

**THE ROLE OF INTELLECTUAL CAPITAL IN
OPPORTUNITY RECOGNITION OF ENTREPRENEURS**

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Abstract

The study hypothesizes that intellectual capital of entrepreneurs enhances their opportunity recognition. The study investigated the population of metal- and ICT-ventures established in 1998 in three regions of Finland. The results of the study illustrated, first, that knowledge acquisition in opportunity recognition requires formal knowledge of a particular domain. Second, the results revealed that formal knowledge increases competitive scanning in opportunity recognition. Third, the results indicated that proactive searching in opportunity recognition is enhanced by prior management experiences, intrinsic motivation, and creativity of entrepreneurs. Fourth, innovative behavior in opportunity recognition needs strong intrinsic motivation, since it is internal, mental playing with ideas. In addition, management experience decreases innovative behavior. Last, management experience hindered collective action in opportunity recognition.

1. Introduction

Entrepreneurship has been defined at least as ownership of firms (Cuevas 1994), management of small businesses (Scott and Bruce 1987), innovativeness (Schumpeter 1934), networking (Larson and Starr 1993), organizing (Johannisson 1988), and making ideas work although the needed resources are not controlled (Stevenson and Jarillo 1990). One of the central definitions is presented by Kirzner (1979, 1981, 1997), who claims that entrepreneurship is about alertly recognizing and exploiting opportunities. Entrepreneurship is then a process of creating new businesses, in which an opportunity is recognized and then turned into a form in which it creates economic value by using own and others' resources and personal relations (see Bygrave and Hofer 1991; Gartner, Bird and Starr 1992; Christensen, Madsen and Peterson 1994; Muzyka, de Koning and Churchill 1997). Several recent studies have proposed that the focus of academic interest in entrepreneurship should be specifically in studying op-

portunity recognition and realization (e.g. Shane and Venkataraman 2000; Sarasvathy 2001; Dew, Velamuri and Venkataraman 2003; Davidsson 2003).

Shane and Venkataraman (2000) have argued that opportunity recognition is about creating new means-ends relationships between goods, services, raw materials, and organizing methods. Sarasvathy (2001) has put forward that in opportunity recognition is merely question of creating imaginatively various possible end-results based on given means. Thus, if opportunity recognition is seen as an artifact of problem solving, so the artifact is not possible to logically deduce because the “information space” is so complex that the best possible decision is impossible to “calculate” (see Mayer 1992). Opportunity recognition is like creating a game at the same time that you are playing it (as children’s games many times are) instead of trying to play the familiar game more efficiently (see Sarasvathy 2001). Thus, an opportunity is not an end-result of a logical process but merely a conglomeration of fragments that will have to be made sense of while the situation is developing. This implies that opportunity recognition is about creating a sketch or a rough illustration of the way a business is going to be created (see also Vesper 1991).

Based on the studies of opportunity recognition it is possible to see that certain intellectual capabilities characterize those entrepreneurs who are able to recognize opportunities (Christensen et al. 1994; Hills 1995; de Koning and Muzyka 1996; Hills and Shrader 1998; Erikson 2002; Baron and Ensley 2003; Davidsson and Honig 2003; Sternberg 2003; Ucbasaran, Westhead and Wright 2003). These entrepreneurs have experience-based skills in the domain where they work, their formal knowledge of the area is often high, they have previous entrepreneurial/managerial experience, their intrinsic motivation pulls them to seek opportunities, and they are able to creatively question the present business situation. Like Davidsson and Honig (2003) have argued entrepreneurs involve their intellectual capital in opportunity recognition in order to be able to create imaginary end-results, i.e. opportunities (see also Sarasvathy 2001).

The research on opportunity recognition is still in its infancy (Chandler, DeTienne and Lyon 2003) although it has been seen as one of the main activities involved in entrepreneurship (Gaglio and Katz 2001). Especially empirical studies are needed to develop the knowledge of the phenomenon (see Davidsson 2003). On the other hand, opportunity recognition is often seen as one-dimensional concept, although recent studies have shown that it consists of several distinct lines of behavior (Davidsson and Honig 2003; Delmar and Shane 2004). This has caused that we do not know how intellectual capital affects the different dimensions, i.e. different behaviors involved in opportunity recognition. In addition, intellectual capital has been often seen in opportunity recognition consisting of only domain knowledge, formal knowledge, and entrepreneurial/management experience (e.g. Davidsson and Honig 2003). Present study proposes that this is too narrow view and it neglects recent developments in the research on intellectual capital specifically. Sveiby (1998) and Rastogi (2000), for example, stress that the concept should besides knowledge include also motivation and creativity because these have been noticed to be important vehicles of processing the knowledge. Based on the above argumentation, the study examines how intellectual capital of entrepreneurs affects their different behaviors involved in opportunity recognition. This study proceeds so that it is presented first the theoretical background, second hypotheses, third the used methodology, fourth the results, and last conclusions of the study.

2. Theoretical Background of the Study

Becker (1975) in his seminal study on human capital suggested that human capital strongly affects quality of behavior in business life. He defined human capital as consisting of experience-based and formal knowledge. Gimeno, Folta, Cooper and Woo (1997) widened this to embrace entrepreneurs as well. Sveiby (1998) and Rastogi (2000) changed the term and used instead of human capital the term intellectual capital because it more clearly shows that it is a question of cognitive, learned (and learn-

able) capabilities. Sveiby (1998) and Rastogi (2000) also pointed out that motivation and creativity should be parts of the concept because cognitive human information processing consists of besides knowledge storing also knowledge aiming and knowledge interpreting and re-interpreting.

Cooper (1981) stressed the importance of knowledge of the domain to be one of the main factors affecting opportunity recognition. The domain-specific experience is important in order to be able to alertly scan the market and find gaps that could be filled (see Kirzner 1979). Without the domain knowledge it is very difficult to interpret the information cues in the industry because the information processing of entrepreneurs is tied to existing knowledge structures, e.g. domain knowledge (Manimala 1992; Shane and Venkataraman 2000). Former experiences and knowledge of the area are required to see opportunities that others do not recognize (Kaish and Gilad 1991). The domain knowledge is needed to scan relevant information, give it appropriate meaning, and make good judgments based on it. Human beings do not just perceive information, interpret it, and act based on it as rationally as possible but are guided by the knowledge they already have acquired in their processes of perceiving, interpreting, and acting (e.g. Woo, Folta and Cooper 1992; de Koning and Muzyka 1996). Thus, less experienced entrepreneurs might miss relevant information, understand poorly what they perceive, and make decisions and actions that are unwise.

Cooper (1981) was the first to suggest that formal knowledge would help to use domain specific experience. Formal knowledge creates knowledge structures that do not have to be learned by trial and error but by education and training. It is suggested here that formal education and training are needed because this type of more general knowledge gives capabilities to examine issues in their entity. Experience-based knowledge as the only knowledge type could cause entrepreneurs to have a narrow view, which could sometimes be even dangerous because it might create biases and errors in thinking of entrepreneurs (Baron 1997, 1998; Zietsma 1999).

This is also argued by Shane and Venkataraman (2000), who proposed that two factors influence opportunity recognition: (1) the information an entrepreneur possesses, and (2) his/her cognitive capabilities. Here it is proposed that these are developed by the interaction of formal knowledge and domain knowledge. The importance of formal knowledge in the creation of excellence is clearly verified in the studies of expert problem solving (see Mayer 1992). First, every individual has a certain stock of information, and this information has an impact on behavior of a person, and also on opportunity recognition (Shane and Venkataraman 2000). Furthermore, such prior information is stored as mental schema to our minds, and these are like "road-maps" guiding our thinking, behaving, and discovering. This information we possess could be knowledge of cheap raw material, the latest research results of digital communication, values of customers, etc. Second, every individual processes information differently. Some are able to connect many kinds of old and new pieces of information into a new value-adding opportunity. What is here suggested is that this second ability is mostly in the form of formal knowledge and achieved through formal education.

