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THE IMPACT OF SELF-EFFICACY TO ENTREPRENEURIAL INTENTIONS OF MECHANICAL ENGINEERING STUDENTS

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The purpose of this thesis was to investigate the entrepreneurial intentions of Mechanical Engineering (ME) students of Satakunta University of Applied Sciences, and whether there is a difference between students of Pori and Rauma campuses. The study was interested of the incidence of entrepreneurial intention among the ME students and strived to reveal the connection between entrepreneurial intention and individual's self-efficacy towards his professional skills. The concept of self-efficacy is a part of the theory of planned behavior.

The study identified three groups of professional skills: business / management skills, entrepreneurial skills and practical / technical skills. It was found that self-efficacy towards all these skill-sets had statistically significant but rather weak correlation with the entrepreneurial intention. Risk-taking tendency and tolerance for uncertainty were also found to have statistically significant but weak correlation with entrepreneurial intention. Entrepreneurial intention itself was very high among the ME students. 85,1% of the ME students had entrepreneurial intentions, 84% at Rauma campus and 85,7% at Pori campus. 66,3% of the investigated ME students are going to start as entrepreneurs in five years time after graduation, and 25,8% in three years time after graduation.

The study also investigated the ME students interest towards starting a business on their own, and starting a business as a member of an entrepreneur team. The impact of starting money, impact of access to financing, and impact of the general economic trend to the entrepreneurial intention were also investigated, among other issues assimilated from the earlier research literature.

The study showed that practical / technical skills are an important explanatory factor for becoming an entrepreneur, as self-efficacy towards practical / technical skills had the second-highest (0.351) statistically significant correlation with appearance of entrepreneurial intention, right after self-efficacy towards entrepreneurial skills (0.389).

MINÄPYSTYVYYDEN VAIKUTUS KONE- JA TUOTANTOTEKNIIKAN OPISKELIJOIDEN YRITTÄJYYSINTENTIOIHIN

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Tämän opinnäytetyön aiheena oli tutkia Satakunnan ammattikorkeakoulun kone- ja tuotantotekniikan opiskelijoiden yrittäjyysintentioita, ja selvittää onko Rauman ja Porin kampusten opiskelijoiden välillä eroavaisuutta yrittäjyysintentioiden määrässä. Tutkimuksessa tutkittiin yrittäjyysintention ja ammatillisen minäpystyvyyden välistä suhdetta. Ammatillinen minäpystyvyys kuvaa sitä, kuinka paljon yksilö luottaa omiin ammatillisiin kykyihinsä. Minäpystyvyyden käsite (engl. self-efficacy) on osa suunnitelmallisen käyttäytymisen teoriaa.

Tutkimuksessa tunnistettiin kolme ammatillisen osaamisen taitoryhmää: liiketoimintataidot, yrittäjyystaidot, ja kädentaidot/tekniset taidot. Selvisi, että kaikilla näillä taitoryhmillä on tilastollisesti merkitsevä mutta kuitenkin melko heikko korrelaatio yrittäjyysintention kanssa. Riskinottotaipumuksella ja epävarmuuden sietokyvyllä todettiin myös olevan tilastollisesti merkitsevä melko heikko korrelaatio yrittäjyysintention kanssa. Itse yrittäjyysintentio oli erittäin korkea kone- ja tuotantotekniikan opiskelijoiden keskuudessa. 85,1 prosentilla tutkimuksen kohteena olleista kone- ja tuotantotekniikan opiskelijoista oli aikomus ryhtyä yrittäjäksi jossain vaiheessa elämäänsä. 66,3 prosenttia heistä aikoo ryhtyä yrittäjäksi viiden vuoden sisällä valmistumisesta, ja 25,8 prosenttia kolmen vuoden sisällä valmistumisesta.

Tutkimuksessa selvitettiin myös kone- ja tuotantotekniikan opiskelijoiden halukkuutta ryhtyä yrittäjäksi yksin, ja halukkuutta ryhtyä yrittäjäksi yrittäjätiimin jäsenenä. Lisäksi selvitettiin mm. starttirahan, rahoituksen saatavuuden ja yleisen taloustilanteen vaikutusta yrittäjäksi ryhtymisen halukkuuteen.

Tutkimus osoitti, että käden taidot/tekniset taidot ovat tärkeä yrittäjäksi ryhtymistä selittävä tekijä. Käden taitoja/teknisiä taitoja koskevan minäpystyvyyden todettiin olevan toiseksi merkittävin yrittäjäksi ryhtymistä selittävä tekijä. Käden taitoja/teknisiä taitoja koskevan minäpystyvyyden ja yrittäjyysintention välinen tilastollisesti merkitsevä korrelaatio oli 0.351 kun yrittäjyystaitojen ja yrittäjyysintentioiden välinen tilastollisesti merkitsevä korrelaatio oli 0.389.

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1 INTRODUCTION

Van Praag and Versloot (2007) say that entrepreneurs have a very important and very specific role in the economy. Entrepreneurs create employment, contribute to productivity growth, produce and commercialize innovations and, by doing so, generate positive regional spillovers. (Minniti & Lévesque 2008). Baumol (1968, 65) says that it has long been recognized that entrepreneurial function is a vital component in the process of economic growth. Birch (1979) and numerous other economic researchers have proved that new job creation stems out of new venture creation (Kirchoff 1994). OECD says that firms less than five years old accounted for nearly all of the increase in employment in the US private business sector from 1980 to 2005 (OECD 2010). Thurik et. al (2008) have confirmed in their study of wide OECD data that countries with a greater increase in entrepreneurial activity also experience systematically higher employment growth rates. They also confirm the finding of van Stel et. al (2005) that increase in entrepreneurial activity increases the income per capita in the economy.

Entrepreneurship and unemployment are both in the spotlight of contemporary Finnish economy. Boosting up entrepreneurship has been in the front seat of Finnish political discussion for 15 to 20 years. However, according to recent statistics (third quarter of 2014) the amount of starting firms has declined 9,1% and ending of businesses increased 28,5% (Tilastokeskus 2015c). Unemployment is currently at 8,8% (Tilastokeskus 2015a) and economic growth drags in 0,2% (Tilastokeskus 2015b). Finnish economy is going through a crisis as the rest of the European Union. There exists a prominent need to generate more entrepreneurial action to the Finnish economy and at the same time, a significant need to reduce unemployment. This research contributes to these problems by pointing out the importance of practical skills and entrepreneurship education and their teaching in Finnish education system. It is assumed as a hypothesis, that high level of practical skills as well as entrepreneurial skills obtained through education, advance individual's decision to start to work as an entrepreneur.

