the crowdfunding model would require that each member of the crowdfund undertake their own due diligence to ensure that they make informed investments. For example:

> The crowd would have to satisfy itself about the individual or the company or start-up that is asking for money…. There is a lot that is necessary in order to… have enough information to make an informed decision. This would be a very intensive process for each person in the crowd… at least this is a very intensive process for venture capital…

Eight of the venture capitalists reported that given the potential of a large diverse group of crowdfund members, adequate due diligence would be unlikely to be undertaken given that in the early stages of venture creation, the information needed is often highly qualitative in nature. For example:

> How much can start-up companies really tell, how much is this the sort of thing that can be written down on a two-page company summary and how much is it going and having a coffee with this guy who has come up with this crazy idea…

These findings are broadly consistent with previous research indicating that venture capitalists should undertake a range of comprehensive measures to minimise their information disadvantage and thus make more informed investments (Fried and Hisrich 1994). Importantly, a majority of venture capitalists did agree that crowdfund investors would have the ability and motivation to make a considered judgement, albeit from different information and experiential bases. Thus,

P5 *The adoption of crowdfunding in start-up financing is reliant upon a model where investment deals do not have complex due diligence requirements.*

Ex-post investment factors

Findings 6: Endowment of the crowd's contractual rights to an external party.

All venture capitalist interviewees self-identified that individual members of the crowdfund would find difficulty in maintaining ongoing involvement in a venture ex-post. This was largely based upon the assumption that large stakeholder groups would promote inefficiencies for the venture concerned. In particular, interviewees nominated difficulties in power sharing and decision making authority. For example:

> If you have a very large number of people participating in this… with an expectation or even a soft expectation that they do contribute towards the vision and execution it can cause all sorts of problems…

However, most venture capitalists agreed that crowdfunds should adopt an intermediary to assist in managing the any ex-post investments. In particular, it was suggested that these intermediaries could hold a seat on the board and perform typical managerial functions normally associated with venture capital firms. This approach was believed tantamount to having a crowd of 'silent investors' for the remainder of the investment period. The following statement is typical of the majority of interviewee responses.

> It's not uncommon for a group of investors to effectively join together with a nominee that basically holds that shareholding for a group of investors. …the individual who is empowered ought to be in a position to make a sophisticated knowledgeable decision about an investment.

There is significant discussion in entrepreneurship literature regarding the venture capitalist's use of contractual clauses in controlling agency-related expenses (Kaplan and Strömberg 2003). In the context of crowdfunding, most of the venture capitalists (nine in total) believed these contractual rights would most likely result in significant inefficiencies unless an external intermediary undertook administrative responsibility (for example, procuring information, additional equity financing, technical advice) for the crowd. Therefore, based upon the above discussion, it is proposed that:

> *P6* *The adoption of crowdfunding in start-up financing is reliant upon a model where the crowd's contractual rights are delegated to an external intermediary capable of making decisions for the crowdfund.*

Findings 7: Board representation in crowdfunding models.

A majority of interviewees were of the opinion that board representation for the crowd would facilitate timely decision-making, thus safeguarding the crowd's investment. For example,

Crowd investing would need some sort of infrastructure around it similar to what we see in the venture capital industry… Who is on the board… would be very important because it's a large part of how we stay involved…' In addition, most suggested that it was important for the crowd to maintain board representation to ensure that the crowd's intentions would be adequately represented. For example:

> Having someone on the board helps ensure that you know how your investment is tracking and having some control… I can't see how a crowdfund could operate without these kinds of things… they are a very important part of the whole process…

A majority of interviewees believed that representation should not be selected from within the crowd but should be a person or intermediary organisation that is external to the crowd and is able to represent the crowd's intentions and skilfully respond to critical business decisions for the venture concerned. This is consistent with prior research suggesting that much of the venture capitalist's ex-post involvement occurs through the contractual right of maintaining a position on the start-up company's board (Forbes et al. 2009; Kaplan and Strömberg 2003). Thus, we posit that:

P7 *The adoption of crowdfunding in start-up financing is reliant upon a model that allows the crowd to maintain representation on the venture's board.*

Findings 8: External intermediary engagement in value-adding activities with portfolio companies.