The study done by Muzyka, Birley and Leleux. (1996) revealed that in venture creation investors appreciate leadership potential of the lead entrepreneur and the management team, industry experience, and track record of the leading entrepreneur and the management team. Birley, Muzyka and Hay (1999) indicated that investors trust management competencies of a leading entrepreneur and a team to hold in any investment opportunity. Furthermore, the authors stress that the leader capabilities of an entrepreneur are important to investors, i.e., the skills to build a team, inspire others, manage the winds of change, and think strategically of the whole business situation. Thus, it could be seen that entrepreneurial management skills are important in opportunity recognition.

Intrinsic motivation is in many studies seen to be an important inspiring factor in opportunity recognition. Cooper (1981) stressed that motivation makes skills, knowledge, and perceptions work together so that they are made use of in opportunity search. Without intrinsic motivation it could happen

that, although entrepreneurs were experienced and their expertise was high, success make them satisfied with the situation (Kaish and Gilad 1991). Thus, despite being skilled they are not any more internally motivated to search for opportunities. Sigrist (1999) claimed that an entrepreneur's own personal line is crucial. By this she means that subjective principles, ideas, and style of an entrepreneur lead him/her to create a unique kind of a venture. This underlines the importance of intrinsic motivation in the form of a personal way to do things. She also found that inner strength is needed in order to achieve goals because often entrepreneurs do not get enough social support. Thus, an entrepreneur must have a very strong intrinsic need to search for an opportunity and confidence to go on even though some might advise him/her not to. The above argues the motivational aspects to be powerful in opportunity recognition.

Gilad (1984) was the first to suggest opportunity recognition to happen due to creativity of entrepreneurs. His point of view is based on Kirzner's (see e.g. 1979) idea that entrepreneurs are more alert to opportunities in the market than others. Gilad (1984) sees that others than entrepreneurs overlook possibilities to establish a new business. The ability to discover inconsistencies by linking information cues requires creativity. Creativity in his case could be understood as seeing of links between many types of information and finding a solution that does not exist yet. Thus, creativity in opportunity recognition is not about routinely searching for the best solution from solutions that already exist – *"it is non programmable, non standardized, and unpredictable insight about the true nature of reality"* (Gilad 1984).

3. Hypotheses of the Study

Hypotheses 1a–1e: Effects of Intellectual Capital of Entrepreneurs on Knowledge Acquisition in Opportunity Recognition

Woo et al. (1992) indicated that lack of domain knowledge created cognitive barriers preventing the knowledge acquisition (see also Mayer 1992; Baron 1998). Shane and Venkataraman (2000) underlined as well the importance of domain knowledge in order to be able to acquire knowledge. De Koning and Muzyka (1996) studied the behavior of entrepreneurs who had been successful in finding several opportunities. What was illuminating was that entrepreneurs with domain knowledge knew how to acquire knowledge and what kind of knowledge they need. In addition, Hills and Lumpkin (1997) and Hills, Lumpkin and Singh (1997) indicated that entrepreneurs who had domain knowledge of the industry actively seek new knowledge. Gaglio and Taub (1992) showed in their experiment where entrepreneurs were asked to develop opportunities based on the data the researchers gave them that entrepreneurs were not willing to do that because they did not have real domain knowledge of the area. Thus, the following hypothesis is presented: **H1a:** The higher the domain knowledge of entrepreneurs, the more intense is their knowledge acquisition in opportunity recognition.

Cooper (1981) already considered formal knowledge to interact with domain knowledge in knowledge acquisition. Gaglio and Taub (1992) indicated that entrepreneurs used formal skills to make sense of the situation. This is supported by the study by Woo et al. (1992). Bhave (1994) also pointed out that formal knowledge motivates entrepreneurs to search the needed knowledge. Last, Sigrist (1999) illustrated how entrepreneurs used their formal knowledge to manage and control the knowledge acquisition of domain knowledge. This suggests that formal knowledge provides the frames and aim for knowledge acquisition. **H1b:** The higher the formal knowledge of entrepreneurs, the more intense is their knowledge acquisition in opportunity recognition.

Hills (1995) found that entrepreneurial/managerial experiences enhanced knowledge acquisition. De Koning and Muzyka (1996) pointed out as well that entrepreneurs who had prior experience in entrepreneurship and/or management acquired knowledge more frequently. In addition, Hills et al. (1997) and Hills and Shrader (1998) illustrated that entrepreneurs with prior entrepreneurial/managerial experience search actively new knowledge of opportunities. **H1c:** The higher the management experience of entrepreneurs, the more intense is their knowledge acquisition in opportunity recognition.

Kaish and Gilad (1991) suggested that entrepreneurs who achieved success lost their motivation to search new opportunities. Herron and Sapienza (1992) noticed that intrinsic motivation has a very important role in the knowledge acquisition of opportunities. They proposed that only after entrepreneurs are motivated to change their lives somehow and search for opportunities for their own business does knowledge acquisition start. Sigrist (1999) also stressed that intrinsic motivation "kicks" entrepreneurs to search opportunities. Drucker (1998), who has studied the sources of opportunities, has stated that entrepreneurs need full commitment to entrepreneurship before the gap finding is possible. Manimala (1992, 1996) illustrated how high-innovative entrepreneurs spent more time continuously searching for new opportunities, and what was important they were intrinsically motivated to do that. The study by Hills (1995) also revealed that knowledge acquisition was activated by the intrinsic need to find a business. **H1d:** The higher the intrinsic motivation of entrepreneurs, the more intense is their knowledge acquisition in opportunity recognition.

Gilad (1984) considered opportunity recognition to be creative behavior. He suggested that creativity is needed to acquire information and connect pieces of information to form a new opportunity. On the basis of this, it is argued that creativity enhances knowledge acquisition as it gives cognitive thinking tools to connect pieces of information that superficially look as if they do not have anything to do with each other into knowledge of an opportunity. Hills and Lumpkin (1997) illustrated how entrepreneurs spend quite a lot of time creatively thinking about the information they have received (see

also Hills et al. 1997; Hills and Shrader 1998). Hills, Shrader and Lumpkin (1999) go further and propose that opportunity recognition is inherently creativity of entrepreneurs. They see that in order for knowledge acquisition to happen creativity is needed. De Koning and Muzyka (1996) saw also that entrepreneurs used their creative capabilities to turn the complex information into the knowledge of the situation. **H1e:** The higher the creativity of entrepreneurs, the more intense is their knowledge acquisition in opportunity recognition.

Hypotheses 2a–2e: Effects of Intellectual Capital of Entrepreneurs on Competitive Scanning in Opportunity Recognition

Long and McMullan (1985) found that entrepreneurs use their domain knowledge to scan the competitive arena. De Koning and Muzyka (1996) proposed that the experience of entrepreneurs made them actively scan the competitive environment in order to find gaps that are big enough for profitable business but not big enough to make big companies interested. Hills and Lumpkin (1997) propose that entrepreneurs see competitive scanning to be very important in opportunity recognition, and this to be affected by the level of domain knowledge. Christensen and Peterson (1990) suggested as well that domain knowledge is very important to able to understand markets and competitors in it. The above studies all propose that domain knowledge should increase competitive scanning. **H2a:** The higher the domain knowledge of entrepreneurs, the more intense is their competitive scanning in opportunity recognition.

Active competitive scanning of skilled entrepreneurs was noticed by Woo et al. (1992). Hills (1995) and Hills and Lumpkin (1997) have suggested that formal knowledge might affect competitive scanning positively. De Koning and Muzyka (1996) proposed as well that formal knowledge enhances competitive scanning. It is proposed that formal knowledge offers tools that could be used to analyze

more effectively the competitive arena. **H2b:** The higher the formal knowledge of entrepreneurs, the more intense is their competitive scanning in opportunity recognition.