According to Global Entrepreneurship Monitor (GEM) 2013 9% of Finnish adult population consider to start a business in next three years of time and only 5,3% is engaged in early-stage entrepreneurial activities (Stenholm et. al 2013). According to Nevanperä and Kansikas (2009) the level of entrepreneurial activity in Finland varied between 4% and 10% during the years 2000-2004. Schoof (2006) has analyzed GEM-data and found out that particularly in high income countries young people aged from 18 to 25 years are less involved in entrepreneurial activity and that adults between 45 and 54 are more involved (Schoof 2006).

It is said that young people are the future. According to Dialogi-survey 2013, 43% of Finnish vocational school students *would consider* to work as entrepreneurs and 16% would be ready to start the business alone (Inget et. al 2014). The survey was conducted among students of 10 Finnish vocational schools and it was answered by 3753 students. In 2011, Dialogi-survey was targeted to students of Aalto University located in Helsinki metropolitan area and it was answered by 1704 students. Compared to the entrepreneurial intention rate of 43% among vocational school students, 80% of Aalto University's students did not consider to be working as entrepreneurs (Piha et. al 2012). According to Piha et. al 7% of Aalto University students have an intention to set up a firm after graduating, and 15% has been thinking about it, but are not sure about their intention. The Dialogi-survey itself, may not fulfill the criteria of a scientific research, but still, its results give an interesting yet superficial view to entrepreneurial intentions among Finnish students. In this research the results of Dialogi-survey were considered as weak signals worth following. According the results of Dialogi-surveys, individuals who have completed vocational education or are at the moment studying in a vocational school have higher intention towards starting as entrepreneurs compared to those who have not studied in vocational school.

Superficial observations are often a starting point of a scientific research. As Knight (1921) puts it, superficial observations suggest questions which study answers (Knight 1921, 7). According the Dialogi-surveys it seems that vocational school students would have more intentions to start their own firms or work as entrepreneurs in family-owned businesses compared to university students, as 43% of Finnish vocational school students *would consider* to work as entrepreneurs. This "*would consider"* does not yet fulfill the definition of actual intention which makes this research important. Ajzen and Madden (1986) say that besides believing that an individual *could* perform the behavior, the individual must also be inclined to do so for other reasons in order the behavior to realize. They refer to behavioral control and say that behavioral control affects to intention in interaction with attitude and subjective norm. (Ajzen & Madeen 1986, 459).

The term intention means an intention to do something, in a target-oriented and goal-oriented manner. The reasoning of an intention is teleological, it is directed to future. (Huuskonen 1992). There have been made several studies about the entrepreneurial intention of students in Finland and internationally. Many of the studies, for example Nevanperä (2003) and Harris and Gibson (2008) have been measuring the effects of entrepreneurial education, that is, education that develops student's entrepreneurial skills and knowledge. An entrepreneur needs entrepreneurial skills, but also practical professional skills to produce the product or service which is provided to the market. With practical skills I mean for example skills to machine metal or wood, repair or build machines, build buildings, install and repair piping of a building or service oil burners. The need for practical skills applies to both "routine" entrepreneurs and "innovative" entrepreneurs.

2 MOTIVATION

Entrepreneurship and new venture creation are essential for the growth of the Finnish economy and for decreasing our high unemployment. I wish to contribute to this setting by producing a research that can help to direct the resources of our society in a manner that fosters entrepreneurship and reduces unemployment.

Students represent the future of our society and economy. Earlier studies considering the entrepreneurial intentions of students have been concentrating to investigate the effect of entrepreneurial education, the effect of subjective norm, and the effect of attitudes to student's entrepreneurial intentions. Self-efficacy has also taken into account as an explanatory factor in some studies, but it has not been previously linked directly to the student's perception of his level of practical skills. This study aims to point out that there exists a need to teach more practical skills to students in order to create more entrepreneurship into society. Practical skills are also needed in making innovations, which again are a source of economic growth.

My personal observation as a student of Mechanical Engineering in Satakunta University of Applied Sciences (SAMK) is that the training and teaching of practical skills is quite limited in our degree program. Students can participate in voluntary development projects where they learn to use tools and machinery, but these projects are not compulsory for all students. The situation is different compared to vocational schools where all students receive teaching and training on use of tools and machinery. An utterance of one of my teachers describes the situation well. On the class of machining techniques he said "the difference here to teaching at vocational school is that we do this machining on the computer screen". On another course we designed a milling object with a computer program but the actual physical milling was executed by the teacher. The teacher showed us how the milling is done with the program that we created, but we did not operate the machine ourselves. In my opinion this approach in teaching leads to the situation where the student has the knowledge in theory,

but lacks the experience of using the machinery itself. The student's practical skills are therefore left quite inadequate.

Students of universities of applied sciences gain practical skills and work experience through practical training periods which in practice means working in summer jobs. Everybody are however not able to get summer jobs, and especially it is difficult to get a summer job at student's own professional field in these economically difficult times. Vocational school students can also gain practical experience through summer jobs, but the difference in these two systems is that teaching practical skills is the main purpose of vocational schools. Practical skills are taught to all students, and students do a lot with their hands during their education. In universities of applied sciences the practical training is very limited compared to vocational schools. It is therefore expected in this research that those Mechanical Engineering (ME) students who have already completed vocational school, have better practical skills compared to those students who have not studied in vocational school. It is however also noted in this research, that vocational school education is not the only possible source for practical skills.

The level of individual's practical skills has not taken into account in earlier research considering entrepreneurial intention. The differences in the practical skills between student groups or inside a student group have not been taken into consideration. The level of practical skills has not been recognized as a possible an explanatory factor for entrepreneurial intention, although it may well be an explanatory factor.

OECD (2010) gives an example of the needs for practical skills. It says that specialist supply firms (such as instrument or software suppliers) may require high-level vocational and practical skills in its operation (OECD 2010). Toner (2007) has said that skills of technicians and tradespersons are particularly crucial for incremental innovation (OECD 2010).

We have two education systems in Finland that are precisely set to fulfill the needs of surrounding society with students who have professional skills needed in working life, vocational school network and network of universities of applied sciences. Universities of applied sciences are also known as polytechnics in other countries. The missions of these two schooling systems are defined in the Finnish law. They are set to produce professional skills for individuals so that they can best serve the society through working. Both of the education systems are spread widely across the nation which gives Finnish citizens a good access to professional education.

