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**THE USE OF INFORMATION TECHNOLOGY AND INNOVATION IN
ENTREPRENEURIAL SMALL FIRMS
- *An Exploratory Study* -**

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THE USE OF INFORMATION TECHNOLOGY AND INNOVATION IN ENTREPRENEURIAL SMALL FIRMS - *An Exploratory Study* -

Abstract

This study explored the relationship of the entrepreneur's/founder's ability and skills and the company's strategic use of innovative information technology. A triangulation of the results based on 7 case studies in Canada, France, Germany, Italy, Spain, UK, and US coupled with a survey instrument found that the personal motivations and skills of the entrepreneur are important phenomena in small firms' IT-based innovation and business development. Also, prior work experience and the entrepreneurs' ability to "act thinkingly" and adapt to changes in market condition are valid explanatory phenomena. The study proposes the existence of a *digital mindset* and a winning formula based on a combination of customer focus, creation of an innovative firm-culture and social entrepreneurial skills to connect, merge, and optimize the resources available in the value chain.

Introduction

Much has been written about how the increase in the use of information technology (IT) has increased firms' effectiveness and their ability to innovate and improve performance and competitive advantage (Johannessen, Olaisen and Olsen 1992; Dibrell, Davis and Craig 2008). Often, however, the focus in the literature is on larger firms and on the relationship between IT investments and performance measured as snapshot of the firm and without an in-depth consideration of the context and the firms' development over time. Also, frequently the analysis describes the internal and external processes of a "going concern", i.e. an already established and operating organization, and the impacts for changes in the firms operating procedures based on IT- investments.

This study offers a more holistic perspective by investigating the impact of small firms' adoption of IT as a managerial and technical innovative resource. The study is based on a collaborative project between ICSB and DELL with the objective of learning more about how small firms use IT to innovate and serve their customers. Data for the study are from the winners and finalists of DELL's Small Business Excellence Award competition 2008.

In the following, the conceptual foundation of the research will be outlined. Thereafter the methodological approach of the study and the outcome will be discussed before drawing conclusions and giving recommendations on further research.

Conceptual foundation

Shuman and Seeger (1986, p.8) state that: “[...] smaller businesses are not smaller versions of big businesses... smaller businesses deal with unique size-related issues as well, and they behave differently in their analysis of, and interaction with, their environment”. Also, for many small firms, the owner-managers’ personality, in particular their values and goals are indistinguishable from the goals of their businesses (Kotey and Meredith 1997) and at the centre of all enterprise behaviour. Thus, “When a firm is led by a single top decision maker, as many small firms are, the cognitive processes of the CEO are arguably the same as those of the firm...” (Peteraf and Shanley 1997, p. 167). Consequently, it seems reasonable to deduce that small firms’ owner-managers (the CEO) play an absolutely central role in the firm’s entrepreneurial- and innovative process and are decisive in its use of IT.

In the following, the entrepreneur is viewed as an innovator (Schumpeter, 1911) and as an individual who are prepared to depart from the conventional in the pursuit of wealth, power, autonomy and/or prestige, and one who can be expected to follow the line of relative least resistance in pursuit of these goals (Dutz *et al.*, 2000) whether in form of new business projects within an existing business operation or as new business start-ups. Innovation is in the following broadly defined as the creation of and exploitation of new ideas (Kanter 2000). Based on a review of several bodies of literature – amongst other entrepreneurship, strategy, networking and information management - a conceptual model (Figure 1) was developed to guide the further research. In line with the literature, it was deduced that the CEO’s education may have an influence on the formation of a future

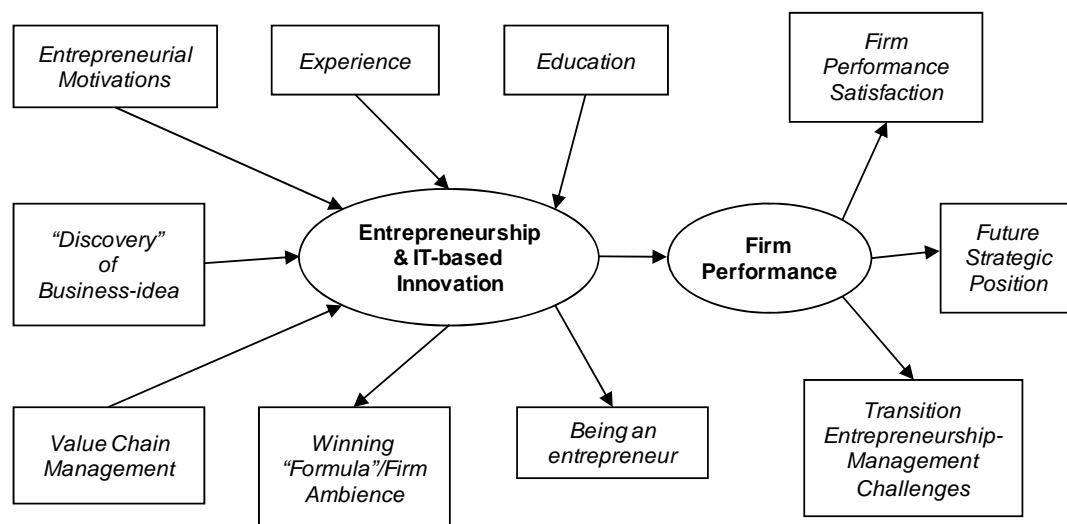


Figure 1: Conceptual Model

entrepreneurial mindset and innovative actions (Peterman and Kennedy 2003; Kruger 2003; Baron 2004). Similarly that experience, both personal and professional, will be an influencing factor (Baron and Ensley 2006; Mitchell *et al.* 2007). Further, specific indicators of entrepreneurial motivations (independence, self-reliance, pro-activeness, creativity,

internal locus of control) proposed to have an influence on entrepreneurship and innovation were identified (Haynie *et al.* 2008; Reitan 1997; Shane and Eckhardt 2003). Then indicators for the discovery of the business-idea construct were identified (Baron and Ensley 2006), particularly aiming at indicators determining the type of innovation (technical versus managerial) and through which processes the opportunity emerged in the business- and network context. Closely related to the discovery process, the concept of value chain management was evaluated based on the assumptions that interactions with actors in the value chain (suppliers, subcontractors, clients, collaborators) and other networking, likely will have an overall influence on the firm's entrepreneurial and innovative processes (BarNir and Smith 2002; Steensma *et al.* 2000; Greve 1995). Next, an attempt was made to capture the firms' winning formula, i.e. the managerial processes distinguishing the winners and finalists. The indicators eventually chosen for the construct as drivers of innovation and learning processes were ultimately partly based on experience and partly on substantive theory (Tidd, Bessant and Pavitt 2008; Heunks 1986; Nonaka and Takeuchi 1995; Senge 1990) and with specific support in the literature on measurement (Chandler and Lyon 2001). Eventually one indicator was left as a confirmation of the CEO's mission of "being an entrepreneur" based on the logic that this indicator will correlate closely with the latent entrepreneurship and IT-based innovation construct. For logical and technical reasons, it should be noted that the direction of the proposed (causal) relationship between the last two construct and the latent (indirectly measured) entrepreneurship and innovation construct is opposite (i.e. with causation from the entrepreneurship and IT-innovation construct to the reflective indicators). The reason for this is that the phenomena are interpreted to be preceded by the entrepreneurial and innovative action (the cause occurs before the effect) (Edwards and Bagozzi 2000).

With general support in the literature, the conceptual model is thus proposing a causal relationship between the IT-based entrepreneurship and innovation construct to firm performance (Dibrell, Davis and Craig 2008; Johannessen, Olaisen and Olsen 1999). The reflective indicators of the performance constructs have all substantive support in existing literature (Dess and Robinson 1984; Sadler-Smith *et al.* 2003; Scherer *et al.* 1984; Vaivio 2004). The measurement and causality appear relatively straight forward and intuitive – i.e. that IT-based performance improvement measures lead to observable and measurable results.

The conceptual model was developed as a theoretical foundation for the exploratory empiric research phase and as a tool for the interpretation of the findings. Table 1 illustrates the measurement instrument developed based on the review of the literature and gives an overview of the main constructs and measurement indicators. The indicators of the measurement instrument correspond item-to-item to the questionnaire developed for the quantitative data-collection (Attachment 2).

Methodological approach

The methodological frame for the empirical research phase is based on a triangulation of case studies of the national winners with a survey instrument developed based on the theory-based conceptual model and distributed to the national finalists in each country. The case studies have been developed based on the preparation of a case study guideline and an interview guide. After each interview (usually 3-5 hours with the CEO or another executive of the firm in the CEOs' absence) transcripts were prepared and followed-up with further questions as required. Additional secondary material (such as webpage-information, blogs, company plans and presentations) has also been reviewed depending on availability.

In addition, and with the purpose of amplifying the findings based on the interviews and subsequent case study essays, an electronic survey instrument (questionnaire) based on the conceptual model, and consisting of 61 variables, was developed and distributed to the national finalists (10 in each country) in 7 countries² by e-mail. After 3 reminders, 41 observations were received representing a response rate of 51%. All responses were complete with no missing data. Use of a small convenience sample is, in this case, found reasonable as far as the objective of the research is exploratory and generalization of the findings not intended.

The potential subjectivity and bias of the researchers during the data collection process, i.e. both during the interviews (and thus possibly reflected in the case studies) and during the development of the survey instrument (wording of the questions), have been sought controlled by engaging several researchers of different nationalities and cultures in the final research phase while leaving the initial preparation of the case studies to national researchers most familiar with the national winners' firms. Towards the end of the process, efforts have also been made to have the case studies peer-reviewed and audited by researchers not directly involved in the development of the cases.

² USA, Canada, UK, Spain, Italy, France, Germany

Qualitative research

Case study research and results

The following case studies were prepared and analyzed (Figure 2). As indicated, the cases are from very different industries giving ample material for comparison of IT-innovation processes.