Thakur (1999) proposed that management experience is needed in order to be able to scan the competitive arena. Hills et al. (1997) and Hills and Shrader (1998) also pointed out that prior experience of entrepreneurship and/or management is needed in competitive scanning. De Koning and Muzyka (1996), then, found that experienced entrepreneurs put a lot of effort into understanding markets. The positive effect of management experience on competitive scanning is also supported by the study by Christensen et al. (1994). **H2c:** The higher the management experience of entrepreneurs, the more intense is their competitive scanning in opportunity recognition.

Gaglio and Taub (1992) showed that entrepreneurs, who relied on their intrinsic motivation, put more effort into trying to understand competition. Manimala (1992) pointed out that intrinsically motivated high-innovative entrepreneurs scanned competition intensively. De Koning and Muzyka (1996) showed how entrepreneurs enjoyed the scanning of the competitive arena. This illustrates clearly how intrinsic motivation enhances competitive scanning. Hills and Lumpkin (1997) showed how entrepreneurs were internally eager to scan competition suggesting that intrinsic motivation would increase competitive scanning. **H2d:** The higher the intrinsic motivation of entrepreneurs, the more intense is their competitive scanning in opportunity recognition.

Hills et al. (1999) noticed that competitive scanning requires skills to creatively question the market situation. This is supported by Hills and Lumpkin (1997), Hills et al. (1997), and Hills and Shrader (1998), according to whom creativity plays an important role in searching for knowledge of a competitive arena and making competitive decisions. De Koning and Muzyka (1996) also pointed out that successful entrepreneurs use their creativity to find market niches. In addition, Sigrist (1999) and Shane and Venkataraman (2000) argue about the skills to link information into new solutions invisible to others, i.e. creativity to give possibilities of flexibly learning from customers, intuitively read market

dynamics, and impulsively react to situations. **H2e:** The higher the creativity of entrepreneurs, the more intense is their competitive scanning in opportunity recognition.

Hypotheses 3a–3e: Effects of Intellectual Capital of Entrepreneurs on Proactive Searching in Opportunity Recognition

According to Cooper (1981), the knowledge of domain gives tools to search for future changes in a business environment. Peterson (1985), as well, underlined how experience is used to proactively position a venture in a business arena. Domain knowledge, thus, creates a kind of cognitive map, which could be used to build a vision of what will happen. It is probable that those who don't know the domain see the future just when it is already the reality. Hills (1995) also indicated this, suggesting that experience in the domain lead entrepreneurs rather to vision of what will happen than to what has happened. Rea et al. (1999) proposed that entrepreneurs construct visions of the future without exact information but merely on the basis of their experience. This is line with the study by Baron (1998), who revealed that entrepreneurs easily fix their eye on the future because their prior experiences advise them to do that. Regrets for past behavior are not leading anywhere. Last, the importance of domain knowledge is clearly shown by Martello (1994). He argues that opportunity recognition is serendipitous future scanning, in which previous experiences in the domain have a central role. **H3a:** The higher the domain knowledge of entrepreneurs, the more intense is their proactive searching in opportunity recognition.

Christensen and Peterson (1990) showed that what is needed besides domain knowledge is also general alertness, i.e. formal knowledge, to be capable to strategic thinking. This contains the idea that formal knowledge is needed to strategically see the future. Hills and Lumpkin (1997) found that entrepreneurs were able to transfer general opportunity recognition skills to different types of situations than

the domain they were familiar with. This also implies that more general skills to use knowledge are used to proactively search for future opportunities. Most importantly, Zietsma (1999) indicated that higher technical education significantly increased the likelihood of deliberate future scanning of opportunities. Herron and Sapienza (1992), as well, stress that formal skills affect positively proactive opportunity searching. **H3b:** The higher the formal knowledge of entrepreneurs, the more intense is their proactive searching in opportunity recognition.

Hills et al. (1997) and Hills and Shrader (1998) indicated that behavior that characterized opportunity recognition was proactive searching for future possibilities. What they also found was that these entrepreneurs had experience in entrepreneurship and management of ventures. This is supported by the study by de Koning and Muzyka (1996), in which they came to the conclusion that experienced entrepreneurs have a skill to vision the future. In addition, Kaish and Gilad (1991) showed how experienced entrepreneurs were able to interpret the information cues. **H3c:** The higher the management experience of entrepreneurs, the more intense is their proactive searching in opportunity recognition.

The study by Baron (1998) was interesting in respect of the motivational background of entrepreneurs searching for opportunities. It showed that entrepreneurs were intrinsically motivated to search for future opportunities. Entrepreneurs were not so much concerned with the past or even the present. Thus, intrinsic motivation for entrepreneurship turn they attention to the future and proactive behavior. Martello (1994) as well suggested that entrepreneurs are highly motivated to work in the field that interests them. At the same time they scan information cues in order to recognize future possibilities. Thus, intrinsic motivation pulls them to proactive searching, at the same time as they are working at other things in the field. In addition, based on the study by Hills (1995) it is possible to see how passionate interest in the domain makes entrepreneurs search for proactive ideas. **H3d:** The higher the intrinsic motivation of entrepreneurs, the more intense is their proactive searching in opportunity recognition.

According to Gilad (1984), creativity is the main cognitive vehicle of human beings in proactive behavior. Hills (1995) and Hills et al. (1999) also proposed that creativity enhances future scanning of opportunities. Christensen et al. (1994) put forward that capability to turn problems into possibilities is linked to the ability to strategically think of the future of the business. De Koning and Muzyka (1996) also suggested that creativity supports proactive behavior. **H3e:** The higher the creativity of entrepreneurs, the more intense is their proactive searching in opportunity recognition.

Hypotheses 4a–4e: Effects of Intellectual Capital of Entrepreneurs on Innovative Behavior in Opportunity Recognition

Hills (1995) showed that successful entrepreneurs, who were experienced in their field, created ideas actively. Further, Hills et al. (1999) argued that domain knowledge should increase innovative behavior. Manimala (1992, 1996), then, found that more innovative entrepreneur knew customers, dealers, supplier, and others dealing with the products and services in that industry better. Thus, domain knowledge enhanced innovative behavior. **H4a:** The higher the domain knowledge of entrepreneurs, the more intense is their innovative behavior in opportunity recognition.

Christensen and Peterson (1990) came to the conclusion that formal knowledge of a market or a technology might be the source of innovative venture ideas. This suggests that formal knowledge should support innovative behavior. Gaglio and Taub (1992) pointed out, when studying opportunity recognition of entrepreneurs and managers, that managers were more skilled innovators. This suggests that formal knowledge, which is arguably higher among managers, affects innovative behavior positively. Zietsma (1999) also found that both high-tech entrepreneurs (high formal knowledge) and managers (high formal knowledge) were good at innovating ideas. The reason for this might be as Shane and Venkataraman (2000) suggested that some are better at processing information than others. This

skill to process information is probably enhanced by formal education, which provides general thinking skills (see Mayer 1992). **H4b:** The wider the formal knowledge of entrepreneurs, the more intense is their innovative behavior in opportunity recognition.

Cooper (1981) stressed managerial experience to support innovative opportunity recognition. Thakur (1999) proposed that without managerial capabilities it would be difficult to create solutions that are useful and appropriate. Hills (1995), Hills et al. (1997), and Hills and Shrader (1998) studied entrepreneurs with prior entrepreneurial and/or managerial experience and found that they spend quite a lot of time playing with ideas. **H4c:** The wider the management experience of entrepreneurs, the more intense is their innovative behavior in opportunity recognition.

Gaglio and Taub (1992) noticed that entrepreneurs were intrinsically motivated in their innovative behavior. Manimala (1992) came to the conclusion that intrinsic motivation increased innovative behavior. The results reached by Hills (1995) suggested that internal motivation enhances innovative behavior. It is also interesting that internal motivation to work with other people enhances innovative behavior (Steyaert, Bowen and Van Looy 1996). **H4d:** The higher the intrinsic motivation of entrepreneurs, the more intense is their innovative behavior in opportunity recognition.