A strong majority of venture capitalists reported that the crowdfund's portfolio companies would require typical value added support normally provided by a venture capitalist firm. During the course of the interviews it became apparent that value adding at the early stage of venture development was an essential ingredient of new venture success. Furthermore, venture capitalists were of the opinion that it would be difficult for the crowd to provide value-adding support without the assistance of an informed intermediary. For example:

> I think it takes quite a while to develop that value-added capability… after you have been in a specific domain for a period of time you just have networks that generate out of necessity and you know where to go to get things and I think then there is value add and I think that goes with good management… Crowdfund investors will want somebody who has ridden some winners and been there in that space.

Importantly the fee-sensitivity of the intermediary undertaking the value added support was identified as an important issue for the crowdfunding model. That is, the crowdfund would need to cover the operational overheads of the intermediary in a similar fashion to the approach

adopted by venture capital funds in apportioning management fees to support professional staff roles within the venture capital firm. For example:

> There are rules about how big a fund has got to be to wash its face. To pay properly its managers there must be a minimum size fund to produce enough fee flow, because people are fee sensitive to engage a successful manager who is capable of ensuring the crowd's investment is difficult…

The significance of the crowds ability to provide value adding capability is consistent with research finding that the role that traditional venture capitalist organisations undertake in providing value added support to their portfolio companies comprises the most significant element of the venture capital firm's ex-post involvement (Sapienza et al. 1996). On this basis, the following proposition is presented.

> *P8 The adoption of crowdfunding in start-up financing is reliant upon a model that allows for the crowd to value add to its portfolio of companies.*

Findings 9: Applicability of crowdfunding models for ventures with a limited economic life.

There was consensus of opinion that crowdfunding is potentially motivated by altruistic desires and thus may not be relied upon as a source of capital for start-ups that may require follow-on investment from funding bodies. For instance,

> When the crowd is investing, they might say yes I'm prepared to put in one dollar to invest to get it to the prototype... So they might only want to fund it to a prototype, but what's the total runway, what is the capital runway, what if that's not all that is required…

Also:

> …the first time you might raise two million dollars from however many people… and then there is a need for a subsequent round and you find that you need to get these people to cough up again. People might say I won't come in, or alternatively they wont change the rights under which they invested… I think this would be very challenging.

As a result of this, most venture capitalists believed that crowdfunds may inappropriate for start-ups focusing upon realizing value over the long term. A complicating factor that was also widely recognised was that venture capitalists perceived crowdfunding to be a risky and unsecure source of capital given the number of individual decisions required for crowd capitalisation. For example,

> …you are dealing with individuals rather than institutions… and their capacity to default on what is agreed and to not provide the money when it is required will create a very intolerable situation...

Based upon the preceding discussion is proposed that:

P9 *The adoption of crowdfunding in start-up financing is reliant upon a model with a limited economic life and where the portfolio companies do not require follow on funding.*

Findings 10: Use of exit options in crowdfunding.

A majority of venture capitalists believed that the crowdfunding model of start-up financing would be more suitable in situations when an exit-funding option could be reached quickly and would be most appropriate for start-up ventures that could reach market commercialisation of their products in a relatively short period of time. One venture capitalist commented that,

> My feeling is that it would not work where there is significant capital requirement. It would be better in the situation where you could fund a business through to profitability by way of them getting a product to market… industries have a very low capital requirement.

In addition, a majority of interviewees commented that a structure around exits may ensure that crowdfund investors could realise their returns. In particular exiting processes were perceived as time consuming and some investors, if enabled, would hold out on exiting in the hope of receiving higher returns in the future. This was viewed as acting as a disincentive for crowdfund investors:

> A very real problem for investment groups like this is that you will have some investors that don't want to take the next round's offer because they would have been diluted or they are not receiving the exit price they think they are entitled to. When negotiating agreements, this is a real problem because you want to make sure that the group has some common understanding or they will not want to work together...

Finally, five of the venture capitalists reported that a set of optimal exits may negate the need to negotiate with each individual crowdfund member when the economic life of the fund was finalised. That is, an intermediary could engage a set of appropriate exit options. Thus, we propose:

P10 *The adoption of crowdfunding in start-up financing is reliant upon a model selecting deals where exits are reached quickly or where optimal exits are pre-determined.*

The impact of crowdfunding

Findings 11: Contribution of crowdfunding to the innovation process.