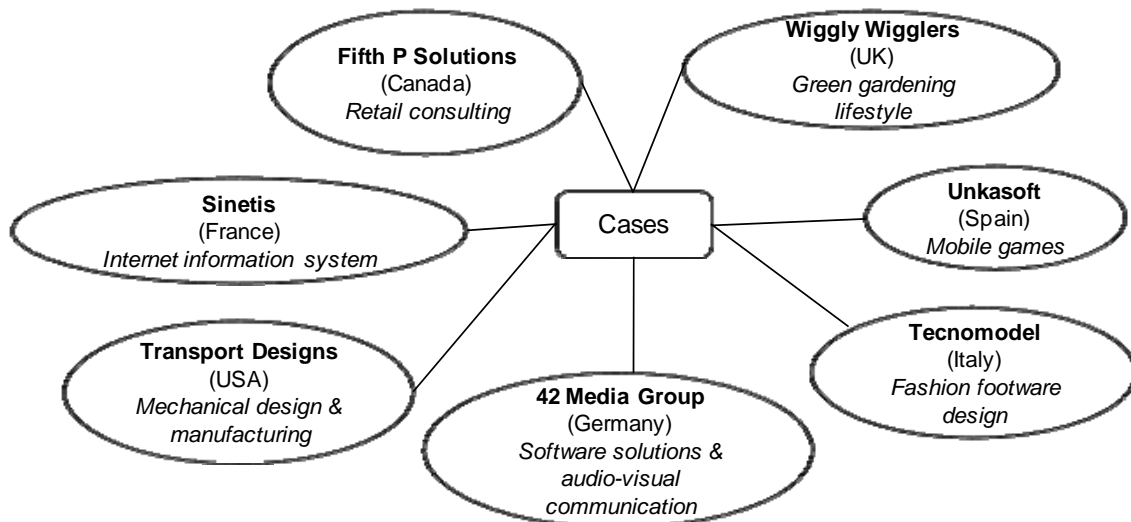


Figure 2: Casestudies of Winners 2008

- Fifth P Solution is a retail consulting firm offering services to clients based on web-based training combined with hands-on and minds-on practical training on the clients' premises. Founded in 1989.
- Transport Designs manufactures custom-made trailers for sports and industrial use. Founded in 1988.
- Tecnomodel offer design and managerial services for the fashion footwear industry. Founded in the early 1990s.
- Wiggly Wiggles produces and sells worms and compost products directly to the end-user. Founded in the early 1990s.
- Unkasoft provides services whereby clients may create their own mobile phone based marketing campaign. Founded in 2005.
- Sinetis provides a service for networking groups of remote PCs via the internet. Founded in 2000.
- 42 Media Group provides software solutions and services for audio-visual communications. Founded in 2005.

Based on an analysis of the interview transcripts some selective citations from the interviews of the winning CEOs are presented with the objective of shedding light on the

cognitive process behind their venture and their way of reasoning about IT-based innovation:

On technology:

- a) *"... I really think technology is the key to it, being able to make changes as quickly as possible. I thought when I first put this computer in and was starting to do my stuff on CAD, I was thinking, okay, it is going to give me a better product, a more accurate product, less time involved with trying to make sure this thing is right and give me more time at the end of the day, and what it has really done was it has allowed me to do more in the same amount of time".*
- b) *"... So instead of adding staff, I have been able to do a whole lot more with the technology but the technology is also not only what we were able to do with setting ourselves up strategically as far as our website, we are getting inquiries from all over the globe which is intriguing to me".*

On how technology is being used:

- a) *"... So it cost us some money - that very first project - it was \$140,000 project which at the time was a monster project for us. And for us to have to cut things apart and start all over again, it was frustrating to the guys but pretty satisfying to me that, well, the drawing actually is what it is and what I laid out is exactly what you got and you did not -- because I'm out there with a tape measure saying, "You guys did not put this in the right spot." They said, "Well, we did not think that we needed to do it like that," but it was obvious that it was wrong. So it was gratifying to know that the accuracy of the CAD drawing was what we needed".*
- b) *"...We are useless at inventing stuff and we did not win the Global Dell Award because we invented anything at all, we are useless at it. We are good at taking somebody else's invention and utilizing it".*
- c) *"... We have not invented Facebook or Twitter, we are not ever likely to do anything like that but we can definitely find ways of using it to connect with customers or suppliers or within the team and that is what I think our strengths are".*
- d) *"... So over the last number of years, we've built an agency that works with world-class brands and really our whole, sole purpose that we exist is we help enable brands to succeed through people" (underline added).*

On performance:

- a) *".... It was not something that we even set a goal at doing but we are finding out different ways that we are getting into these (more distant) markets and it is paying off pretty well".*
- b) *"...And I got to tell you it's just -- we've had a great run of this over the last five-six years. And despite our budget's still being somewhat in the training and the marketing area where theirs budget is softest right now, we're winning all kinds of business".*

Combining the interviews and the subsequent case studies, several common concepts are identified in spite of the differences concerning their sector, specific firm-context, stage in development and national culture. The concepts found to be overlapping between the national winners are illustrated in Figure 3.

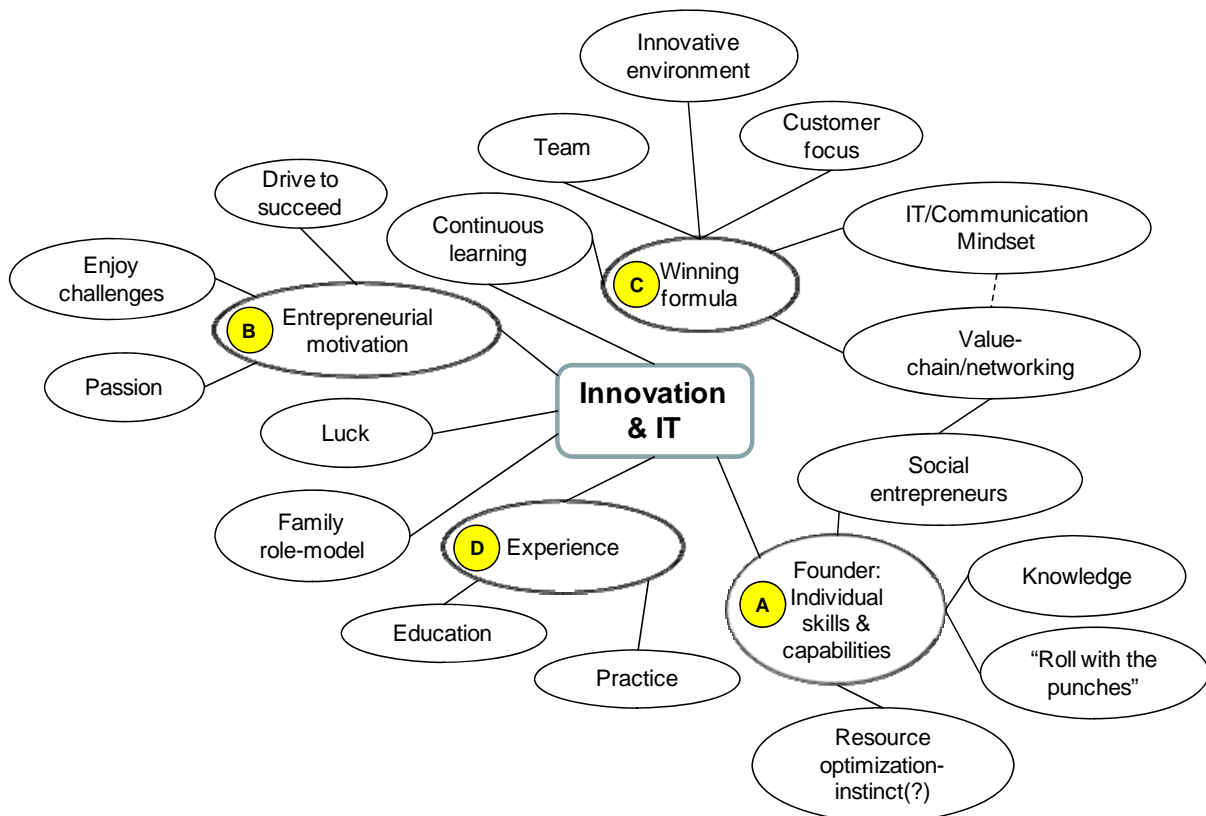


Figure 3: Winners' Common Features

First and foremost for the firms' entrepreneurial success appears to be the role, the energy and the individual skills and capabilities of the founder (Figure 3 - A). In the majority of the cases the driving innovator was one person, at least during the start-up phase. Common features or characteristics are primarily the knowledge and idea about a project they were pondering on doing. Curiously, this often did not develop in a "business school's" rational manner by developing a formal business plan (feasibility study, profit & loss statement, cash flow, etc.), but more in the form of a vision or absolute resolve to be independent and do something fun and meaningful. However, throughout the process from start-up to becoming a growing firm, the founders (in some phases more than one person) showed an, in retrospect, astonishing tacit capability of optimizing available resources (from achieving access to local raw materials, hooking up with local capable people or negotiating workable terms with suppliers and clients). This appears not as a controlled rational process, but more as an evolutionary adaptation and as an instinct of survival. All national winners show an ability to "roll with the punches" – avoiding being hit while simultaneously looking for a way ahead for their company and themselves. During the start-up phase (often 1-5 years) the founder (or a close-nit founding team) literally *is* the company.

Having skills and capabilities, the founder needless to say also has what may be categorized as an innate motivation for entrepreneurship (Figure 3 - B). Almost 60% of the founders (Appendix 1 – descriptive statistics) come from families with an entrepreneurial role-model and are used to the ups and downs of being a small firm CEO (the excitement, but certainly also the sometime end-of-the-month squanders and frustrations). All the winners have a clear drive to succeed in *their* project; they very much enjoy the challenge of creating something and being part of an independent and successful establishment. All have a living *passion* for what they doing and what they have done. They have created their dream and some of them, however not all, appear to be closely emotionally tied to their companies.