Gaglio and Taub (1992) proposed that entrepreneurs use their creativity to innovate ideas. Hills (1995) studied opportunity recognition of successful entrepreneurs and found out that they frequently try to innovate ideas. On the other hand, the entrepreneurs said that they use creative thinking as a tool for this. In the studies of Hills and Lumpkin (1997), Hills et al. (1997), and Hills and Shrader (1998) entrepreneurs also told the authors that they frequently use creativity in order to play with new ideas, i.e. to innovate. De Koning and Muzyka (1996) pointed out that entrepreneurs use their personal creativity to innovate new opportunities. **H4e:** The higher the creativity of entrepreneurs, the more intense is their innovative behavior in opportunity recognition.

Hypotheses 5a–5e: Effects of Intellectual Capital of Entrepreneurs on Collective Action in Opportunity Recognition

De Koning and Muzyka (1996) pointed out that experienced entrepreneurs discussed intensively with their social context. The authors found that opportunity recognition was affected especially by expertise in the field and skills to communicate socially to find opinions, advise, information, and partners. In addition, domain knowledge created such self-confidence among the entrepreneurs that they were open to their own weaknesses and relied on other people. The above results show quite clearly how domain knowledge increases collective action because it gives such self-esteem that you do not have to know everything and that you are "allowed" to discuss with other people without the fear that they steal your idea, or think "what a silly thought". This common trust in others might be created through social conversations (Steyaert et al. 1996), in which parties together create domain knowledge, which then enhances further collective action. Hills and Lumpkin (1997) found that collective, social action with other people was one of the most important ways to look for opportunities in markets (see also Christensen et al. 1994). **H5a:** The higher the domain knowledge of entrepreneurs, the more intense is their collective action in opportunity recognition.

Burt (1992) has indicated that formal knowledge increases collective action. According to him, formal knowledge makes it possible to have higher positions in companies and hierarchies and., thus, better positions in a network structure. This, then, increases the collective action with information sources and not just with anybody. Manimala (1992) pointed out that highly innovative entrepreneurs developed their formal technical capabilities before they started to collaborate. This might mean that formal knowledge is needed in order to be ready for collective action. Hills et al. (1997) came to the conclusions that networking entrepreneurs were able to scan opportunities from a wide base. This suggests that networking entrepreneurs might have more general skills to process information than only in

the familiar context. This, again, suggests that formal knowledge might create more active collective action. **H5b:** The wider the formal knowledge of entrepreneurs, the more intense is their collective action in opportunity recognition.

Kaish and Gilad (1991) pointed out that although experienced entrepreneurs like to think themselves about their ventures they still gather opinions and actively discuss business issues with other people. Hills (1995) introduced that successful entrepreneurs, who had management experience, were active socially. De Koning and Muzyka (1996) also indicated that entrepreneurs with prior entrepreneurial/managerial experience discussed a lot with other people and even asked their opinions of questions in which they were not experts. Hills and Lumpkin (1997) proposed that entrepreneurial experience enhances network behavior. Last, Singh, Hills, Hybels and Lumpkin (1999) also showed how management experience produces intense collective action. **H5c:** The wider the management experience of entrepreneurs, the more intense is their collective action in opportunity recognition.

According to Manimala (1992) highly innovative entrepreneurs were intrinsically motivated and spend time discussing with their social relationships. De Koning and Muzyka (1996) also noticed that internally passionate and self-confident entrepreneurs were willing to discuss their venture ideas with other people. Last, Sigrist (1999) found that an own personal line of entrepreneurs supports interaction with external resource holders. **H5d:** The higher the intrinsic motivation of entrepreneurs, the more intense is their collective action in opportunity recognition.

Gilad (1984) suggested that entrepreneurs need creative capabilities in order to be able to see links between many types of information and that this information is achieved by collective action. Gaglio and Taub (1992) followed Gilad's (1984) ideas and indicated that those individuals who were more creative were also ready and willing to go in for social interaction. Hills (1995) also expressed the notion that entrepreneurs spent time thinking creatively about business ideas and taking active part in social dialogue (see also de Koning and Muzyka (1996). Rea et al. (1999) proposed that creativity and

social networking of entrepreneurs go hand in hand in opportunity recognition. **H5e:** The higher the creativity of entrepreneurs, the more intense is their collective action in opportunity recognition.

4. Methodology

The sample was drawn from Trade Register of Finland. The sample was defined by three criteria: First criterion was that firms must be established in 1998. Second criterion was that the regions of Jyväskylä, Oulu, and Vaasa in Finland were chosen. Third criterion was that metal- and information- and communication technology (ICT) firms were chosen. Metal- and ICT-industry sectors were defined and firms chosen based on the industry categories presented by Statistic Finland.

A questionnaire was designed based on the literature review (see Appendix 1). Factor analysis and the Cronbach alpha reliability coefficient were used to confirm the unidimensionality and inter-item reliability of constructs. The items were measured on a seven-point Likert-scale, where the choices ranged from 1 = strongly disagree to 7 = strongly agree. Measurement items, sources, and factor loadings are presented in Appendices 2 and 3. As a pilot test, three entrepreneurs from firms representing the population filled out the questionnaire. The main effect was that wording was changed to simpler and more exact. The three entrepreneurs in the pilot test were excluded from the sample. A total of 101 firms out of 213 firms returned the questionnaire.

In the data analysis was used structural equation modeling with AMOS-software. It is suggested that sample size in structural equation modeling should be counted so that there are at least five observations per parameter. In the present study there are in the hypothesized model 19 parameters and 101 observations, so the sample size is just enough (Schumacker and Lomax 1996).

The dependent and independent variables were operationalized in the following way: The dependent variables are knowledge acquisition, competitive scanning, proactive searching, innovative be-

havior, and collective action. Four items measured knowledge acquisition. The items were adopted from a study by Miller (1987). The items asked whether an entrepreneur gathered a lot of information on sales, gathered a lot of information on markets, did organized work to find an opportunity, and made forecasts about technological developments.

Competitive scanning was measured in the questionnaire by using three items (see Miller 1987). First, it was asked if the entrepreneurs had a strong proclivity for high-return projects, even though they involved high risk. Second, it was inquired in the questionnaire whether the entrepreneurs went in for bold and wide-ranging actions in opportunity searching. Third, it was asked whether the entrepreneurs tried to find original ideas.

Proactive searching was measured using three items (Miller 1987). The first of the measurement items asked whether the entrepreneurs did long-term planning. The second item asked whether the entrepreneurs tried to find an opportunity with high newness-value. The third question asked whether the entrepreneurs purposefully spent time on creativity.

Innovative behavior was measured through two items (Miller 1987). First, it was asked whether the searching is about trial and error with ideas and, second, whether entrepreneurs played and tried many different things. Two items also measured collective action. First, it was asked whether the entrepreneurs preferred to work alone rather than together with others. Second, it was asked whether the entrepreneurs negotiated and discussed a lot with other people.

The independent variables are domain knowledge, formal knowledge, management experience, intrinsic motivation, and creativity. Domain knowledge was measured by using three items. The first of them asks how similar entrepreneurs' recent customers are to the customers of the former employers of the entrepreneurs. The second item asks how similar the products of the entrepreneurs are to the former employers' products. Last similarity of suppliers is asked about. These questions are applied from the study by Gimeno et al. (1997).

Two items measured formal knowledge. These are, first, education of entrepreneurs and, second, technical skills of entrepreneurs. Phan and Lee (1995) and Gimeno et al. (1997) indicated these items to well reflect the knowledge of the theories, rules, knowledge etc. of the domain, i.e., formal knowledge of entrepreneurs.