3 HYPOTHESES AND RESEARCH QUESTIONS

Knight (1921) says that the actual procedure of science consists of making and testing hypotheses (Knight 1921, 7). The aim of this research has been to investigate the differences in entrepreneurial intention between students who have attended studies in vocational school to those who have not studied in a vocational school. This kind of comparative research has not been conducted earlier. Another issue to investigate has been how the students regard their practical hands-on skills, what is their self-efficacy in relation to their own practical skills. It remains still unknown how big proportion of students feel that they have received well enough practical skills training through their education in order to feel assured about their professional skills, so that they could think themselves to work as entrepreneurs. It is assumed in this research that the level of self-efficacy regarding practical skills will be different between those who have studied in vocational school and those who have not. This study will also survey entrepreneurial education given in Finnish education system and evaluate how the entrepreneurship education affects to the entrepreneurial intention.

There are studies available which have investigated the differences in entrepreneurial intention between vocational school students and upper secondary school students. Hands-on practical skills are however taught only in vocational schools. This issue has not been taken into account in the earlier research and it may however be an explanatory factor to the differences in entrepreneurial intention between vocational school and upper secondary school students. Also the fact that students in universities of applied sciences may have educational background in vocational school education has not been taken into consideration in earlier research.

The target group of this research is second and third year Mechanical Engineering students at Satakunta University of Applied Sciences (SAMK). According to Grossman and Helpman (1993) technical change has been a major source of economic growth through the last 200 years and technological innovations are becoming an ever more important contributor to economic well-being. This observation rationalizes the need to investigate those actors in society who deal with technological advancement and the use of technology.

Hypothesis H1 of the study is that students who have higher self-efficacy towards their practical skills, have more entrepreneurial intentions. It is expected that the differences in entrepreneurial intention could be explained with the difference in the level of practical skills. Boyd and Vozikis (1994) have studied the effect of self-efficacy to entrepreneurial intentions and actions and found out that individual's self-efficacy influences the development of entrepreneurial intentions and actions or behavior. They say that an examination of perceived self-efficacy provides insight into the broader cognitive process involved in the formation of entrepreneurial intentions and actions. (Boyd & Vozikis 1994). Karim (2013) says that entrepreneurial behavior is a skill based behavior and the behavior should be measured using the skills or competencies required to perform the behavior. It is therefore assumed that a higher level of practical skills is being expressed through a higher self-efficacy towards these skills.

It is also assumed, as hypothesis H2 of the study, that students who have completed vocational school have higher self-efficacy towards their practical skills and thus, higher entrepreneurial intention.

This study will also investigate student's self-efficacy regarding their entrepreneurial skills and business/management skills. Hypothesis H3 is that students who have received entrepreneurship education have higher entrepreneurial intention compared to those who have not received entrepreneurship education in their studies. Hypothesis H4 is that students who have conducted studies of business and management have higher self-efficacy towards their professional skills, and thus, higher level of entrepreneurial intention.

4 THEORETHICAL FOUNDATIONS

It is justified to choose the best available theory for testing (Niiniluoto 1983). Theory of planned behavior is the best theory available, when we wish to explain how and why individuals start as entrepreneurs or intend to start as entrepreneurs. Gartner (1988) has examined behavioral and trait approaches to entrepreneurship and reached a conclusion that the personality trait approach should be abandoned because personality traits do not explain the decision to become an entrepreneur. Also Ajzen (1991) has found out that personality traits do not explain behavior. Intentions have proven to be the best predictor of planned behavior, particularly when that behavior is rare, hard to observe, or involves unpredictable time lags. Entrepreneurship is exactly the type of planned behavior for which intention models are ideally suited. (Krueger et. al 2000). This research will test the theory of planned behavior, especially its extension by Ajzen (2002) which describes the relationship between self-efficacy and perceived behavioral control to behavioral control and their relation to intention.

4.1 Definition of the entrepreneur

Gartner says that entrepreneurship is the creation of new organizations and entrepreneurs are identified by a set of behaviors which link them to organization creation. (Gartner 1988). Views of Davids (1963) and Draheim (1972) and Howell (1972) support Gartner's definition. Draheim (1972) and Howell (1972) link the ownership of the firm into the definition of entrepreneur and realize that new venture can be founded by a group of individuals. (Gartner 1988). Entrepreneur types have previously been defined through their relation to ownership (owner entrepreneur, small business owner), through their social ties (family entrepreneur), through their employer role (self-employed person, employer) and through their relation to innovation (innovative entrepreneur, routine entrepreneur).

4.1.1 The relationship between self-employment and entrepreneurship

Many authors discuss about self-employment and entrepreneurship in parallel without making a clear statement the relationship of these two definitions. Some, for example Evans and Leighton (1989) treat these terms as synonyms for each other. There is however a difference between them. The definition of entrepreneurship used in this study defines entrepreneurship to be creation of new businesses, which includes the element of creating a new organization, a new firm. Entrepreneurs are self-employed because they work for themselves. All self-employed persons are however not entrepreneurs. For example a painter, a sculptor or an independent researcher may be self-employed, but he is not an entrepreneur, since he does not establish a firm to practice his profession. It is stated here that all entrepreneurs are self-employed persons but all self-employed persons are not entrepreneurs. The illustration in figure 1 clarifies the relationship of the terms. Although entrepreneurship in this study is defined as an action to establish a firm it is noted that there exists other definitions of entrepreneurship as well. It is therefore noted here that there exists schools of thought that define internal entrepreneurship, intrapreneurship, to be a certain type of entrepreneurship. This is taken into account in the illustration, to make the definition between self-employment and entrepreneurship universal and complete.

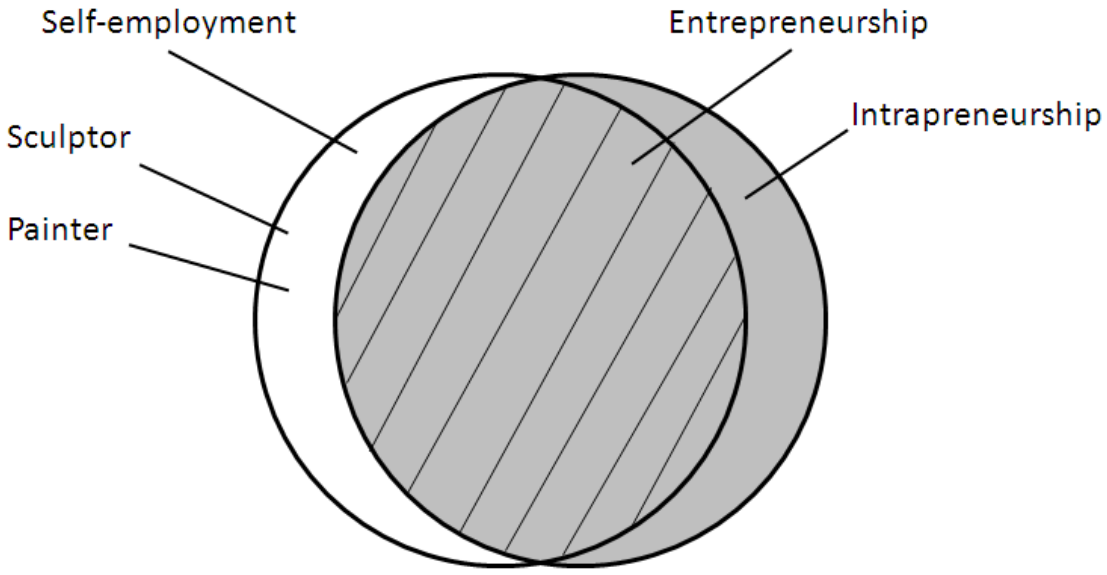

Figure 1. The relationship between self-employment and entrepreneurship

Finnish law 1290/2002 regarding unemployment benefits draws the line between an employee and a self-employed person. In fifth clause of the law it is