The national winners show clear common features regarding the winning formula (Figure 3 - C). The winning formula is here simply used as a metaphor for those key managerial elements which generally are in common among the firms up to this stage of their development while at the same time emphasizing that the strength of the observed phenomena vary between them. In interviews with the CEOs most of them emphasize first and foremost the skills and capabilities of their *team*. Other characteristics to be emphasized are an innovative environment and a managerial perspective focused on continuous learning - i.e. interdisciplinary collaboration, an environment open for learning through trial and error and freedom of opinion-exchange. In fact, several observations are as taken from a textbook in organizational learning (Argyris and Schön 1996; Senge 1990) with a particular twist suitable for resource-scarce small firms. Similarly, and with particular reference to most of the CEOs' level of attention to the human side of the organization, while simultaneously focusing attentively on innovation for the benefit of the final customer, a fine balance of contextual *ambidexterity*³ seems to be struck. I.e. a firm-ambience and management style which call for individual employees to make choices between alignment-oriented and adaption-oriented activities in the context of their day-to-day work (Duncan 1976; Birkinshaw and Gibson 2004).

Another phenomenon which appears to be fundamental in the success of the firms is the founders' (through their teams) early adoption of a *digital mindset*. They all, in their different circumstances and contexts, were able early on to perceive the utility of using IT in the various management disciplines of their firms and managed to digitalize their operation, gradually, to the maximum extent. The benefits of IT was thus perceived early and converted into a company resource and eventually developed to become a competitive advantage. See further discussion on this below. The use of *information* technology (here spelled out for emphasis) for all firms became over time absolutely crucial in their dialogue and communication with clients and suppliers. Due to the difference in operation and sector, the role of digitalized communications varies, however, widely between the firms, but the

³ Ambidexterity: A combination of adaptability (ability to move quickly toward new opportunities and to adjust to volatile markets) and alignment (and coordination) of current assets and resources to optimize operational performance and value creation (Birkinshaw and Gibson 2004)

principle is the same, digitalization is taken advantage of to the maximum extent possible to increase the quality of communications and to facilitate the dialogue and the contact with the market and with the members of the value chain.

Very important among the capabilities of the founder appear to be the skills as a *social* entrepreneur, i.e. skills in personal interactions (conversations, dialogues, collaborations, negotiations, pleading, reasoning, arguing, convincing, creating trust, etc.) with the members of the firms' value chain. Thus, for all the firms it appears as if IT (hardware and software) is only one more managerial tool, though a very important one, to gain additional efficiency and scope, while simultaneously maintaining the human element as the "glue and oil" which keeps the firm, the value-chain or the network together and in a state of fluidity .

Another, maybe not surprising finding is the observation that experience (Figure 3-D) appears as a fundamental element in the preparation of their entrepreneurial ventures. Among the national winners, all the founders had experience before starting up on their own. Most of them had specific experience in a somewhat similar firm and the majority had professional experience from different disciplines to draw on, some from entrepreneurial and relatively small firms. Some of the founders have higher education while, overall, the academic education does not seem to play a significant role in their later development as innovators and entrepreneurs beyond its general role as basic formation. Only one of the CEOs had participated in a local governmental educational program for entrepreneurs.

Common for all of the cases appears to be an element of good *luck*. In the interviews, this is sometimes with the benefit of retrospect described as a "chance meeting" with an "angle" (giving office space for free during the startup-phase, having support from parents/family, getting access to a special machine or computer software, etc.). Becoming aware of this *luck* may simply be a question of having the perceptive skills and guts to grab an opportunity when occurring by a coincidence. Certainly, however, it appears as if the CEOs possess capabilities to "run with the ball" when opportunity knocks. In all cases the instances of luck appear of great importance as does the entrepreneurs' ability to take advantage of them.

Finally, and maybe somewhat surprising from an academic perspective, none of the CEOs mentioned deep concerns about risk as a problem or bottleneck in the start-up or development of their ventures. They all appear convinced that they knew they were on to something and consequently possibly myopic (biased) and not able or willing to anticipate the risk of a possible failure.

Differences in degree of digitalization

Depending on the activity and operations of the firms, they are digitalized to a very different extent and in different manners. Those of the firms which are most technical and using IT to transfer or communicate technical data, and to a certain extent related

quantitative management information to clients and collaborators in the value chain, have digitalized their operation to the greatest extent. Examples on this are for instance Transport Design and Tecnomodel, both of which use digital technical drawing and drafts of design in their dialogue with clients and giving clients a possibility to comment and make counter-specifications in an accurate and effective manner. The operations are highly technical (based on laws of natural science and numeric measurements) and with much of the knowledge based on objective measures apt for codification and electronic transmission to and from (more or less) remote clients.

Fifth P Solutions and Wiggly Wiggles may be seen to be on the other side of the scale and much more dependent on subjective interpretations and less numeric dialogue and communication with clients in their operations. Consequently, these elements also appear to dominate their use of IT. These firms are digitalized in a different manner – that is a manner which allows a significant amount of “human touch” in the dialogue with clients and in the marketing of their services. The CEO of Wiggly Wiggles want to change the world to become more ecological (while making money) and this you simply cannot do with reference to a digital map or an electronic drawing. Here you need passion and communication skills to a much larger extent. A similarly observation may be made with reference to Fifth P Solutions. Here, the entrepreneur has added a fifth P by adding *People* to Kotler’s Product, Price, Production and Place (distribution), by making the human touch an absolute crucial element in their contact with clients and development of their service. In these cases it appears neither possible nor desirable to fully computerize the business and the firms instead rely on a much softer and subjective approach. The differences in digitalization and its context are illustrated in Figure 4.

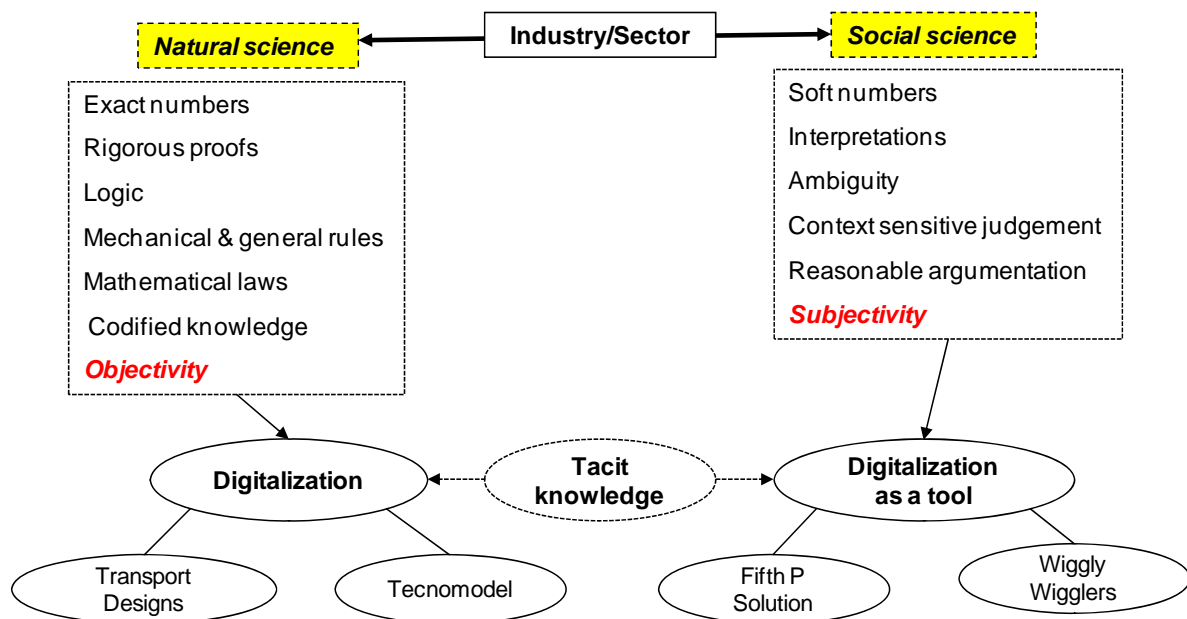


Figure 4: Digital Differences

What all the firms do have in common is an absolute focus on customer attention in all they do, particularly in marketing and customer related activities. Consequently, in this process of connecting the resources of the firm – including converting the mindset of the entrepreneur to a collective *winning mindset* of the firm – the tacit knowledge of the entrepreneur and his team seems to play an important role. This is an intangible factor (maybe reflected in a vision, an unspoken mission statement - some kind of unwritten strategic plan), that helps bringing the winning formula or *winning mindset* together in practical management actions and routines, frequently digitalized. Independent on the level of digitalization, it is this tacit, dynamic and renewable knowledge component which ultimately appears to convert the national winners into winners in the marketplace (Teece, Pisano and Shuen 1997; Teece 1998).

Quantitative analysis

Measurement instrument, model specification and results

Simultaneously with the literature review and deduction of the conceptual model, the research was operationalized by identifying measurement indicators for each main construct in the literature. In addition to substantive theoretical support, support was also sought based on practical management experience and a fair proportion of common sense. It should be emphasized, however, that a similar measurement instrument on the same theme as this research was not found in the literature and that the presented conceptual model thus is exploratory. The indicators of the measurement model and their link to the main constructs are illustrated in Figure 5, while the conceptual model's latent constructs and measurement indicators are summarized in Table 1.

With reference to Figure 5, it should be noted that constructs E1-E5 are deduced to be formative, i.e. as causing the latent entrepreneurship and innovation construct (entritin), while the models other constructs are reflective variables, i.e. with a causal relationship going from the latent constructs (entritin or frmprf) to the observed variables and indicators (Bollen 1989; Bagozzi 1994; Edwards and Bagozzi 2000). With reference to the conceptual model's proposition of causal relationships, it is for sake of good order emphasized that this theoretical proposition, usually is expected to go beyond explaining why variables are correlated or not and include theorizing about causal relationships among the variables. Nevertheless, in isolation, correlation or covariance is only a necessary, but not sufficient condition for causal relations and thus finding an expected pattern of correlations would not imply that the underlying theory is right only that it is plausible (Kelloway 1998).