Management experience was measured by using two items inquiring experience of managerial actions and entrepreneurial actions. The questions were adopted from Gimeno et al. (1997).

Five items measured the intrinsic motivation of entrepreneurs. The first item measures how strongly entrepreneurs wanted to show that they are able do it. The second item asked if entrepreneurs felt the situation as a challenge. The third question inquired how important it was that they were able to do work they enjoy. Fourth by it was asked how much entrepreneurs wanted to be respected by others. The fifth item measured the need to develop as a human being. These questions were adopted from the studies by Gimeno et al. (1997) and Kuratko, Hornsby and Naffziger (1997).

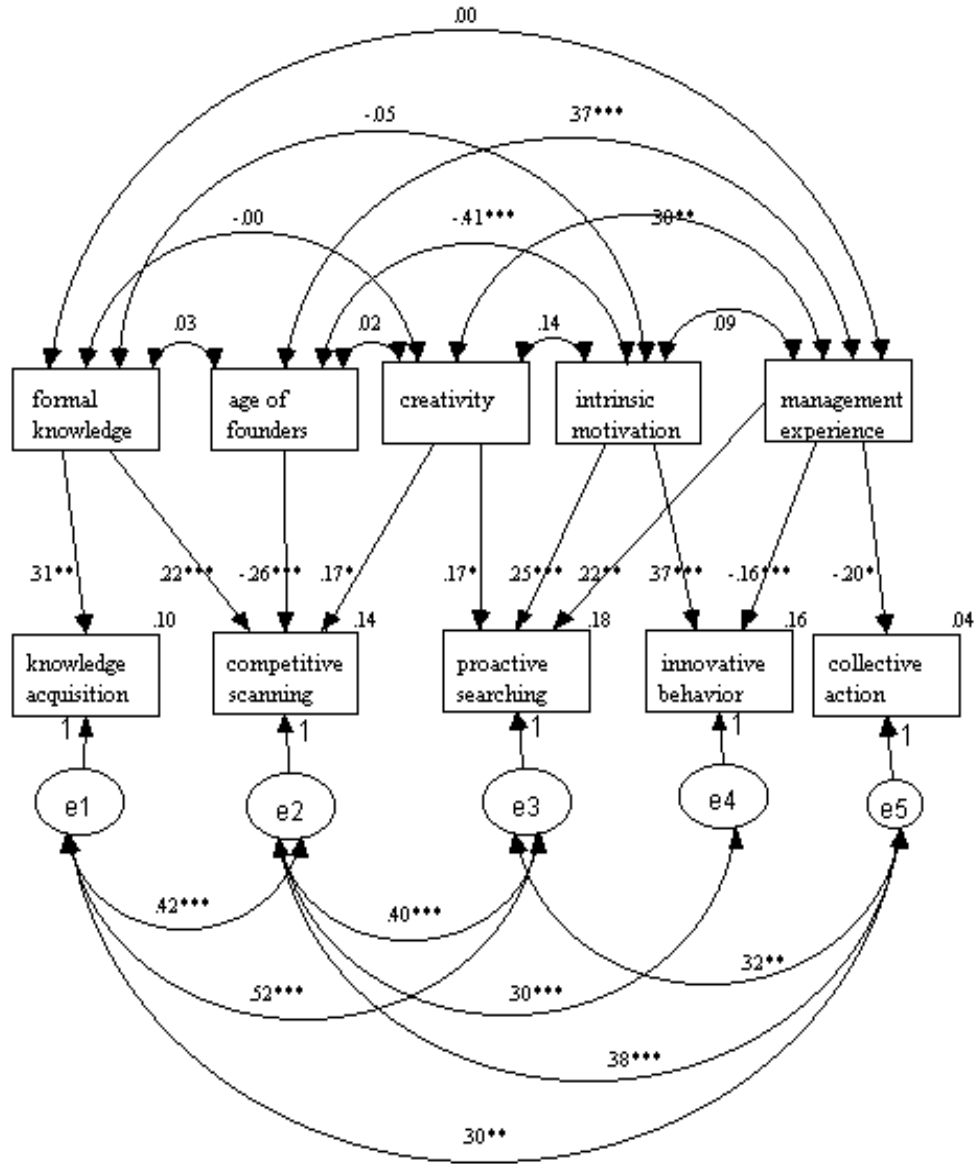
Five items measured creativity of entrepreneurs. First is asked how good an entrepreneur is when it comes to questioning normal ways of doings things. Second is asked how sensitive an entrepreneur is to seeing the kind of problems that others can't see. The third item asks how often new solutions come into an entrepreneur's mind though not necessarily wanted. The fourth item concerns originality of ideas. The last item asks if an entrepreneur has plenty of ideas. The questions are adopted from the studies by Kivikko (1977) and Vesalainen and Pihkala (1998).

The control variables of the study were age of founders, initial amount of capital, number of employees in the beginning, and radius of business in the beginning.

5. Results

The model was first run with the AMOS structural equation modeling program. The model was identified (see Figure 1). Second, error variances (e_1 – e_4) were examined for negative or non-significant error variances. None of these types of results were found. Third, it was checked that none of the model coefficients were close or over 1 and standard error coefficients unusually large. Problems in respect of these issues are not to be expected. Third, multicollinearity of the exogenous variables was studied, and it was found that none of the correlations were above 0.80. Thus, multicollinearity should not cause trouble (Schumacker and Lomax 1996).

Knowledge acquisition in opportunity recognition was significantly affected only by formal knowledge of intellectual capital. This shows that formal education and -skills provide general abilities that could be used in turning pieces of information into useable knowledge. Knowing well the theories, rules, techniques, etc. of the domain offers tools to analyze the situation and create knowledge of the situation. Even though knowing the theories, rules, techniques, etc. is crucial in order to be able to analyze the situation, this type of knowledge is quite abstract to be used straightforwardly in real business-creating situations. Thus, entrepreneurs get involved in knowledge acquisition in opportunity recognition in order to combine both their abstract and empirical knowledge. Figure 1 illustrates the results with the standardized maximum likelihood parameter estimates for the paths.



Causal coefficients are standardized beta weights.
 *** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

Figure 1. The effects of intellectual capital on opportunity recognition.

Formal knowledge affected significantly and positively competitive scanning. Thus, those who have learned the formal tools of thinking and had a thorough knowledge of the domain were able and willing to analyze competition and competitors and find more aggressively their own place in the competitive arena. Creativity also affected significantly and positively competitive scanning. This indicates

that by using creativity it is possible to understand the competitive arena in exceptional ways and see clues for opportunities that others are not able to see (Kirzner 1997). Creativity, thus, makes it possible to interpret the information from the competitive arena so that entrepreneurs perceive anomalies in the arena. Of the control variables, age of entrepreneurs influenced negatively competitive scanning. Thus, when the age of entrepreneurs rises, they do not analyze competition so actively. The reason for this might be that experience develops confidence in one's capabilities, and competitive scanning is set aside. Also it is possible that the age of entrepreneurs changes how entrepreneurs in general think about business and life as a whole. They are more willing to make room for others and less eager to compete.

It is interesting that management experience was used in proactive searching and not for knowledge acquisition or competitive scanning. Thus, management experience affected significantly and positively proactive searching. This result suggests that experience is used rather for intuitive future forecasting than for rational analyzing of the present situation. It is, thus, possible to suggest that management experience offers understanding of what has happened in the business before, what is happening now, and what will happen in the future. In this way by using management experience entrepreneurs are able to predict future trends and search proactively for opportunities. Intrinsic motivation also had a positive effect on proactive searching. This result could be interpreted so that searching for future opportunities requires more internal motivation from individuals than analyzing the present situation. Proactive searching of newness is about linking a complex set of weak cues, and to be motivated to do this demanding work, intrinsic motivation of entrepreneurs must be high. This result that intrinsic motivation do not support more rational analyzing, indicates that intrinsic motivation is connected more with intuitive searching for new possibilities than for rational information organizing. In addition, creativity enhanced significantly proactive searching. It is possible to propose that in proactive searching intrinsic motivation gives the enthusiasm, management experience the knowledge, and creativity mental information-processing tools.