stated that the person is considered to be employed full-time as an entrepreneur or by corresponding manner in his own work (to be self-employed) if the amount of work is so big that it is an obstacle to receive a full-time job (Finlex 2002). Entrepreneurs have to take a statutory insurance against senescence, disablement and death. The obligation to take such insurance is defined in the entrepreneur´s pension laws 1272/2006 and 1280/2006. The law 1272/2006 also provides further definitions for an entrepreneur. The main idea of the definitions given is that entrepreneur is a person who receives income of his work without being in an employee position (in another firm) or without being in a public office position. This is in line with Brockhaus (1980) who says that an entrepreneur is defined as a major owner and manager of a business venture not employed elsewhere (Gartner 1988).

It is important to acknowledge what is meant with *entrepreneur* in this study. But we should also bear in mind that the informants of this study are not aware on the fuss around the definitions of entrepreneur. This issue has to be considered when making the survey questionnaire. Therefore the informants are be given a clear description what is meant with an entrepreneur. The information is given in the survey questionnaire.

4.1.2 Routine entrepreneur vs. Innovative entrepreneur

Iyigun and Owen (1998) say that entrepreneurs provide the economy with new ideas, products, and ways of doing things (Iyigun & Owen 1998). Schumpeter (1934, 66) describes entrepreneurship as introduction of a new good or a new characteristic of a good, introduction of a new production method, opening of a new market, conquest of a new source of supply, and establishment of a new organization. These qualities draw a figure of an *innovative entrepreneur* (Kirzner 1999). An innovative entrepreneur enters the market with such a product or service which does not exist at the market and is therefore not well-known and widely used. But all entrepreneurs are not innovative entrepreneurs. There exists a vast amount of entrepreneurs that do exactly the same compared to earlier entrepreneurs at their field. This goes for example for plumbers, car repairers, tinkers and carpenters. These entrepreneurs are *routine entrepreneurs* (Leibenstein 1968, Röpke 1990). A routine entrepreneur provides such products and services to the market that are already well-known and widely used. He uses well-established production methods and sources of supply. The products and services of a routine entrepreneur do not include the element of innovation. But an operative entrepreneur is a founder of an organization, which makes him entrepreneur. Practical skills are necessary for the routine entrepreneur to be able to provide his services to the customers. Leibenstein's (1968) definition of routine entrepreneur is actually in line with Cantillon (1755) whose definition of an entrepreneur does not include the role of an innovator. According to Parker (2004) Cantillon defined an entrepreneur as an individual who brings supply

and demand together by providing goods and services, and bears all the risks involved in this process.

When we think of individuals as innovators, and potential future entrepreneurs, practical skills may be highly significant in making innovations. This goes especially specially in case of inventors who develop a solution to a technical problem which they have identified. If a person works around an idea of a new product with limited resources it is crucial to be able to manufacture prototypes and test them on their own. Therefore practical skills are essential for the innovator entrepreneur as well. Bessant and Tidd (2007) say that identifying, assessing and refining an idea have a substantial importance in developing an idea into a business concept. They say that while the initial idea may require a significant creative leap, much of the rest of the process will involve hundreds of small problem finding and solving exercises which need creative input. (Bessant & Tidd 2007, 40). European Commission refers to OECD (2011) and says that the evidence to show that much of recent productivity gains come from innovation (European Commission 2012). OECD (2010) says that vocational education and training play an important role in innovation, by helping firms make incremental changes to production processes and adopt technologies (OECD 2010).

4.2 Theory of planned behavior

The theory of planned behavior was derived from the theory of reasoned action (Fishbein & Ajzen 1975) which assumed that most human social behavior is under volitional control and therefore, can be predicted from intentions alone. The construct of behavioral control was added in an attempt to deal with situation in which individuals may lack complete volitional control over the behavior of interest. (Ajzen 2002, pp. 2-3). A central factor in the theory of planned behavior is the individual's intention to perform certain behavior (Ajzen 1991, 181). According the theory of planned behavior (Ajzen 1991, 2002) human behavior is guided by three kinds of considerations: beliefs of the likely consequences of the behavior (behavioral beliefs), beliefs about the normative expectations of others (normative beliefs) and beliefs about the factors that may facilitate or hinder performance of the behavior (control beliefs). According to Ajzen (1991, 2002) behavioral beliefs produce a favorable or unfavorable attitude toward the behavior, normative beliefs define the perceived social pressure, the subjective norm, and control beliefs give rise to perceived behavioral control. The combination of attitude toward behavior, subjective norm, and perception of behavioral control lead to the formation of a behavioral intention. Finally, when a sufficient degree of actual control is given, individuals are expected to carry out their intentions to actual behavior when the opportunity for such behavior arises. Intention is then assumed to be the immediate antecedent of behavior. (Ajzen 2002). Ajzen (1991, 184) says that behavioral intention, together with

perceived behavioral control, can be used directly to predict behavioral achievement. The relations of the mentioned components of intention to behavioral intention and actual behavior are illustrated in figure 2.