In particular, it should be noted that in line with the literature and based on experience, it was reasoned that the indicator based on the direct question of the perceived "Importance of being an entrepreneur?" may be considered to represent the latent entrepreneurship and innovation construct (entritin). This representation of the latent construct should help making the subsequent interpretation of the findings easier.

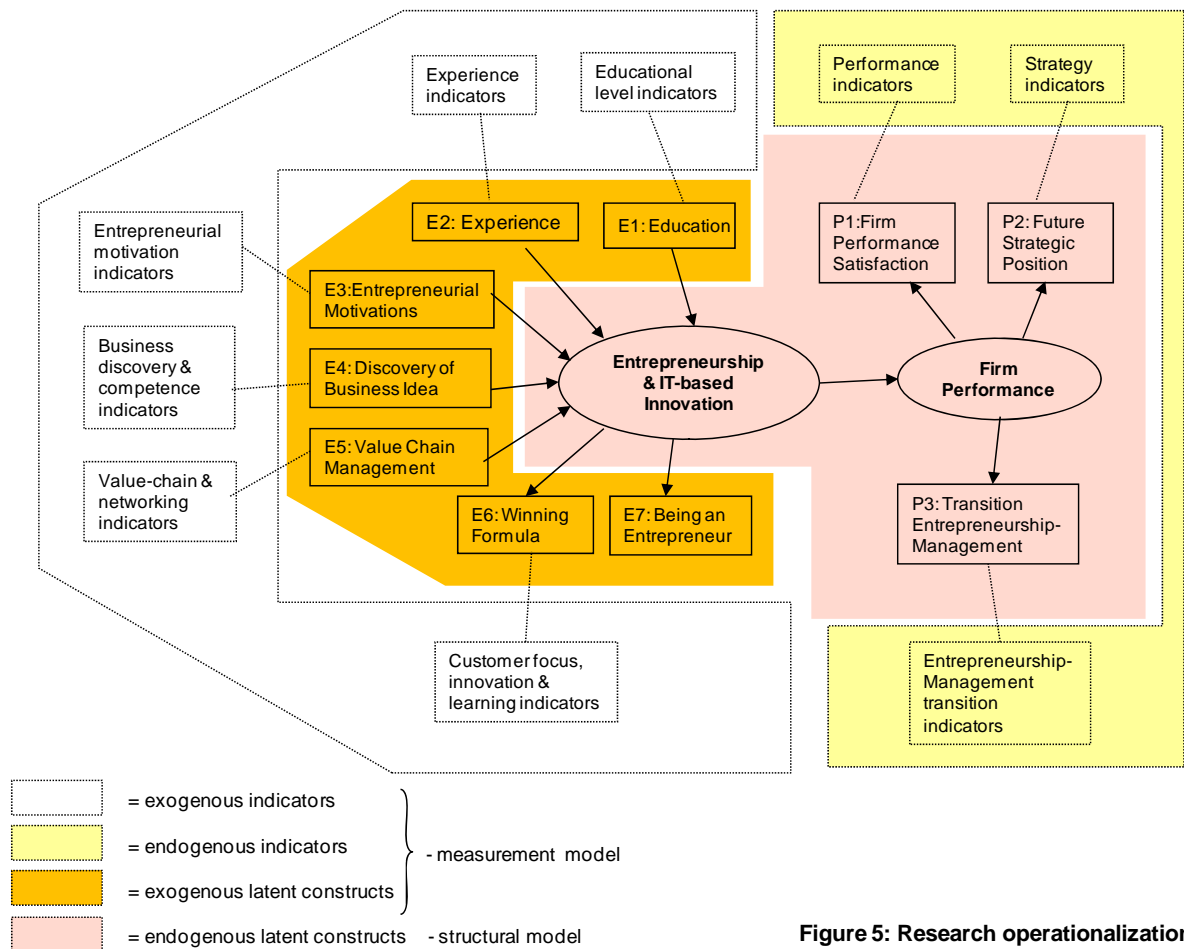


Figure 5: Research operationalization

In accordance with the literature (Diamantopoulos and Winklhofer 2001; Diamantopoulos and Siguaw 2002), composite measure indices were developed with the object of explaining abstract (unobserved) variances, considering multicollinearity among the indicators and emphasizing the role of indicators as predictor rather than predicted variables. The collected data representing each main construct were consequently converted to factor scores⁴ thus transforming sets of indicators into one variable per main construct representing items that have high loadings on one factor (Hair *et al.* 1998) and maximum reliability for the construct. This was done for each main construct with more than one indicator. It should be noted that each indicator represents a question in the questionnaire (Appendix 2). With reference to the measurement indicators (Table 1), the first column refers to the variable name used in Figure 5. The exogenous and endogenous indicators are measured using a Likert-scale with scoring 1-5 with labels adapted for the different question-types. The second column refers to the non-observed latent constructs of the conceptual model, the third column lists the observed indicators as reflected in the questionnaire, the fourth column indicates indicators (questionnaire items) per construct and column 5 the measurement reliability. The Cronbach's alpha for the constructs with several measurement indicators is within or above the 0,60-0,70 range indicating an acceptable to good reliability. For the four constructs with only one indicator, however,

⁴ Factor scores are standardized with a mean of 0 and standard deviation of 1

Construct name	Latent construct	Indicators	Indicator/Construct	Cronbach's α
Edu	E1: Education	48 Educational level	1	n/a
Exp	E2: Experience	8 Similar business experience	1	n/a
Entrmot	E3: Entrepreneurial motivation	27 Being in control 28 Being my own boss 29 Financial success 30 Recognition 31 Creating something new 32 "The thrill of the chase" 33 See something through to implementation	7	0,726
Discidea	E4: Discovery of the business idea	11 Internal innovation	1	n/a
Valcman	E5: Value chain management	20 Personal relationships 21 IT-based infrastructure/infosharing 22 Networking 23 Value-chain collaboration 24 Networking for learning 25 Networking with innovative "people"	6	0,787
Wform	E6: Winning formula/firm ambience	1 Customer focus 2 Time for creative efforts 3 Cross-functional teams 4 Learning by trial & error 5 Effective leadership 6 Innovative ambience 7 Diversity of ideas 26 Internal focus on continued learning	8	0,662
Beinge	E7: Being an entrepreneur	34 Being an entrepreneur	1	n/a
Perfsat	P1: Firm performance satisfaction	39 Overall performance 40 Growth 41 International expansion 42 Market share 43 Profitability 44 Development of new prod/services	6	0,784
Futstrat	P2: Future strategic position	15 Weakening competitive advantage 16 Weakening economy/demand 17 Growth-management challenges 18 Difficulties with continued innovation	4	0,624
Transem	P3: Transition entrepreneurship-management	19 Transition entrepreneurship-management 35 Adm.routines repetitive & boring	2	0,716

Table 1: Measurement Instrument

there are no reliability indicators. The indicators are, however, in spite of the danger of measurement errors, deemed critical in the research and maintained as part of the model based on support in substantive theory.

The empirical data were collected using a web-based survey instrument⁵ (Appendix 2). A sample of 41 observations was obtained based on a response rate of 51% from a convenience sample consisting of the national finalists of Dell's Small Business Excellence Award 2008. Descriptive statistics of the data collected are included in Appendix A-1, while a basic normality-check of the data is illustrated in Appendix A-2. The main conclusion from the data characteristics analysis is that individual constructs in fact do deviate from the normality assumption⁶, however, the literature generally supports that structural equation model's maximum likelihood theory is reasonably robust (Satorra 1992; Boomsma and Hoogland 2001) in spite of deviations. The deviation from normality combined with the small sample size will, however, nevertheless reduce the quality of the estimations.

The conceptual model was specified in LISREL to estimate to which extent the correlation matrix (of the main constructs) implied by the theory-based conceptual model corresponds to the correlation matrix of the empirical data of the sample. The result of the LISREL-estimation is illustrated in the path-diagram shown in Figure 6.

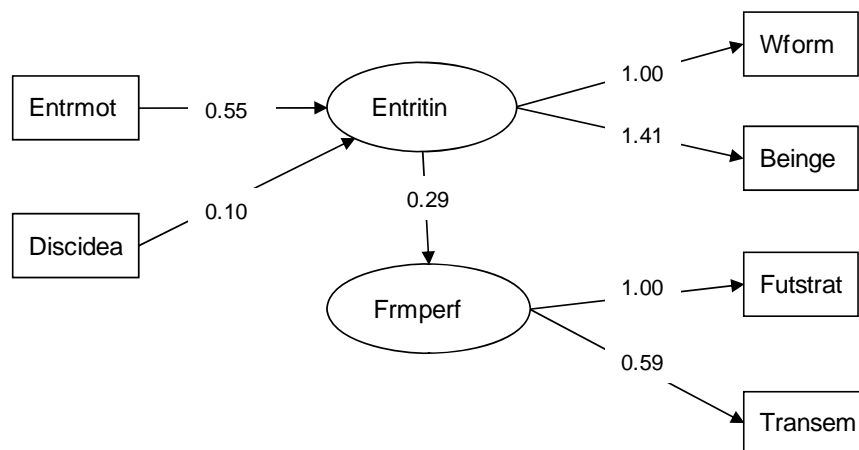


Figure 6

The model was run using the correlation matrix of the conceptual model's main constructs as input-data and with the measurement errors (Cronbach's alphas) inserted on the diagonal of the input correlation matrix to correct the estimates for measurement error. The model estimation is based on maximum likelihood and the standardized estimates of the loadings on each path are indicated. While correcting for measurement error where possible, it should, however, again be drawn attention to the fact that as many as 4 of the conceptual model's construct had only one indicator and thus no correction for errors in the measurement. As a consequence of this, no further comments on the model's fit will be made and the results of Figure 6 used only on an indicative basis with interpretations grounded on substantive theory in the further context of this exploratory research. With

⁵ The software "Survey Monkey" was used to collect the data

⁶ Structural equation modeling is based on the assumptions of basic data-linearity, approximate normal distribution, independent observations and random sampling

this caveat, however, it can be seen that the results indicate a rather strong causal effect parameter (0.55) from the entrepreneurial motivation (Entrmot) construct to the latent entrepreneurship IT and innovation (Entritin) construct. The results also indicate a much weaker causal effect parameter (0.10) from the discovery of the business idea construct to the entrepreneurship IT and innovation (Entritin) construct. Further a medium strong causal effect parameter (0.29) is indicated between the entrepreneurship IT and innovation (Entritin) construct and the firm performance (Frmperf) construct. I.e. this exploratory study, with its stated measurement weaknesses, nevertheless and in line with other studies (Dibrell, Davis and Craig 2008) seems nevertheless to indicate a *positive causal relationship between the entrepreneurship and IT-based innovation construct and firm performance*. The results also seem to indicate that the conceptual model's estimation of the reflective constructs winning formula (Wform) and being an entrepreneur (Beinge) in fact are caused by the latent entrepreneurship IT and innovation (Entritin) construct.