Management experience affected significantly and negatively innovative behavior. This illustrates how experience decreases the flexibility of thinking and directs it to be close to prior experiences, thus affecting negatively questioning the present and innovating something new. This phenomenon is known as path-dependency, in which an individual stays in the path that is familiar to him/her in respect of his/her prior experiences (see e.g. Tversky and Kahneman 1974). Intrinsic motivation enhanced strongly innovative behavior. Research on creativity (e.g. Amabile 1997) has revealed that one of the most important factors supporting free play of ideas is the internal will of an individual to play for the sake of playing without any concrete and explicit goals.

Management experience affected as well significantly collective action. However, opposite to expected the effect was negative. This is an unexpected result because it would be reasonable to expect that the more management experience you have more willing and enterprising you are to work with others. But the above result indicates that instead through management experience entrepreneurs learn to count and make the decisions themselves and to keep others out of their opportunity recognition. This result, like results above, illustrates how prior experiences cause biases in thinking and overwhelming confidence in present knowledge.

The goodness-of-fit of the model and nested model tests

The goodness-of-fit statistics in Table 1 below indicate a good fit between the hypothesized model and the data. The chi-square value of 20.55 with 18 degrees of freedom is not significant ($p=.30$), indicating that the estimated and observed data matrices do not differ significantly. Further, the GFI value of 0.96 and the AGFI value of 0.88 indicate reasonable good fit between the model and the data. The AGFI value does not reach the recommended value of 0.90 (Schumacker and Lomax 1996) but is very close to it. Good fit is also supported by the NFI value of 0.92, which is clearly above the recommended 0.80.

The model fit was further assessed using nested model tests. The rival models are compared with each other in respect of the fit of the model to the data. Three rival nested models were compared: (1) the hypothesized model, (2) a null model, in which no relationships are posited, and (3) a saturated model, in which all the possible relationships are posited. As Table 1 shows, the null model does not fit the data because its chi square statistics indicate significant difference between the observed and estimated data matrices. Also GFI and AGFI values are clearly under 0.90 and NFI value under 0.80. The saturated model has a good fit between the observed and estimated data matrices. Also the other fit measures are acceptable. Nevertheless, the hypothesized model fits a little better. In addition, because the more parsimonious model (the hypothesized) fits better than the more complicated one (saturated), the more parsimonious model is chosen. The above results of the nested models increase the validity of the hypothesized model because the fits of both the simpler and the more complicated model were weaker than the fit of the hypothesized model.

Table 1. Structural equation model statistics for the intellectual model.

Model	Chi ²	p	df	GFI	AGFI	NFI
1. Hypothesized	20.55	.30	18	.96	.88	.92
2. Null	90.26	.00	28	.85	.71	.59
3. Saturated	4.45	.22	3	.98	.84	.90

6. Discussion

The prior studies of opportunity recognition have regarded formal knowledge to be less important than domain knowledge (see e.g. Hills 1995). However, formal knowledge has been widely seen to have an important role in knowledge acquisition as it gives more general analyzing tools to interpret informa-

tion (Christensen and Peterson 1990; Woo et al. 1992; Zietsma 1999). The results of this study were in line with the results of these previous studies. The results of the study pointed out, first, that knowledge acquisition requires formal knowledge of particular domain. This was also indicated by Woo et al. (1992) and Zietsma (1999). With formal knowledge entrepreneurs are able to analyze and synthesize information to create usable knowledge. However, the study disagrees with the previous studies as regards the idea that also domain knowledge, management experience, intrinsic motivation, and creativity should enhance knowledge acquisition. The results of this study suggest instead that knowledge acquisition is very rational, purposeful behavior that requires mostly formal abilities to analyze information and perhaps even strength to put aside the rest of the intellectual capital an entrepreneur possesses.

Prior research has strongly argued that domain knowledge of a particular profession should enhance opportunity recognition (e.g. Kaish and Gilad 1991; Woo et al. 1992; de Koning and Muzyka 1996; Hills and Lumpkin 1997). Shane and Venkataraman (2000) argue even that opportunity recognition is possible only when an entrepreneur has knowledge structures, i.e. domain knowledge, of that particular domain. Otherwise, entrepreneurs would not see what they should search for and what they should do with the information. Woo et al. (1992) indicated that less experienced entrepreneurs did not search because their lack of knowledge produced the bias that new knowledge is not important. This study revealed that the relationship is positive but at least here not significant. This might point out that experienced entrepreneurs in the domain rely on their existing knowledge and only fill the gaps they have. This suggests, as research on cognitive knowledge structures has revealed (Tversky and Kahneman 1974), that prior knowledge interferes and cause biases in thinking and behavior. Baron (1997, 1998) already indicated that this is possible in opportunity recognition. Thus, domain knowledge enhances opportunity recognition, but after some point, when domain knowledge is quite high, it starts to interfere with opportunity recognition because of the bias to think that it is known enough already (see Baron 1998). Hereafter, this study points out that domain knowledge might be important, as previous

studies have strongly argued, but it can also be dangerous when interfering with opportunity recognition behavior.

Second, prior studies have strongly argued competitive scanning to be based on domain knowledge, as it would offer the tacit knowledge of the area (Cooper 1981; Long and McMullan 1985; de Koning and Muzyka 1996; Hills and Lumpkin 1997; Kirzner 1997). However, this study revealed that formal knowledge is more important in competitive scanning than domain knowledge. The reason for this might be that knowing the business and actors there (domain knowledge) do not show where the anomalies are in the competitive arena. What is needed is also and especially formal analyzing- and technical skills to see where and what kind of gaps are going to open up.

The results also indicated that creativity is significant in competitive scanning. This was in line with previous results (e.g. Hills et al. 1999). It is interesting that creativity is significant but domain knowledge is not. This implies that tacit knowledge, or in other words alertness to connections between pieces of information that is needed, is involved in capabilities of entrepreneurs to process information in novel ways and not in knowing the business per se. This is also suggested by the fact that management experience was not significant in competitive scanning. This shows further that experience does not tell what kind the competitive arena is but that what is needed is ability to formally analyze it and willingness to creatively play with information to create in minds of entrepreneurs awareness of anomalies that are going to open. Interesting is also that intrinsic motivation is not so important, although it is proposed that competitive scanning is demanding emotionally (e.g. Herron and Sapienza 1992). This indicates that competitive scanning is not fun but hard work that must be done. Because it is an unpleasant job, it is thus possible that experienced entrepreneurs avoid it. Many times entrepreneurs even try to escape boring work and perhaps thus also avoid competitive scanning (see Kuratko et al. 1997). As a whole, in competitive scanning formal knowledge proposes the tools that are needed to understand the competition and creativity vehicles to see anomalies in this competition.

Previous studies have argued that proactive searching requires both domain- and formal knowledge (e.g. Woo et al. 1992; Christensen et al. 1994; Hills 1995). However, the results of the present study revealed that proactive searching is not about rational analyzing of information but merely intuitive visioning of the future. The results indicated that proactive searching is enhanced by prior management experiences, intrinsic motivation, and creativity of entrepreneurs. Proactive searching, which is more about abstract projecting of the future than rational and “hard” analyzing of the present situation, calls for knowledge of how an industry is developing in a larger frame (Hills et al. 1997; Hills and Shrader 1998). This knowledge is dependent on managerial/entrepreneurial experiences. In other words, if you have worked as a manager and/or an entrepreneur, it is probable that you have a vision of larger trends in that business, and thus you have also capabilities to forecast in some extent the future. However, proactive searching requires also strong intrinsic motivation to be able to explore the future. This is so maybe because proactive searching is largely based on intuitions, which are possible only if an individual is really internally motivated. Intuitions are not possible to create by force or necessity (see Manimala 1992; Martello 1994; Hills 1995; Baron 1998). Creativity is also necessary to be able to link weak information cues so that an entrepreneur recognizes future developments (Gilad 1984; Hills and Shrader 1998). Present study showed that although rational analyzing of the competitive arena and knowledge acquisition are very important in order to know what the industry stands for creative and intuitive visioning of future possibilities is the most crucial part of opportunity recognition. Thus, it should be underlined that, when capabilities to recognize opportunities are developed, serious time and effort should be given to developing creative and intuitive capabilities as well.