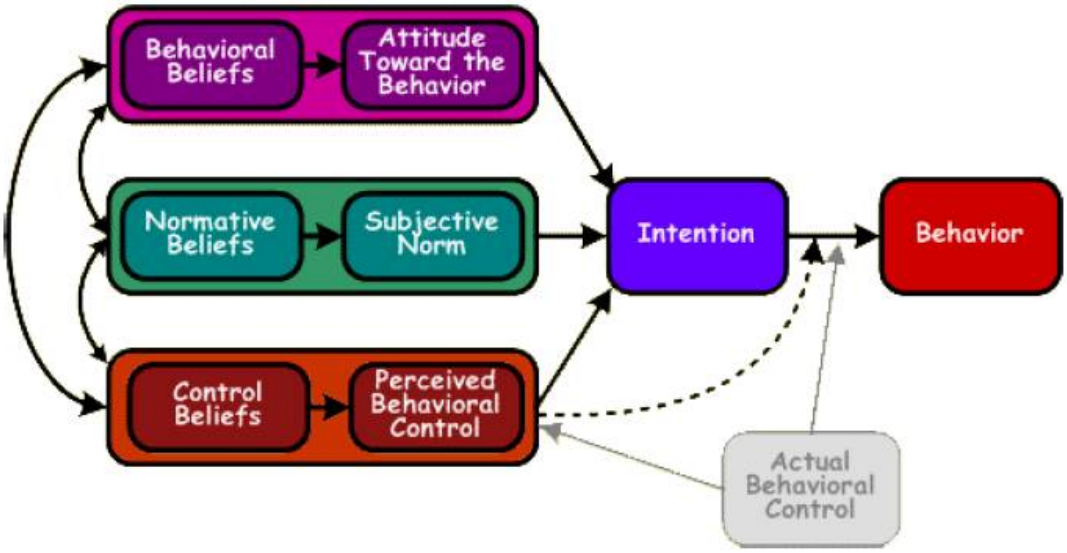

Figure 2. Components of behavioral intention (Ajzen 2006)

As intentions are the immediate antecedents of behavior, this study focuses on finding out the intentions of the individuals who form the study's population. As described by Ajzen (2002) individual's *intention* to perform a behavior already includes the effects of individual's attitudes and effect of subjective norm. We are interested in the individual's intention to start as an entrepreneur, not so much in which kind of attitudes or normative beliefs there exists behind this intention. The control beliefs of the individuals of the target group are however in great interest of this study.

4.2.1 Perceived behavioral control

Ajzen (1991, 184) says that perceived behavioral control can be used as a substitute for a measure of actual behavioral control. Ajzen (2002) says that perceived behavioral control provides useful information about the actual control. Assuming that individuals are realistic in their judgments of a certain behavior's difficulty, a measure of perceived behavioral control can serve as a proxy for actual control and contribute to the prediction of the behavior in question. (Ajzen 2002, 3). Ajzen (2002) says that a high level of perceived control strengthens individual's intention to perform the behavior, and increases his effort and perseverance to do so. Therefore, perceived behavioral control can affect behavior indirectly, by its impact on intention.

According to Ajzen (2002) the concept of perceived behavioral control consists from two separate components, from perceived self-efficacy and perceived controllability. Ajzen (2002, 6) says that empirical research has provided considerable evidence for the distinction between measures of self-efficacy (ease or difficulty of performing a behavior) and measures of controllability (beliefs about the extent to which performing the behavior is up to the actor). The components of perceived behavioral control are presented in Figure 3. These two components comprising the concept of perceived behavioral control do however partly overlap each other. Ajzen (2002) says that Armitage and Conner (1999) have found that the control beliefs that are presumed to reflect one or the other of the mentioned components do overlap. Ajzen (2002) also refers to earlier studies and says that there is a considerable overlap between control beliefs that predict controllability and self-efficacy. Therefore, Ajzen (2002) says that "Although perceived self-efficacy and perceived controllability can reliably be distinguished, they should nevertheless be correlated with each other". Ajzen (2002) says that many studies have failed in examining this convergence, which makes this study important.

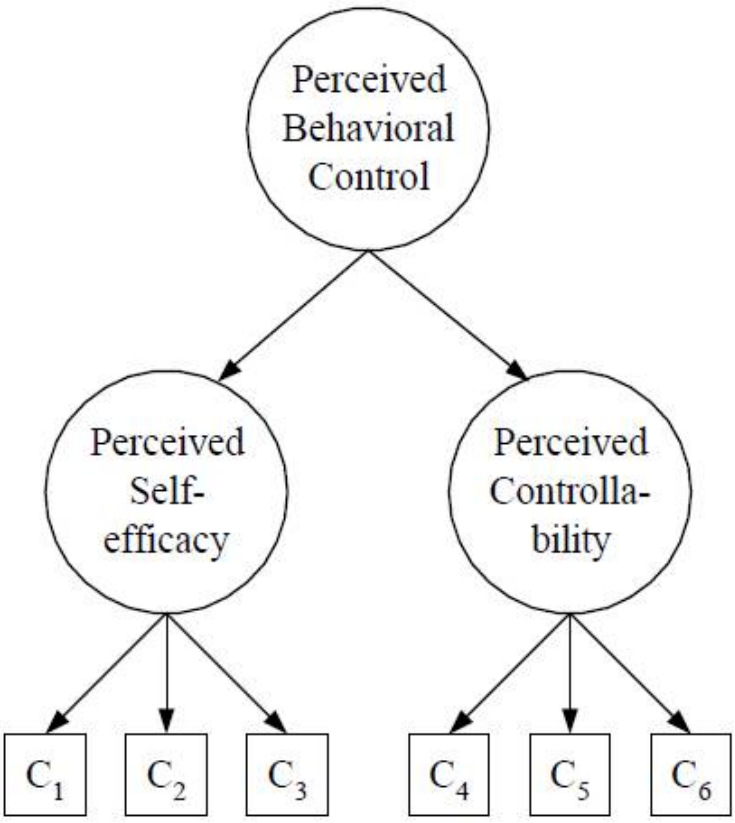

Figure 3. Components of perceived behavioral control (Ajzen 2002)

We assume that in free market economy an individual has a volitional control per se, over the decision if to start or not start as an entrepreneur. An

individual may however have internal or external barriers to perform that behavior, which are reflected to his intentions.

> When individuals believe that they have the required resources and opportunities (skills, time, money, cooperation parties, etc.), they should have confidence in their ability to perform the behavior and thus exhibit a high degree of perceived behavioral control. And when they believe that they lack requisite resources or that they are likely to encounter serious obstacles, they should judge performance of the behavior to be relatively difficult and have a low level of perceived behavioral control. (Ajzen 2002, 9)

Ajzen (2002) says that the latter is true, whether the resources and obstacles in question are located internally or externally. He says that self-efficacy and controllability may both reflect beliefs about the presence of internal and external factors (Ajzen 2002, 11). The same factor, for example ability, an internal factor, is viewed by some individuals as malleable and potentially under volitional control, and by other individuals as immutable and hence not amenable to control (Ajzen 2002, 8). Therefore, measures of perceived behavioral control should contain items that assess self-efficacy as well as controllability (Ajzen 2002, 12).

> "It can be seen that perceived behavioral control and self-efficacy are quite similar: Both are concerned with perceived ability to perform a behavior (or sequence of behaviors)" (Ajzen 2002, 4).

When an individual is considering if he intends to start as entrepreneur or not, there is expected to arise some restrictive factors, such as access to capital or financing. These findings are brought out in the analysis of the survey and reported in the findings of this research. The restrictive conditions are actually in great interest of this research. When restrictive conditions arise in the respondent's answers it reflects lack of perceived behavioral control.