In an attempt to get an increased understanding of the interpretation of the LISREL estimation, a closer look was taken at the correlation between the main constructs of the conceptual model. For simplicity, the analysis of the correlations is limited to significant correlations and to make the interpretation of the findings easier, focus is directed towards the proportion of variance (r^2) obtained by squaring the correlation coefficient. "Using r^2 often aids interpretation as it shows the proportion of variance in one variable explained by the other; however, it tells us nothing about the direction of the relationship" (Diamantopoulos and Schlegelmilch 1997). Nevertheless, the r^2 is helpful by indicating the %-change in the variation of one variable in correlation with the variation in the other. The proportion of variance of the significant main constructs is illustrated in Table 2.

		Proportion of variance (r^2)			
		E3: Entrepreneurial motivation	E4: Discovery of the business idea	E5: Value chain management	P2: Future strategic position
Constructs	n	41	41	41	41
E4: Discovery of the business idea		0,165			
E5: Value chain management		0,342	0,222		
E6: Winning formula		0,182		0,188	
E7: Being an entrepreneur		0,394	0,171	0,260	
P3: Transition entrepreneurship-management					0,219

Note: Only correlations significant at the 0.01 level (2-tailed) included

Table 2

Based on support in substantive theory, the following main causal relationships between the composite scores of the constructs are interpreted based on the proportion of variance and considered as an extension of the preceding LISREL-analysis. The interpretations are made with reference to the theory-based conceptual model (Figure 5):

1. Keeping in mind that E7 (Being an entrepreneur) may be seen to indirectly represent the latent entrepreneurship and IT-based innovation construct (Entritin), a strong (causal) relationship (39%) from E3 (Entrepreneurial motivation) to E7 (Being an entrepreneur) is found. Thus strong entrepreneurial motivation positively influences entrepreneurship and IT-based innovation. This is also in line with the LISREL-findings.
2. A strong relationship is found between E3 (Entrepreneurial motivation) and E5 (Value chain management) (34%). This may be seen to be in line with both theory and practice, as effective networking and value chain relations will be an implicit process in the entrepreneurial development of the firm. Also based logic and experience it may be argued that the main causal influence goes from E3 to E5 at least during the start-up phase of the venture.
3. A relatively strong relationship (26%) is found between E7 (Being an entrepreneur), representing the the latent entrepreneurship and IT-based innovation construct (Entritin), and E5 (Value chain management) again indicating the importance of value chain management and networking in the entrepreneurship and IT-based innovation process.
4. A relationship (22%) is also seen between E5 (Value chain management) and E4 (Discovery of the business idea). In this case, however, the causal direction is more complex to interpret (and thus not included in the conceptual model). Causality in both directions may argued as the entrepreneur may in fact discover the business idea being member of a value chain or a network or, opposite, may seek support or growth via value chain collaboration and networking.
5. Similarly, the possible causal relationship (23%) between P2 (Future strategic position) and P3 (Transition from entrepreneurship to management) is hard to interpret. It is, however, not unlikely that a growing entrepreneurial firm may encounter complexity in the transition from entrepreneurship to management and in particular managing in direction of solidifying the firm's future strategic position. This may be linked to the need for new management skills, increasing organizational complexity during growth or challenges related to maintaining the innovative process.

Conclusions

Based on a comparison of the qualitative findings of the case studies and the quantitative analysis and interpretation of the data collected by help of the questionnaire, some main conclusions may be drawn. First and foremost, the triangulation supports the notion that the personal motivations of the founder or the founding team are crucial for entrepreneurship and IT-based innovation in small firms. Secondly, the founders' individual skills and capabilities appear as fundamental for innovative actions and creativity, including skills in discovering the business idea and converting the business idea into a commercially

valid proposition through simultaneous and sequential innovative actions. From a cognitive perspective, the entrepreneurs show a great capability to “[...] behave thoughtfully” (Weick 1984, p. 222) and adapt to the turbulence and dynamism of the day-to-day operation as the market fluctuates. Thirdly, prior work experience also appears as a fundamental prerequisite for entrepreneurial startups in that all of the national winners had prior work experience and several from the same business sector in which they later made their entrepreneurial debut. Thus work experience is of preeminent formative importance. Fourth, a central ingredient in what herein has been categorized as the “winning formula” is, in addition to customer focus and an innovative ambience, value chain collaboration and networking. Successful value chain and networking processes appear to be very closely related to the founding entrepreneurs’ personal social entrepreneurial skills – i.e. skills in dialoguing, motivating and in short dealing with the people-aspects of managing innovation.

Finally, as in most entrepreneurial stories, the personal efforts and personal sacrifices of the entrepreneur should not be underestimated. And neither should the help of “angels”, a touch of good luck and least, but not least, a good portion of passion for what you are and what you are doing.

Implications and recommendations for future research

The main implication of this exploratory study is the visualization of how significant IT-tools are in the innovative process of small firms. With the exception of possibly one or two firms (Unkasoft and Tecnomodel) all of the firms started off on their entrepreneurial voyage without a vision of how IT later on should convert itself into a main competitive resource. Later, as their individual business strategies matured and developed was IT “rediscovered” by the entrepreneurs as resource for reengineering their business processes and as a major tool in their competitive strategy.

Also worth emphasizing is the observation that the degree of digitalization of the individual firms in fact is limited by the firms’ industrial boundaries. Thus each small firm, depending on their embeddedness, internal processes and interactions with their value chains must be conscious of how far the impact of digitalization may go in direction of improving their production, service or customer attention. Degree of digitalization may thus be seen as context-dependent.

One of Dibrell, Davis and Craig’s (2008, p. 213) conclusions is “... that an SME that is able to understand the power of IT and to link this power to support the core competencies of the firm successfully can have a competitive advantage”. Thus while IT may improve performance through technical- or managerial innovations in data processing, the advantage may, however, be temporary unless the IT-advantage is not easily imitable. In line with the resource-based view (Barney 1991), the firms will depend on a continuous innovative process to stay abreast of the competition as temporary monopolies hardly exist. Some of the key challenges for the future of entrepreneurial IT-based small firms are in

summary form illustrated in Figure 7. It appears that the key to future success may be closely related to how the entrepreneurs and their teams manage to maintain the innovative climate of the firm. Continued innovation combined with a conscious management of the firms' overall resources, represents the great challenge for the future of

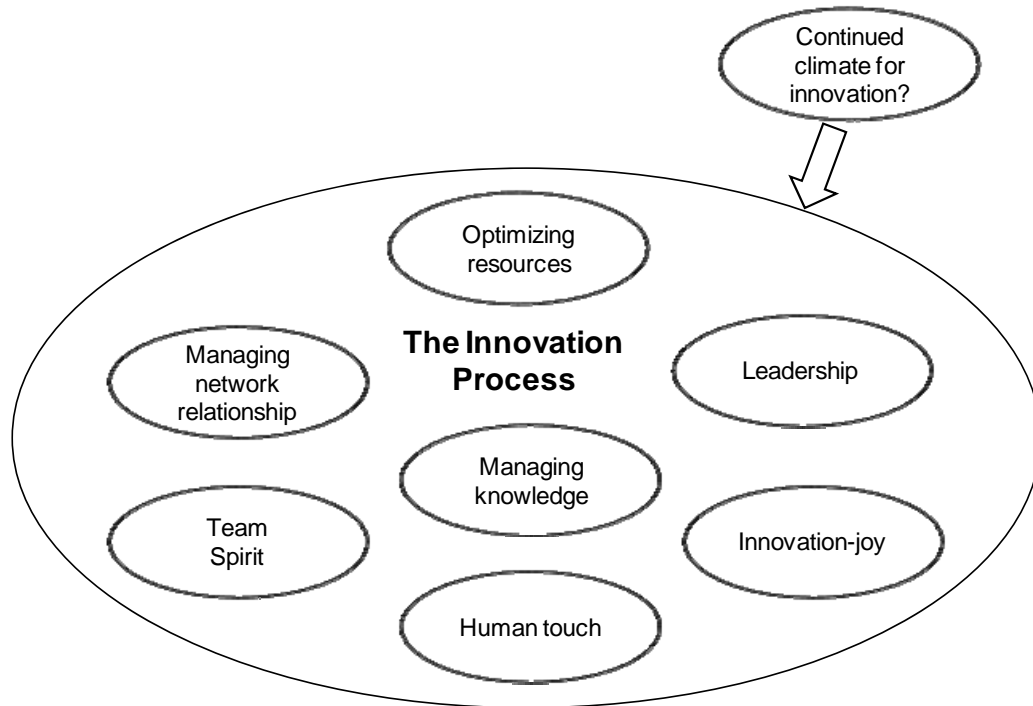


Figure 7: Continued innovation

the companies.