The results of this study indicated that innovative behavior is not enhanced by level of knowledge. Instead, innovative behavior is probably very natural to all human beings and thus it needs only intrinsic motivation to be turned on (Amabile 1997). Innovative behavior needs strong intrinsic motivation, since it is internal, mental playing with ideas. It is impossible if an entrepreneur does not enjoy it.

Innovativeness is hard to rationalize and thus it needs a pull from inside. Thus, this study agrees with Gaglio and Taub (1992) and Manimala (1992), who have suggested that innovative behavior in opportunity recognition requires a strong motivational ground. Management experience, again, decreases innovative behavior. This points very clearly how existing knowledge might hinder free play with ideas (Baron 1998). The fact that creativity does not enhance innovative behavior further shows that although innovative behavior is not about rational processing of information neither it is totally creative but has certain goals to obtain.

All the other variables besides management experience did not have any significant effect on collective action. Many studies have proposed that collective action is also a result of individual capabilities (de Koning and Muzyka 1996; Steyaert et al. 1996; Hills and Lumpkin 1997; Hills et al. 1997; Singh et al. 1999). However, this study proposes that collective action is merely learned in a social community and is thus a social phenomenon. Thus, in spite of intellectual capital, entrepreneurs can behave socially collectively dependent on how used they are to social behavior. Still, management experience hindered collective action. On the basis of this, it seems that managerially and/or entrepreneurially experienced persons want to control themselves the actions and decisions in opportunity recognition and keep others out. Perhaps experienced managers/entrepreneurs feel that somehow new opinions threaten their own opinions. On the other hand, management experience might create cognitive biases that cause managerially experienced entrepreneurs to trust themselves too much (Baron 1997, 1998). This shows again how dangerous experience can be if it is used in an inflexible way.

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Appendices

Appendix 1. The survey instrument of the study.

Name and company	
I. INTELLECTUAL CAPITAL	
First group of questions deals with your personal qualities in time you were establishing your company under the study. The questions/statements are presented on the left side and possible answers on the right side of the page. Please read the questions/statements carefully and CIRCLE the number that best suits for you.	
.....	
1. Which one of the followings is closest to your formal degree of education at the time of you established your company?	1 = no formal education 2 = elementary school 3 = vocational school/high school 4 = engineering school, commercial institute etc. 5 = polytechnic degree 6 = university degree 7 = licentiate/doctoral degree
.....	
2. How much did you have work experience from your company's field of business at the time of you established your company?	1 = less than a year 2 = less than 2 years 3 = less than 4 years 4 = less than 6 years 5 = less than 8 years 6 = less than 10 years 7 = 10 years or more
.....	
3. What were your main objectives when you started your company? Mark a cross beside those which were important to you (in the box) and number 1 (on the line) beside that one which was the most important one.	<input type="checkbox"/> ___ = I hadn't any specific objectives or goals <input type="checkbox"/> ___ = my objective was to have a company and my recent job at the same time <input type="checkbox"/> ___ = my objective was to create a job for me <input type="checkbox"/> ___ = my objective was to create a family company, which I could then hand over to my children in the future <input type="checkbox"/> ___ = my goal was to establish a company, develop it further, sell it for a good price, and enjoy the fruits of my work <input type="checkbox"/> ___ = my objective was to establish first one company, and then when its life-cycle would end, establish a new company <input type="checkbox"/> ___ = my objective was to establish little by little several companies and run them at the same time.
.....	
4. How close the products of your company were to products of your prior employees*? * Think the situation at the moment of your company's establishment as the situation of your company might have been changed.	1 = completely different 2 = quite different 3 = a little different 4 = neutral 5 = a little similar 6 = quite similar 7 = very much the same
.....	
5. What were your technical capabilities* in the line of business in which your company was at the moment of establishment? *By technical capabilities is meant here for example medical doctor's knowledge when heart transplant is needed, mechanic's knowledge how to change piston rings and why those are needed in an engine, or construction supervisor's knowledge how humidity affects building structures and how this is eliminated.	1 = no technical capabilities 2 = beginner 3 = trainee 4 = skilled worker 5 = skillful 6 = expert 7 = "world beater"

6. How much did you have management experience* at the moment of your company's establishment?
- *By management experience is meant responsibility of decisions, responsibility of planning, implementing, and supervising of issues in an organization, and responsibility of instructing, educating, and developing his/her subordinates.
- | | |
|---|----------------------|
| 1 | = less than a year |
| 2 | = less than 2 years |
| 3 | = less than 4 years |
| 4 | = less than 6 years |
| 5 | = less than 8 years |
| 6 | = less than 10 years |
| 7 | = 10 years or more |

7. How close the customers of your company were to customers of your prior employees*?
- * Think the situation at the moment of your company's establishment as the situation of your company might have been changed.
- | | |
|---|------------------------|
| 1 | = completely different |
| 2 | = quite different |
| 3 | = a little different |
| 4 | = neutral |
| 5 | = a little similar |
| 6 | = quite similar |
| 7 | = very much the same |

8. How much did you have entrepreneurship experience* at the moment of your company's establishment?
- *By entrepreneurship experience is meant prior ownership or significant partnership in a firm in which you and your partners hold the power of decisions.
- | | |
|---|----------------------|
| 1 | = less than a year |
| 2 | = less than 2 years |
| 3 | = less than 4 years |
| 4 | = less than 6 years |
| 5 | = less than 8 years |
| 6 | = less than 10 years |
| 7 | = 10 years or more |

9. How close the suppliers of your company were to suppliers of your prior employees*?
- * Think the situation at the moment of your company's establishment as the situation of your company might have been changed.
- | | |
|---|------------------------|
| 1 | = completely different |
| 2 | = quite different |
| 3 | = a little different |
| 4 | = neutral |
| 5 | = a little similar |
| 6 | = quite similar |
| 7 | = very much the same |

10. What were the important reasons for you to establish a company of your own? Please read the questions/statements carefully and CIRCLE the number that **best** suits for you. Choose only one number per statement. The scale for statements is the following: 1 = not important, 2 = little important, 3 = somewhat important, 4 = moderately important, 5 = quite important, 6 = important, and 7 = very important

	<i>not important</i>						<i>very important</i>
a. I wanted to achieve high personal wealth.	1	2	3	4	5	6	7
b. I wanted to have appreciation.	1	2	3	4	5	6	7
c. I wanted to show that I can do it.	1	2	3	4	5	6	7
d. I wanted to develop as an individual.	1	2	3	4	5	6	7
e. I wanted to get higher incomes.	1	2	3	4	5	6	7
f. I wanted to enjoy the excitement of being an entrepreneur.	1	2	3	4	5	6	7
g. I wanted to do that kind of work I like.	1	2	3	4	5	6	7
h. I wanted to have more money.	1	2	3	4	5	6	7
i. I wanted to do work that offers personal challenges.	1	2	3	4	5	6	7
j. I wanted to create a successful company.	1	2	3	4	5	6	7

11. How you see your own creativity? Please read the questions/statements carefully and CIRCLE the number that **best** suits for you. Choose only one number per statement. The scale for statements is the following: 1 = I don't agree at all, 2 = I agree a bit, 3 = I agree somewhat, 4 = neutral, 5 = I agree quite a bit, 6 = I agree, and 7 = I strongly agree