Overwhelmingly, all venture capitalists believed that crowdfunding would provide access to a new pool of funding and that this new pool of funding would generally have a positive impact. However, while many acknowledged that this financing model would attract some start-up firms that currently may find difficulty in raising finance through traditional means, most did not believe that crowdfunding would enable firm-level innovation. For example:

> That whole financing ecosystem relies on an idea being protected, now that idea is either protected by trademark or IP patents or it's kept as a trade secret i.e. no one publishes anything about it… Crowdfunding would require to a certain extent that an entrepreneur expose an idea to a very broad base of participants… that loss of confidentiality of an idea I think actually destroys the element of innovation that can be monetised over time.

Also:

> I think the concept of crowdfunding in certain areas is a fascinating one. I can certainly see that it has a lot of merit for one-off events for example, but as a basis for innovation and seeking investment and returns, I suspect it is not something that will gain any traction, and is potentially quite dangerous…

The venture capitalists perceptions of the agency control mechanisms required for the adoption of crowdfunding in start-up financing documented in this study represent significant barriers and restrictions to how and when the model can be engaged. Therefore, the success of the crowdfunding model appears to be predicated on how appropriately it is engaged in the start-up financing realm. Where crowdfunding can be harnessed, there is a great potential for innovation in these areas to be exploited by an interested and informed crowd of investors willing to assume these high level risks. Thus it is proposed that,

> *P11* *Where crowdfunding may be harnessed, there is great potential for innovation in these areas to be exploited by an interested and informed crowd of investors willing to assume high-level risks.*

CONCLUSION

This exploratory research aimed to capture the salient agency dynamics influencing the adoption of crowdfunding in start-up financing. Given the paucity of prior research in this area, a convergent interviewing approach was used to identify venture capitalists' perceptions of crowdfunding agency dynamics throughout the investment process. Venture capitalists were interviewed so as to gain in-depth understanding of the actual agency dynamics in a variety of

situations in which they occur (Gartner and Birley 2002). As well as being experienced and informed investors, venture capitalists maintain a close working relationship with the entrepreneurs and managers of their portfolio of companies (Arthurs and Busenitz 2003; Bottazzi et al. 2008). Previous research has investigated this relationship using an agency theoretical lens (see Arthurs and Busenitz 2003; Bolton and Scharfstein 1990; Cumming 2005; Norton 1995) finding that agency problems and costs are particularly apparent in the investor and investee relationship. Therefore, mechanisms that control for agency problems and costs typically dictate the structure and form of the relationship between these two parties. Importantly this research has identified what mechanisms are required to ensure the appropriate application of crowdfunding models in start-up financing.

Given that crowdfunding is an emerging trend, this research provides a preliminary guide to assist entrepreneurs in how to appropriately engage with crowdfunding capital sources in the context of start-up finance. For example, deal screening criteria may limit what start-ups are appropriate candidates for crowdfunding. As such, this research provides the first criteria in identifying appropriate start-ups for crowdfunding. That is, start-ups with high information sensitivity, complex due diligence requirements, and a long duration before an available exit would not be appropriate candidates in accessing finance through crowdfunding models.

For investors and venture capitalists, the identification of the agency control mechanisms relevant to crowdfunding in start-up finance may help ensure that this online form of capitalisation is engaged appropriately. This is particularly important given the high costs incurred when failing to adequately control for agency problems (Kaplan and Stromberg 2004; Sahlman 1990). For this reason, the model identifies how investors can control for agency related problems and costs. In addition, agency dynamics are identified (and conceptualised) throughout the investment process. This information may be useful to practising venture capitalists or other stakeholder investors analysing the investment process by highlighting ex-ante and ex-post agency cost controls.

The success and longevity of crowdfunding in start-up finance may depend on ensuring the model is appropriately engaged. By doing so, the uptake of crowdfunding may provide access to socially embedded capital that is typically not available to entrepreneurs. However access to this capital is dependent on the restrictions set in place for the appropriate use of crowdfunding. Nevertheless, facilitating capitalisation in this way may provide a new pool of finance and help contribute toward bridging the equity-financing gap.