4.2.2 Perceived self-efficacy and perceived controllability

Perceived self-efficacy influences choice of behavioral settings. Individuals fear and tend to avoid threatening situations they believe exceed their ability to cope with the situation. (Bandura 1977). The latter gives explanation why some individuals, more than others, avoid situations which could lead them into some kind of trouble. In the context of this research getting into trouble could mean the situation of getting into financial difficulties because of entrepreneurial behavior. Efficacy expectations determine how much effort individuals will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy is, the more active the efforts are. Given appropriate skills and adequate incentives, efficacy expectations are a major determinant of choice of activities. (Bandura 1977, 194).

Ajzen (2002, 9) points out that individual's skills are one factor upon which he considers his ability to perform a behavior. We therefore expect that when we

ask an individual whether or not he will start his own business, start as an entrepreneur, the individual will consider his own skills in relation to the behavior (to start and work as an entrepreneur). He will assess his skills into the skills he believes to be needed, in order to perform the behavior. His perception might result that he is or he is not confident about his skills in relation to the behavior. If he feels that he is able to perform the behavior, his perceived self-efficacy is positive, and if he feels that he is not able to perform the behavior, his perceived self-efficacy is negative.

> Self-efficacy scales do not measure skill, they measure what people believe they can do under varied circumstances, whatever skills they possess or the particular skills required by the task. People's attainments are partly determined by their beliefs about how well they will be able to orchestrate their existing subskills, how much effort they will be able to mobilize, and how long they will be able to persevere in their attempts. (Bandura 1986).

An individual will likely also consider his professional skills in relation to the given level of attainment, as pointed out by Ajzen (2002). When asked about his intention to start as entrepreneur, an individual might however think also the possible outcomes of starting as an entrepreneur. He might be thinking if he is able to perform successfully as an entrepreneur. This has to be considered when designing the surveys questionnaire.

According to Ajzen (2002) self-efficacy refers to individual's confidence to that he can successfully execute a certain behavior required to produce certain outcomes. Ajzen refers to Bandura (1977) and says that perceived self-efficacy refers to individual's beliefs in his capabilities to organize and execute the courses of action required to produce *given levels of attainment* (Ajzen 2002). Bandura (1977) differentiates outcome expectations from efficacy expectations. Bandura (1977, 193) says that an outcome expectancy is defined as an individual's estimate that a given behavior will lead to certain outcomes. An efficacy expectation, on the other hand, is the conviction that one can successfully execute the behavior required to produce the outcomes. As it is actually said by Bandura (1977), efficacy-expectation is however linked to the consideration of the behaviors outcomes. This notion has an effect to questionnaire design of this research.

In this research, respondents are first asked about their professional skills in relation to the skills they believe to be needed in the role of an entrepreneur, without thinking the successfulness of the behavior. They are also asked, with a different question, to assess their professional skills in relation to achieving success as an entrepreneur. The experience of success is subjective of its nature. The *given level of attainment*, the definition of success, is provided in the questionnaire alongside with the latter question.

One way to view the success of a firm is to evaluate is the firm is able to produce a positive monetary return. Another way to view success of a firm is that the firm will produce sufficient income to the entrepreneur. A sufficient level of income is in this research considered to be 2488 Euros gross wage in a month. This value has been taken from the Finnish private sector wage statistics

(Tilastokeskus 2013) and it is the highest figure of the lowest quartile in the statistics of 2013. 25% of Finnish private sector full-time employees earned less than this amount of money in a month before taxes. This level of separation between success and failure is sufficient and suitable for the purposes of this research.

4.3 Entrepreneur's skill set

Lazear (2004) says that entrepreneurs must be multi-skilled and that they must be sufficiently good at a wide variety of skills in order to make sure their business does not fail. He doesn't however tell explicitly what these skills should be. Stuetzer et. al (2012) have found that balanced skills are an important success factor throughout the entrepreneurial process and that the establishment of a new venture is faster when the founder or the founders of the firm have a balanced skill set. Chandler and Jansen (1992) found out that the most successful business founders see themselves as competent generalists. Chandler and Jansen (1992) operationalize the founder competencies identified in earlier literature and cluster these according to three fundamental roles: entrepreneurial skills, managerial skills and technical-functional skills (Mitchelmore & Rowley 2010). Smith et. al (2007) say that entrepreneurial activities require a broad array of skills and recognize four major skill categories: technical skills, managerial skills, entrepreneurial skills and personal maturity skills. Different authors categorize the skills differently and from different perspectives. For example the definition and content of entrepreneurial skills by Smith et. al (2007) is totally different from the one presented by Chandler and Jansen (1992). There does not yet exist a single well-established categorization, a ready-made model in the earlier literature. Also the actual skills under similar category names do vary. Mitchelmore and Rowley (2010) refer to Brinkmann (2008) and point out that the discussion of entrepreneurial competencies in the entrepreneurial literature is in its early stages. It therefore is justifiable to pursue to develop the definitions and categorizations of entrepreneur's essential skills.

After exploring the earlier literature, I define the skill categories used in this research and provide reasoning for their use. The skills under the each category are based on the earlier literature, and also new skills are named. Some of the skills used in earlier literature are defined more accurately. For example Smith et. al (2007) have identified a skill called "Marketing/Sales". In this research marketing and sales are however distinguished from each other to separate skills.

Some skill categories identified in earlier literature are not used at all. The category of personal maturity skills identified by Smith et. al (2007) is left off because those skills are difficult to measure and they are actually not related to self-efficacy what this research is to investigate. The broad variety of skills that have been identified by Mitchelmore and Rowley (2010) are used as a checklist in constructing the complete skill set used in this research.

4.3.1 Entrepreneurial skills

The skills defined by Chandler and Jansen (1992) under the category of "entrepreneurial role" (ability to recognize and envision taking advantage of opportunity and capacity for intense effort) are combined with the psychological variables presented by Hofer and Sandberg (need for achievement, need for power, locus of control, attitude towards risk, and tolerance for ambiguity). (Hofer and Sandberg 1987). Ferreira et. at (2012) say that the main psychological characteristics associated with entrepreneurship in the literature are internal locus of control, propensity to take risk, self-confidence, need for achievement, tolerance for ambiguity, and innovativeness. Our definition of entrepreneurial skills leans on the mentioned definitions by mentioned authors, but some content of the definitions has been slightly modified. Each entrepreneurial skill is presented in the following to provide an accurate trail of its origin.