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. I have plenty of ideas. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. I search for new solutions even then when those are not needed. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. I'm alert to see problems which are possible to solve by new solutions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. My ideas are often very original. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. I'm good at questioning the used ways to do things. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| f. It is easy for me to find proposals for improvement. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| h. When a wall comes in my way I can find a detour from completely different direction. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| i. I find special and surprising solutions to problems. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| j. When I see a new solution, new, additional solutions becomes to come in my mind | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. OPPORTUNITY RECOGNITION

Instruction: The early phase of a business before the actual business actions is possible to divide into three phases: (1) business opportunity recognition, (2) planning of business actions, and (3) formal establishment of a business. In the business opportunity recognition phase it is tried to recognize and create that kind of idea for a business that grabbing on that it would be possible to add new value to customers and earn profit to owners. In the planning phase, then, it is planned how this idea for business is possible realize. In the formal establishment the business is then actualized and formally registered by the laws of the country. These phases take place before the business earns any revenues. This study is interested in business opportunity recognition. By an opportunity it is meant here that kind of need in markets that, if this need is served by products and services of the business, it would create that kind of new value for customers that they are willing to buy products and services and by that way earn profit to the business. The above phases are, of course, overlapping in reality but I kindly ask you to think back what and how you did things when you tried to recognize an opportunity for your business. Questions are presented as statements (25).

Please read the questions/statements carefully and CIRCLE the number that **best** suits for you. Choose only one number per statement. The scale for statements is the following: 1 = I don't agree at all, 2 = I agree a bit, 3 = I agree somewhat, 4 = neutral, 5 = I agree quite a bit, 6 = I agree, and 7 = I strongly agree

- | | <i>I don't agree at all</i> | | | | <i>I strongly agree</i> | | |
|---|-----------------------------|---|---|---|-------------------------|---|---|
| 1. I gathered a lot of information on sales, tastes, technology etc. in order to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I did organized work in order to find an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I gathered a lot of information on markets to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. I outlined things in a few years perspective when I tried to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. I used often experts to help me in opportunity recognition. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. I tried very actively to sketch that kind of an opportunity that would be | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. I gathered a lot of information on competitors in order to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. I didn't plan that carefully my opportunity recognition but it merely just happened and developed in time by itself. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. In order to recognize an opportunity I made a lot of forecasts about sales, profit, and nature of markets. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. I gathered a lot of information on needs, plans, and opinions of customers in order to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. I played with and tried a lot of different and new types of ideas to the industry in order to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. I had a strong proclivity for high-return projects, despite high risk, rather than for low-profit, low-risk projects. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. I purposefully spent time on creativity when I tried to recognize an opportunity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

	<i>I don't agree at all</i>				<i>I strongly agree</i>		
14. I planned far ahead (for example 3 years) already from the phase of opportunity recognition.	1	2	3	4	5	6	7
15. I made forecasts about technological developments that would be important to my products and services of my company in order to recognize an opportunity.	1	2	3	4	5	6	7
16. I preferred to work alone rather than together with others in order to recognize an opportunity (reverse).	1	2	3	4	5	6	7
17. I made forecasts about future investment needs in order to recognize an opportunity.	1	2	3	4	5	6	7
18. I tried actively to recognize an opportunity that would be growth oriented and innovative rather than thoroughly tried and secure idea.	1	2	3	4	5	6	7
19. I did often organized work to find and evaluate markets, new products, new technologies, etc. in order to recognize an opportunity.	1	2	3	4	5	6	7
20. I tried very actively to recognize an opportunity that would beat competitors rather than let all flowers bloom.	1	2	3	4	5	6	7
21. I used often information technology to assist me in my opportunity recognition.	1	2	3	4	5	6	7
22. I went actively in for bold, wide-ranging actions in opportunity searching rather than accepted too cautious and thoroughly studied ways of doing things.	1	2	3	4	5	6	7
23. I liked a lot to negotiate and discuss with other people in order to recognize an opportunity.	1	2	3	4	5	6	7
24. I tried to find original and new type of ideas in order to recognize an opportunity.	1	2	3	4	5	6	7
25. Recognizing of opportunities was more about trial and error with ideas than carefully planned activity.	1	2	3	4	5	6	7

3. BACKGROUND INFORMATION

1. Age and gender:

2. How many years have you worked in the industry of your business?

3. Are you the founder/one of the founders of the company:?
 Yes No → Who was/were?

4. First customer of your company (year and month):

5. Home municipality of the registered office of your company:

6. Estimate how many kilometers from your office 80% of your customers live:

Appendix 2. Measurement items, sources, and factor loadings of intellectual capital.

Items	Sources	Factor loadings
<i>Domain knowledge</i>		
How close are your prior employers' customers to your own firm's customers?	Gimeno, Folta, Cooper and Woo 1997	.90
How close are your prior employers' products to your own firm's products?	Gimeno et al. 1997	.82
How close are your prior employers' suppliers to your own firm's suppliers?	Gimeno et al. 1997	.71
<i>Formal knowledge</i>		
What is your highest official degree of education?	Phan and Lee 1995; Gimeno et al. 1997	.88
What is your amount of technical skills in your firm's industry?	Phan and Lee 1995	.83
<i>Management experience</i>		
How much entrepreneurship experience have you from your prior jobs?	Gimeno et al. 1997	.88
How much management experience have you from your prior jobs?	Gimeno et al. 1997	.88
<i>Intrinsic motivation</i>		
I wanted to show that I can do it.	Kuratko, Hornsby and Nafziger 1997	.89
I felt it like a personal challenge.	Kuratko et al. 1997	.87
I wanted to do work that I enjoy.	Gimeno et al. 1997; Kuratko et al. 1997	.78
I wanted to be respected by others.	Kuratko et al. 1997	.77
I wanted to develop as a human being.	Kuratko et al. 1997	.77
<i>Creativity</i>		
I'm good at questioning normally used ways of doing things.	Vesalainen and Pihkala 1998	.89
I'm sensitive to seeing problems that others don't see.	Kivikko 1977	.82
New solutions come into my mind also when they are not especially needed.	Kivikko 1977	.82
My ideas are very original.	Vesalainen and Pihkala 1998	.76
I have plenty of ideas.	Vesalainen and Pihkala 1998	.71

Principal component analysis using VARIMAX rotation. Item loadings not less than 0.6 on a primary dimension and not more than 0.4 on any other dimension were retained.

Appendix 3. Measurement items, sources, and factor loadings of opportunity recognition behavior.

Items	Sources	Factor loadings
<i>Knowledge acquisition</i>		
I gathered a lot of information on sales.	Miller 1987	.94
I gathered a lot of information on markets.	Miller 1987	.90
I did organized work in order to find an opportunity.	Miller 1987	.89
I made forecasts about technological developments.	Miller 1987	.70
<i>Competitive scanning</i>		
I had a strong proclivity for high-return projects, despite high risk.	Miller 1987	.92
I went in for bold, wide-ranging actions in opportunity searching.	Miller 1987	.86
I tried to find original ideas.	Miller 1987	.62
<i>Proactive searching</i>		
I planned far ahead.	Miller 1987	.90
I tried to find an opportunity with high newness-value.	Miller 1987	.68
I purposefully spent time on creativity.	Hart 1992	.60
<i>Innovative behavior</i>		
Searching was about trial and error with ideas.	Miller 1987	.91
I played with and tried a lot of different ideas.	Miller 1987	.71
<i>Collective action</i>		
I preferred to work alone rather than together with others (reverse).	Miller 1987	.92
I negotiated and discussed a lot with other people.	Miller 1987	.64

Principal component analysis using VARIMAX rotation. Item loadings not less than .60 on a primary dimension and not more than .40 on any other dimension were retained.