This exploratory study has several noted weaknesses. Among them, from a qualitative perspective, is the difficulty of capturing managerial- or technical processes within the firms through in-depth interviews. It is likely that this objective can only be achieved through extensive observations within the firms for instance through action research. Along this line, the collection and quality of the data would further improve based on more interviews at different levels and with personnel at different disciplinary functions within each of the firms.

In future research, also the quantitative part of the research should improve on several fronts. Based on the experience of this study, it is clear that the quality of the measurement instrument (the questionnaire) can be improved. In addition, the fundamental weakness of a small non-random sample limits the value of a quantitative approach and should be given due consideration in future research efforts.

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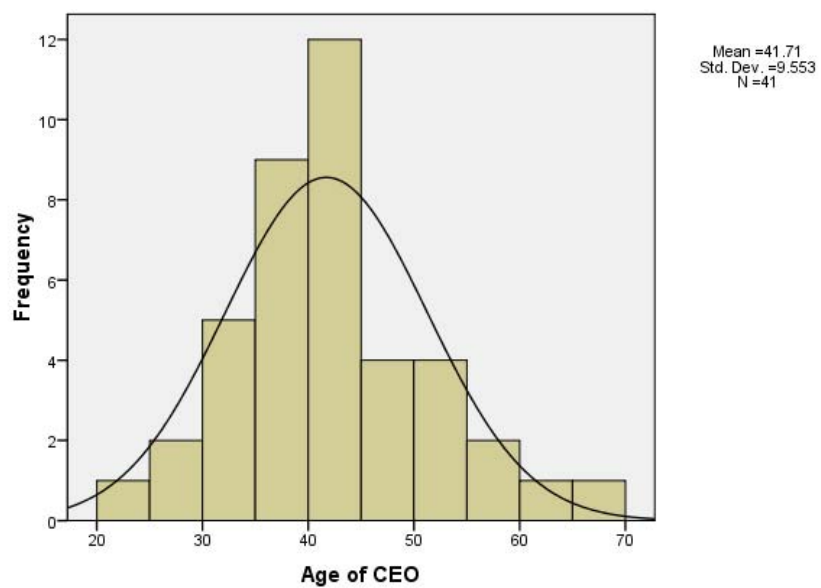
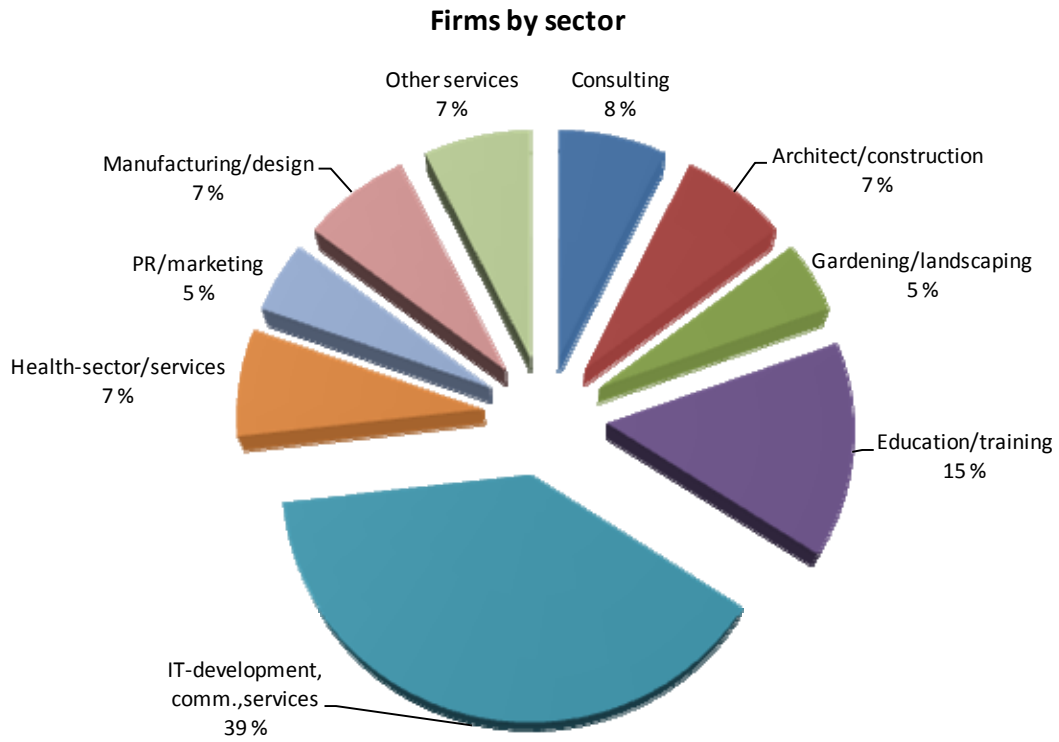
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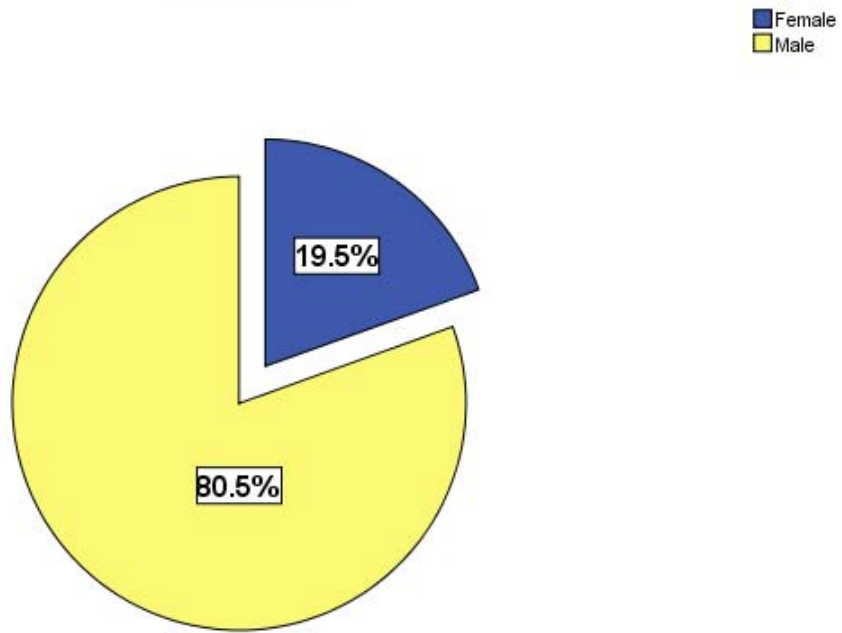
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APPENDIX 1