Limitations

Differences in managerial orientation and experience may limit the predictive application of this study in adopting crowdfunding in start-up financing. The relationships proposed in this research may be relevant to the interviewed venture capitalist's experiences, successes and risk preferences in new venture investments. As such, the venture capitalist's personal experience as

an investor may influence their perspective of the adoption of crowdfunding models in start-up financing. A further limitation of this research is dependent upon how venture capitalists value, perceive and engage with online communities and social media. That is, the perceived credibility, longevity and capacity of crowdfunding in start-up financing may be dependent on the venture capitalist's personal online behaviour.

In addition, the interviewees' perceived understanding of crowdfunding may limit the construct validity of this research. Whilst great care was taken to ensure all venture capitalists were presented with a complete definition of crowdfunding, there still remains scope for the individual venture capitalist to personalise and interpret this information differently. Whilst this research highlights the agency dynamics apparent in crowdfunding models when applied to start-up financing it does not seek to explain the agency dynamics present when the crowd funds not-for-profit or cause-related ventures. Therefore, these findings are limited in their predictive application to other uses of crowdfunding.

Furthermore, the size of the sample, the contextual information of the interviewee respondents as well as the qualitative methods of data collection and analysis may limit the generalisability of these findings. Therefore, whilst 'replication logic' (Yin 1994) may be claimed with convergence determined between different venture capitalists with proximal similarity, the predictability and generalisability of the findings should nevertheless be limited to the context of early stage financing (Johnson 1997).

Theoretical implications

This research extends our understanding and application of agency theory in start-up financing, specifically, and the venture capital industry, generally. In particular, we examined venture capitalists' perceptions of the agency dynamics relevant to crowdfunding as a source of start-up financing. Through focusing upon the investor-investee relationship, this research provides new information as to what mechanisms venture capitalists consider important in this relationship design. Thus, this research highlights agency control mechanisms relevant to early stage financing. In addition, this research exposes the complexities of the principal-agent relationship before and after the initial investment decision. In particular, venture capitalists have identified the elements of venture capital they consider most important and most likely relevant in contributing to risk minimisation and success, thus controlling for agency problems and agency costs (Osnabrugge 2000). Our findings provide new information regarding how these mechanisms can be applied throughout the investment process in the context of crowdfunding start-up ventures and is the first investigation of the perceived agency cost controls throughout the investment process from an Australian perspective.

By introducing crowdfunding as a topic for academic exploration, this research builds on social capital theory relating to resources embedded in online communities and social networking sites (Ellison et al. 2007; Utz 2009). That is, this research presents a model detailing

how online communities and 'crowds' can be effectively engaged in light of apparent growth and the emergence of crowdfunding trends. Furthermore, this research explored crowdfunding as a vehicle for bridging social capital embedded within online environments. Using an agency theoretical perspective, a unique understanding of how online communities can be utilized to best manage and allocate their resources in start-up financing contexts. Therefore, this research provides preliminary insight into the use of agency control mechanisms in collaborative (social networking) models which are based on receipt of small contributions from online investors.

Finally, this research adds to prior social capital theoretical research investigating the development of business models centering upon virtual communities (Bughin and Hagel 2000; Hagel and Armstrong 1997). Businesses that successfully harness social media in the context of commercial transactions may have significant leverage opportunities through greater access and information sharing with consumers (Hagel and Armstrong 1997). Hence, with the growth of virtual communities directly impacting on traditional business models (Bughin and Hagel 2000), this research provides a basis for future measurement of agency dynamics and leveraging resources embedded within online communities.

Implications in the market for start-up finance

The identification of the agency control mechanisms relevant to crowdfunding in start-up finance may assist in ensuring that this online form of capitalisation is engaged appropriately so as to promote venture creation and sustainability. This is particularly important given the high costs incurred when failing to adequately control for agency problems (Kaplan and Stromberg 2004; Sahlman 1990). This information may be useful to practising venture capitalists or other stakeholder investors within the context of ex-ante and ex-post agency cost controls. By doing so, the uptake of crowdfunding may provide access to socially embedded capital that is typically not available to many entrepreneurs. Whilst access to this capital is dependent on the restrictions set in place for the appropriate use of crowdfunding, facilitating capitalisation in this way may provide a new pool of finance and help contribute toward bridging the equity-financing gap.

Venture capitalists represent only one stakeholder in the market for start-up finance. Therefore, further explanation and exploration of perceptions from informal providers of start-up finance and an investigation into entrepreneurs' perceptions of crowdfunding models is recommended.

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