Ability to recognize and envision taking advantage of opportunities presented by Chandler and Jansen (1992) is condensed to ability to recognize opportunities because opportunity recognition and ability to recognize opportunities are well-established phrasings in the literature. Capacity for or intense effort presented by Chandler and Jansen (1992) is divided to ability to stretch personal capacity to the maximum and willingness to stretch personal capacity to the maximum, because the act of intense effect happens under volitional control. Need for achievement presented by Hofer and Sandberg (1987) is defined more accurately as need for success. Need for power presented by Hofer and Sandberg (1987) is changed to need for independence because need for power refers to the need to achieve a high rank in an organization, and entrepreneurial organizations have usually relatively low hierarchical structure. Need for autonomy is in practice a synonym for need of independence. Caird (1991) has recognized that need for autonomy is higher among entrepreneurs than of teachers, nurses, clerical trainees, civil servants, lecturers and trainers. The need for independence has been recognized to be a factor which may effectively distinguish successful entrepreneurs from the general population (Brockhaus 1982). Internal locus of control and propensity to take risks are taken as such to the definition of entrepreneurial skills used in this research. Respondents are asked how willingly they take risks in life and asked to evaluate how much entrepreneurship is associated with risk-taking. Respondents are also asked to evaluate how much they can affect themselves to being successful in entrepreneurial behavior (working as an entrepreneur) and to achieving success as entrepreneurs. These variables tell about the locus of control of the respondents. Self-confidence is in this research measured with self-efficacy towards specific skills, of which entrepreneurial skills is one of the three categories. Tolerance for ambiguity is in this research changed to tolerance for uncertainty, to be clear and precise and to better match the terminology with Knight's (1921) theory of risk and uncertainty. Innovativeness is changed to the form of ability to innovate, but otherwise it is

taken as such to the definition of entrepreneurial skills. Creativity and ability to make innovations are strongly linked to entrepreneurship as presented by Schumpeter (1934). For example Sexton and Bowman (1986) have recognized that entrepreneurs tend to be adaptive to change. Ability to adjust to changing conditions is therefore added to the list of entrepreneurial skills. In this research, also the tolerance for failure is considered to be an entrepreneurial skill. Ilkka Paananen, CEO of Supercell, a very successful start-up, says that entrepreneurs must have tolerance for failure (MTV 2015, Panzar 2015). The need for tolerance of failure has also been recognized in a Finnish entrepreneurship guide (YritysHelsinki 2015). The following skills thus constitute the category of entrepreneurial skills in this research:

- Willingness to take risks
- Tolerance for uncertainty
- Tolerance for failure
- Ability to recognize business opportunities
- Ability to innovate
- Ability to stretch personal capacity to the maximum
- Willingness to stretch personal capacity to the maximum
- Need for achievement (need for success)
- Need for independence
- Ability to adjust to changing conditions

The viewpoint of this research is to approach entrepreneurial intentions from the perspective of self-efficacy, from the perspective of professional skills of an entrepreneur, not from the defining personality traits point-of-view. It is worth noticing that some personality traits recognized by the traits approach have however appeared on our list of entrepreneurial skills. It seems that that the personality traits approach is partially overlapping with the skills perspective.

4.3.2 Management skills

Management skills presented here include the skills need to manage a business (business management skills) and the skills to act as a manager (management skills). Mitchelmore and Rowley (2010) have reviewed earlier literature and found out for example following skills related to management of a firm: development of the management system necessary for the long term functioning of the organization, management skills, business plan preparation skills, financial and budgeting skills, operational business skills, skills of acquisition and development of resources, marketing skills, leadership skills, ability to motivate others, interpersonal skills, written and oral communication skills, decision making skills, and ability to coordinate activities. These skills appear also in our definition of managerial skills.

Sales and marketing skills are very essential skills for an entrepreneur. Entrepreneurs need to be able to sell and market their products and services. Selling and marketing are separate yet interrelated skills. Entrepreneurs have to be

able to organize issues, events, resources and work. They also have to be able to prioritize which issues or tasks are more urgent than others. They have to be able to make decisions related to many issues, for example whether or not to enter to a certain project, and how much to allocate resources for a certain project, on which price to sell, and with whom to partner with. Entrepreneurs need business management skills and project management skills. They need to be able to manage their business as a whole and manage their projects effectively. They also need development skills in order to be able to develop their business. They have to be able to produce business forecasts in form of budgeting, business plans and investment plans. They need also skills to assess the rationality of an investment plan and assess the profitability of their business. Entrepreneurs should be able to do tax planning in order to optimize taxes. Entrepreneurs need interpersonal skills and communication skills. They need to be able to communicate effectively and in a discrete manner with their customers, suppliers, financers and employees. Interpersonal skills are especially needed in leading and inspiring people, which is another skill entrepreneurs should possess. Ability to acquire financial resources is one of the most crucial skills for a starting entrepreneur. Evans and Jovanovic (1989) have found out that capital is essential for starting a business. They say that difficulties in accessing the needed capital explain why people won't start as entrepreneurs and that liquidity constraints tend to exclude those with insufficient funds at their disposal, to start a business. Parviainen (2013) says that to attract investors, a firm should include such individuals in the team who can communicate to potential investors, what is the firm's strategy, and how it is to be achieved. He says that the start-up team should include an individual who can explain how the firm's strategy can be seen in the numerical information of that firm. In case of start-up and its founding team Parviainen highlights the need for effective presentation skills and persuasive communication skills and highlights the need for an individual who can assure and attract investors by his marketing communications (Parviainen 2013). Parviainen emphasizes especially the effective and persuasive communication of the business plan. Parviainen is investment professional working in United Arab Emirates and CEO of Devenir Ltd based in Finland. As described communication skills and interpersonal skills are needed for example attracting investors and financers. The following skills constitute the category of management skills in this research:

- Sales skills
- Marketing skills
- Business management skills
- Business planning and business development skills
- Project management skills
- Budgeting skills and ability to do financial calculations
- Taxation planning skills
- Acquisition of financial resources
- Ability to organize

- Ability to prioritize
- Ability to make decisions
- Ability to lead and inspire people
- Interpersonal skills
- Communication skills (written and oral communication)

4.3.3 Practical/technical skills

Entrepreneurs need practical skills for producing their products and services. Especially starting entrepreneurs usually have scarce resources and they need practical skills because they themselves are the actual workforce of their production. Ability to do with hands refers to general do-it–yourself (DIY) skills which are linked to the ability to use hand tools. Ability to use typical production equipment of a machinery shop is a more advanced technical skill. Using of hand tool is essential for producing technical professional services, but may not be sufficient for producing prototypes of new technical equipment. This usually needs ability to use machinery shop equipment such as turn or numerically controlled milling machine. Engineering skills and product development skills are general abilities to do technical planning skills and testing. The following skills constitute the category of practical / technical skills in this research:

- Ability to do with hands
- Ability to use hand tools
- Ability to use typical production equipment of a machinery shop
- Ability to use typical manufacturing design tools (designing software)
- Engineering skills (in general)
- Product development skills

4.4 Explanatory factors of reluctance to start as an entrepreneur

This study is interested in the reasons why individuals are reluctant to start to work as entrepreneurs instead of starting to work as an employee. Earlier research has disclosed that individuals may avoid risk-taking and that they have difficulties to access adequate capital or financing to start their own businesses.