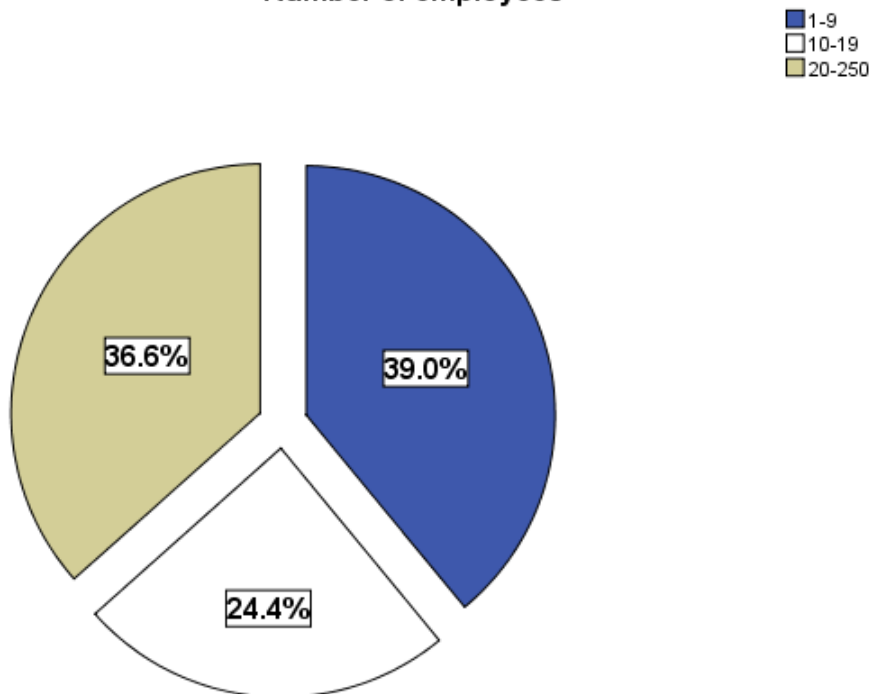
A-1 Descriptive statistics



Gender of CEO

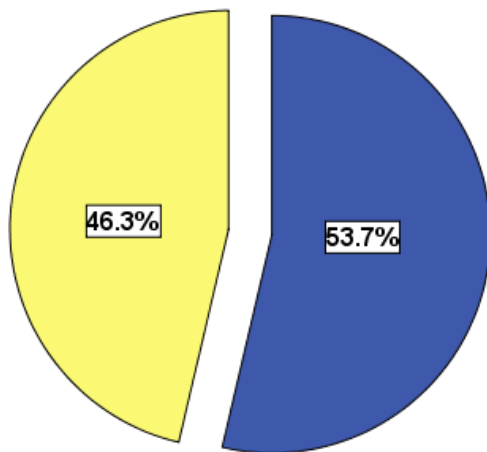


Number of employees



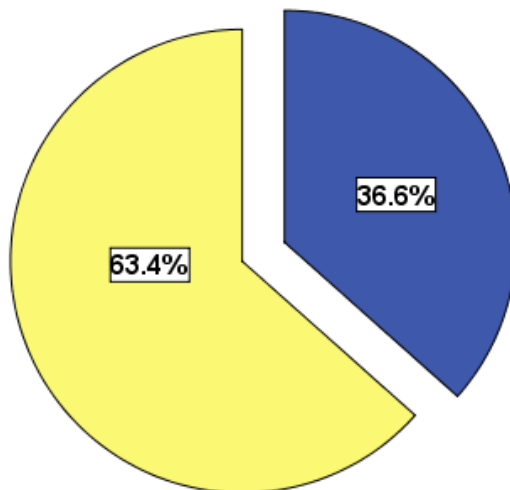
Sole owner of more than 50% of equity

■ Yes
■ No



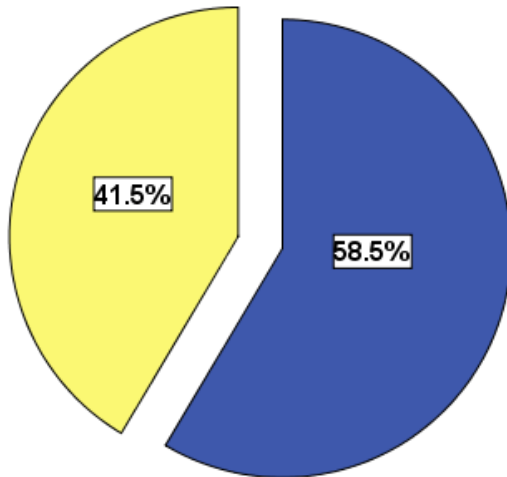
Started business alone

■ Alone
■ With others



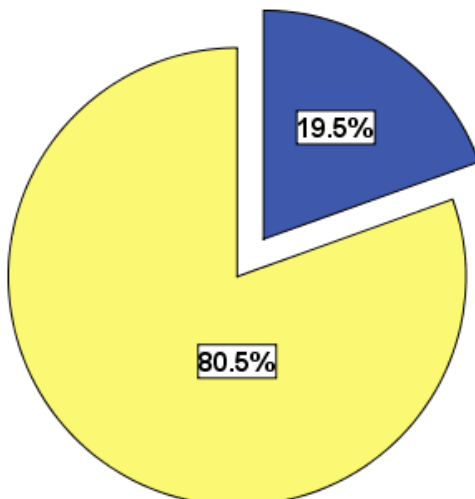
Either of parents owned business when growing up

■ Yes
■ No



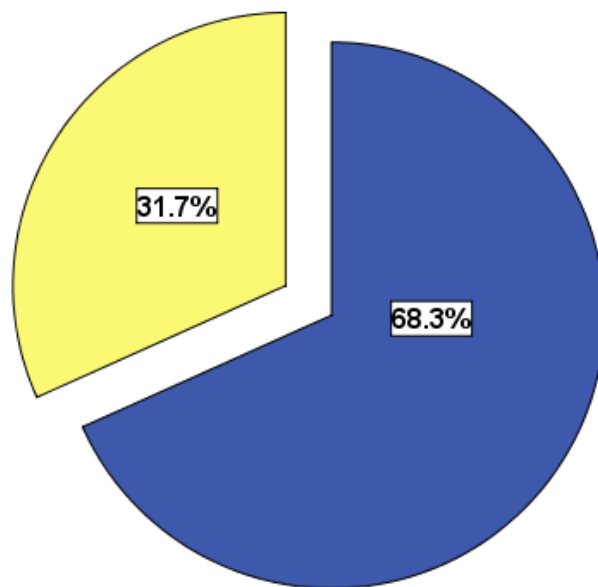
Present job is first full-time job

■ Yes
■ No



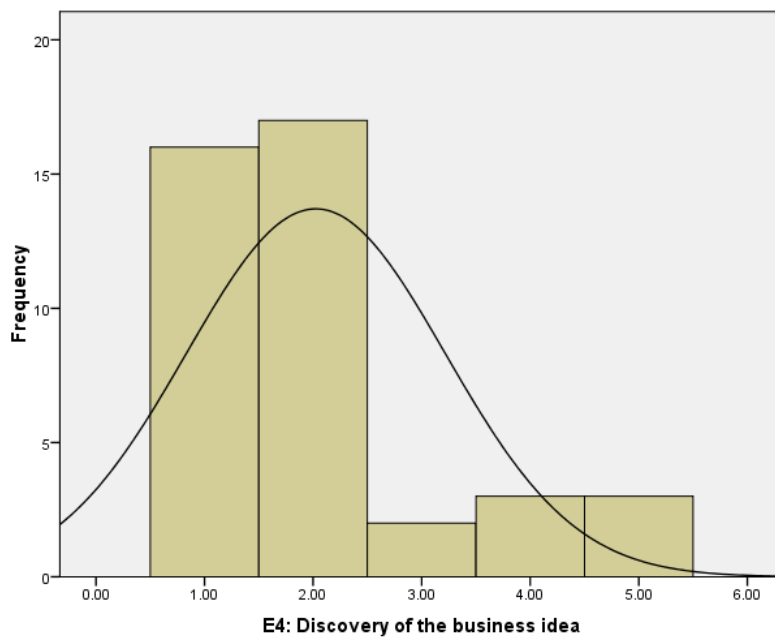
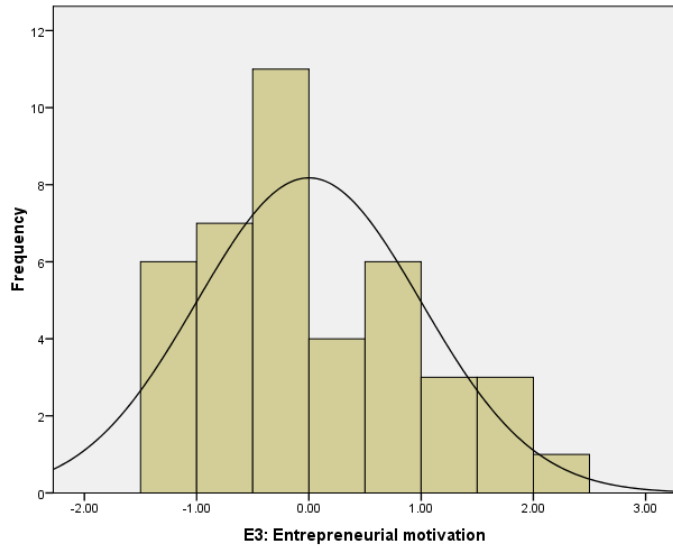
Strategic focus of the firm

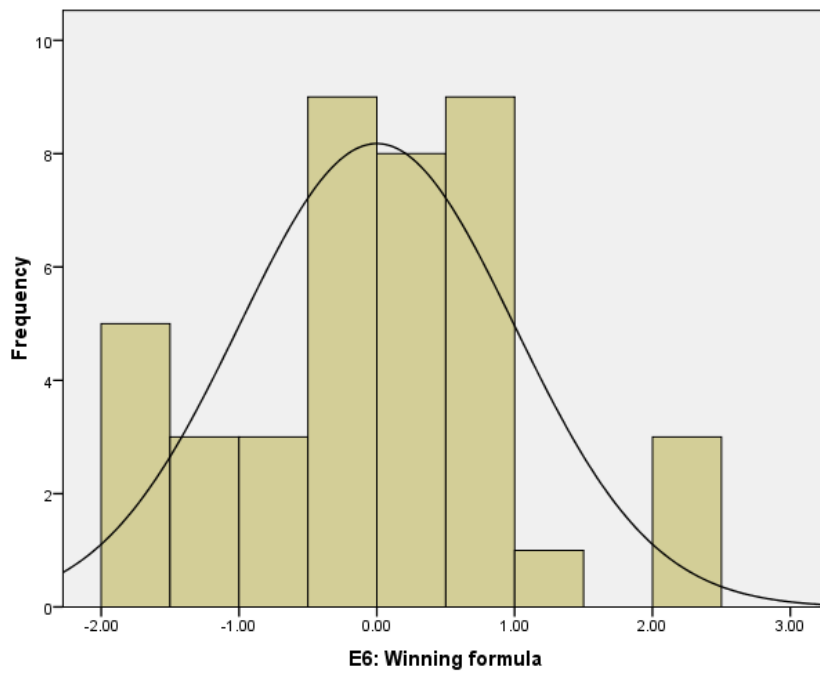
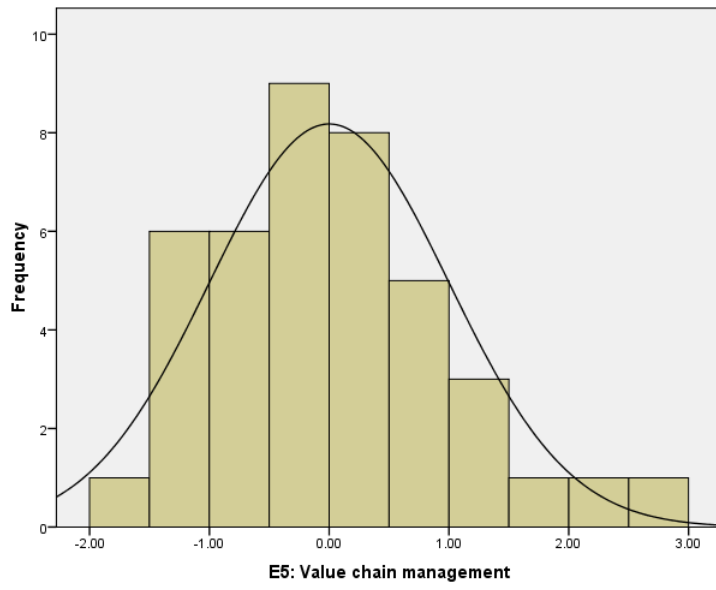
- A process of continued technological innovations (IT-based or other)
- Continued managerial improvements (marketing, sales, administration)

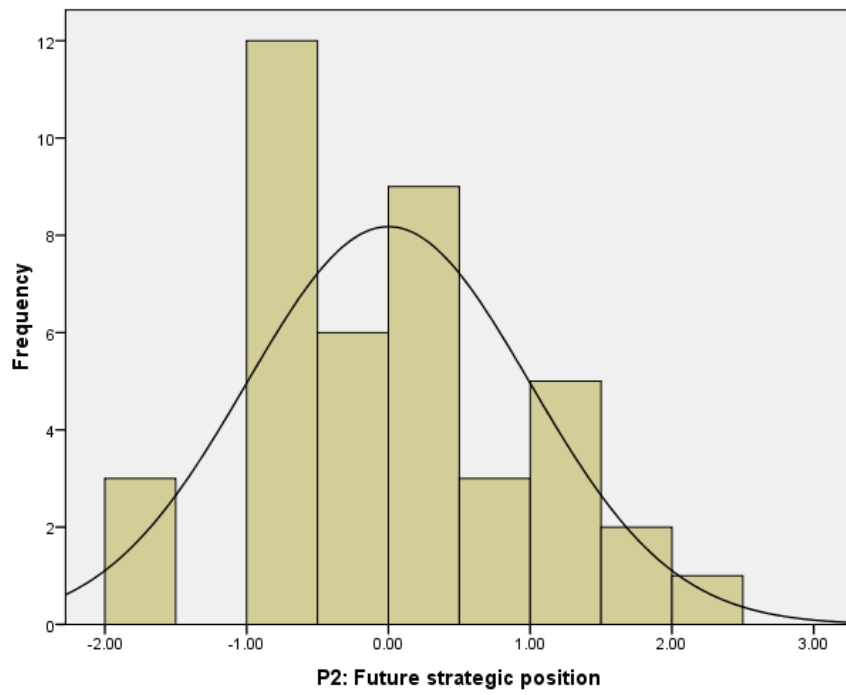
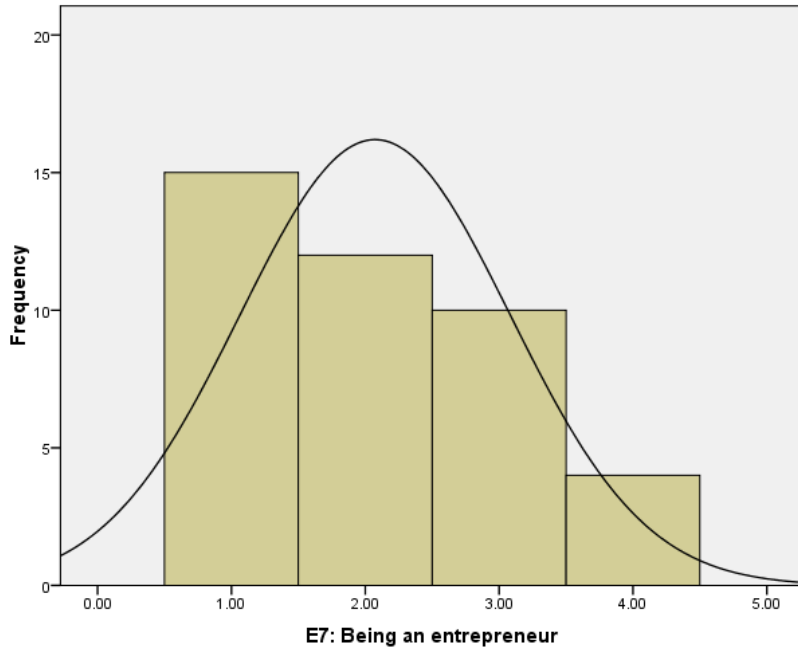


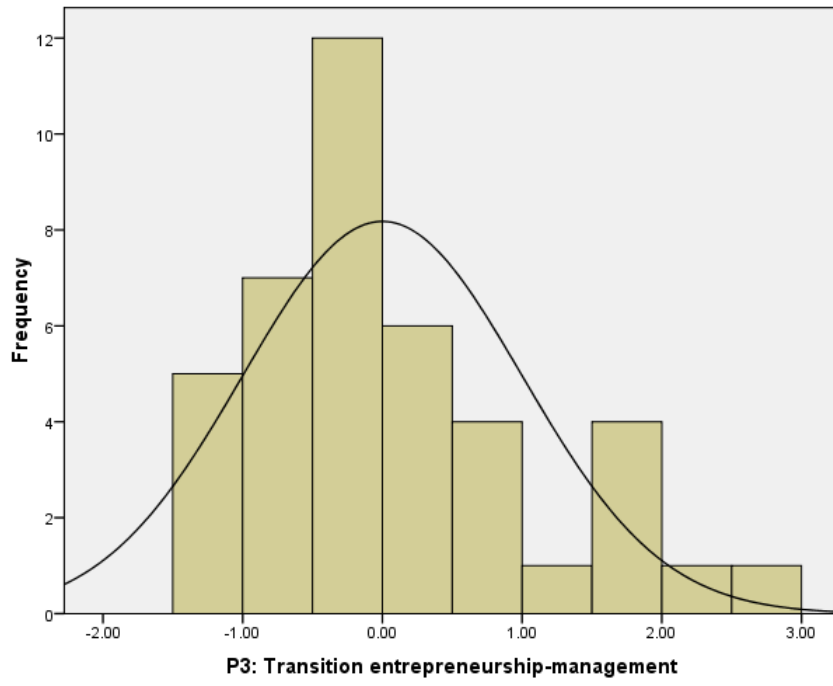
A2 - Test of normality

Test limited to significant main constructs (E3-E7 and P2-P3):









APPENDIX 2

ICSB2008Finalists

1. ICSB-DELL Research: Questionnaire

Your company was one of the finalists in the 2008 ICSB-Dell IT Excellence competition. To learn more about those organizations that made it into the final round of the competition we have developed a short questionnaire. The International Council for Small Business (ICSB) would greatly appreciate it if you would take a few minutes to complete this questionnaire. Your answers will be anonymous. What we learn as an aggregate will be shared with all those interested in increasing the effectiveness of information technology innovation and the success of entrepreneurial organizations. We will be selecting randomly a winner from the respondents to receive a one year membership to ICSB and a news article to be published on the ICSB web site profiling their firm. If you would like to be part of the raffle, please indicate your email address at the end of the survey.

I thank you personally for your willingness to participate and please do not hesitate to contact me if you have any questions at +1-202-468-3133 and or via email at aymanelt@icsb.org

Sincerely,

Dr. Ayman El Tarabishy
Executive Director for the International Council for Small Business (ICSB)

*** 1. How important is each of the following to your organization's success?**

	Extremely Important	Very Important	Somewhat Important	Slightly Important	Not Important
The customer is the focus of innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time is provided for creative efforts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cross-functional team-collaboration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The freedom to progress through trial and error	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effective leadership	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The environment of the firm encourages innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversity of ideas are encouraged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 2. To what extent do you agree or disagree with each of the following statements?**

	Agree Completely	Agree Mostly	Neither Agree nor Disagree	Disagree Mostly	Disagree Completely
When I started my organization, I already had experience in the same type of business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I started my organization, I already had experience from starting other businesses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The innovation, described in my Dell entry, is mainly a technical innovation (new design, new technical solution, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business opportunity was a result of an innovation within our company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business opportunity emerged based on contacts with our network participants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business opportunity is a result of special competence developed over time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. My organization's strategy is mainly based on (choose one):**

- A process of continued technological innovations (IT-based or other) Continued managerial improvements (marketing, sales, administration)

*** 4. I am concerned about:**

	Agree Completely	Agree Mostly	Neither Agree nor Disagree	Disagree Mostly	Disagree Completely
A gradual loss of competitive advantage due to increased competition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A weakening of the economy and decreased demand for our products/services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulties of managing a growing firm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulties of maintaining an innovative process within the firm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulties of managing the transition from entrepreneurship to management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ICSB2008Finalists

* 5. How important for business success is each of the following:

	Extremely Important	Very Important	Somewhat Important	Slightly Important	Not Important
Personal Relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IT-based technological infrastructure for communications and information sharing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being a member of a network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Network-collaboration with suppliers and clients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Networking for learning and sharing best practices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taking advantage of opportunities to network with other innovative people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A focus within the company on continued learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 6. How Important to you personally is each of the following:

	Extremely Important	Very Important	Somewhat Important	Slightly Important	Not Important
The feeling of being in control of my own projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being my own boss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial success	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting recognition for a job well done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being involved in creating something new	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling the "thrill of the chase" of a new innovation (a new product or service)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
See something through from idea to implementation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being an entrepreneur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. To what extent do you agree or disagree with each of the following statements?

	Agree Completely	Agree Mostly	Neither Agree nor Disagree	Disagree Mostly	Disagree Completely
I find the administrative routines of management repetitive and boring.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I attempt to delegate detailed analytical decision-making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to use my intuition and "gut feeling" to make decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The relationship between the founder(s) and other key-personnel has become more complex over time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 8. To what extent do you agree or disagree that you are generally satisfied with your firm's:**

	Agree Completely	Agree Mostly	Neither Agree nor Disagree	Disagree Mostly	Disagree Completely
Overall Performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
International Expansion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Market Share	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Profitability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of new products and services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 9. What is your company's current number of employees?**

- 1-9
 20-250
 10-19
 251+

*** 10. What is your age (in numbers)?**

11. Please indicate your sex below:

- Female
 Male

*** 12. How many years of education have you had?**

- 1-12 years
 13-16 years
 17+

13. I am a member of (check all that apply):

- a) an international professional association
 b) national professional association
 c) local professional association

*** 14. Were either of your parents self-employed while you were growing up?**

- Yes
 No

*** 15. Did either of your parents own a business when you were growing up?**

- Yes
 No

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*** 16. My present job is my first full-time job.**

Yes

No

*** 17. How long have you managed your current business?**

0-1

4-5

11+

2-3

6-10

*** 18. Which of the following best describes the type of work you did in your last job?**

General management

Production management

Technical (non-management)

Sales management

Research & development

*** 19. In your firm, does one person own more than 50% of the equity?**

Yes

No

*** 20. Did you start your present business alone or with others?**

Alone

With Others

*** 21. Briefly describe the product or service your company provides**

22. Please add any additional comments you may have to help us better understand your organization.

23. Please be assured all your responses will be anonymous.

If you would like to be included in our raffle, please provide your e-mail below. We will randomly select an email from this field to select a winner to be a member of ICSB for a complete year and to showcase their company on the ICSB website.