4.4.1 Liquidity constraints

Evans and Jovanovic (1989) have found out that capital is essential for starting a business. They say that difficulties in accessing the needed capital explain why people won't start as entrepreneurs and that liquidity constraints tend to exclude those with insufficient funds at their disposal, to start a business. (Evans & Jovanovic 1989). Nykvist (2008) has verified the existence of liquidity constraints in Sweden and Johansson (2000) has verified their existence in Finland.

Kerr and Nanda (2009) say that financing constraints are one of the biggest concerns impacting potential entrepreneurs around the world (Kerr & Nanda 2009). Taking a bank loan to start a business represents a risk as represents investing earlier cumulated funds into a new venture. Therefore, in this research, students should be asked questions that measure their risk-taking tendency.

4.4.2 Risk aversion

In the context of entrepreneurship and earning through working, *risk* can be defined as the possibility of financial loss (Oxford University Press 2015). Cramer et. al (2002) have proven that individuals who have low risk aversion tend to start as entrepreneurs more often compared to those who are more abstinent of taking risks (Cramer et. al 2002). Risk aversion exists when an individual prefers a guaranteed payoff to an uncertain payoff with the same expected value (Sewell 2011).

Some individuals want to be sure and avoid uncertainty whereas others seem to prefer rather than avoid uncertainty (Knight, 1921, 242). Individuals differ of their risk-taking tendency. Sewell (2011) says that normatively and most likely descriptively, individuals have a tendency towards slight risk aversion with respect to utility generated by a process including many variables.

Evidence from OECD countries suggests that 20 to 40 percent of entering firms fail within the first two years (OECD 2010). Therefore it evidently is wise to consider carefully if it is worth to start a business and start working as an entrepreneur. It is however notable that the element of risk is needed for profit to exist (Brooke 2010).

4.5 Theory of risk and uncertainty

Knight (1921) differentiates risk from uncertainty, saying that risk is measurable class of uncertainty whereas pure uncertainty is not measurable. The possible outcomes of a risk can be specified and the odds of the realization of the risk can be calculated *a priori.* In case of uncertainty the possible outcomes of future happenings cannot be anticipated. (Knight 1921, 233). For example the probability of going out of business or facing an economic downturn can be assessed *a priori.* A business student might know that economical upswings and downswings have a cyclical tendency, so he has some information to "calculate" the probable outcomes of future uncertainty. Or he may have knowledge that 20 to and 40 percent of entering firms fail within the first two years. Without such knowledge the risk might be perceived smaller or higher and the individual would face the uncertainty with scarce information. However, only a few of those who consider whether or not to start as entrepreneurs are aware of the statistical probabilities of going out of business or facing an economic downturn. Entrepreneurial action, or business decision

making, is often characterized by scarce information (Brooke 2010). Knight (1921, 236) says that the pay-off for taking a risk should be high enough in order it to be rational to take the risk. This might be something what individuals considering entrepreneurship will evaluate in their decision-making and in developing their intentions of future behavior. Knight (1921, 237) says that the degree of confidence in entering to a risky situation can be based upon an objective probability calculations or in a subjective estimate of one's own power of prediction, and that these objective and subjective can take place simultaneously. He however concludes that most individuals do not carry their deliberations so far, that their opinion or prediction may be an estimate of an objective probability. Knight (1921, 242) also says that individuals vary in their confidence of their judgement related to the uncertainty.

According to Knight (1921) one characteristic of a risk is that one is able to insure against the realization of a risk. He also defines the main characteristic of uncertainty to be, that one is not able to take insurance against uncertainty. An entrepreneur is actually able to insure himself against the loss of entrepreneurial income, in form of earning-related unemployment benefit insurance which covers 68-90% of the lost wage depending on how many children the entrepreneur has (Ammatinharjoittajien ja yrittäjien työttömyyskassa 2015). But entrepreneur is not able to insure against all the losses encountering from a bankruptcy, he cannot insure against losing the invested money or losing his house that has been as collateral for loans of the firm. There is therefore a need to consider Knight's perspective on separating risk and uncertainty from each other. As Brooke (2010) points and my example illustrates a perfect insurance does not exist. According to Brooke (2010) there has been considerable discussion and disagreement over the meaning of Knight's distinction between risk and uncertainty. Brooke (2010) says that any instance where the expectations of the future are based on subjective beliefs there is uncertainty. He says that risk refers only to instances where there is certainty about the distribution of possible outcomes, and this certainty exists only in the textbook theories of perfect competition. (Brooke 2010).

> It is clear that Knight had difficulty with his definition of uncertainty. That he defined uncertainty clearly in terms of insurability and non-insurability, and then proceeded to discuss problems with producing certain outcomes in the face of either type of risk suggests that he was not in full command of his material. (Brooke 2010)

Brooke (2010) says that either the future is uncertain, or it is subject to risk. As it seems that one is not able to insure perfectly against a risk, there remains only uncertainty. Because all risks cannot be insured perfectly, a risk is a class of uncertainty. Entrepreneurs face uncertainty, not risk. Therefore, in this research, students should be asked questions which measure how well they bear uncertainty, instead of only asking questions measuring are they willing to take risks.

5 ENTREPRENEURSHIP IN THE OBJECTIVES OF FINNISH EDUCATION SYSTEM

5.1 Objectives of upper secondary school education

Objectives for education given in Finnish upper secondary schools come from the Finnish law 629/1998. The objectives of vocational school education are stated in the second clause of the law. According to that, objective of upper secondary school education is to support the student's growing to good, balanced and civilized human being and member of society, and to provide students with knowledge and skills which are required in further studies, working life, hobbies and diverse development of personality. In addition to that, upper secondary school education shall support student's abilities to lifelong learning and personal development during his life. (Finlex 1998b). Developing of entrepreneurial skills is not mentioned in the objectives, but it is justified because the mission of upper secondary school education is to raise the level of student's general education and prepare him to further studies, not to prepare him to a certain profession. However some upper secondary schools offer such education in their curriculums that prepares the student to entrepreneurial career, for example Teuvan lukio at Teuva, and Sepän lukio and Voionmaan lukio at Jyväskylä. (Nevanperä 2003, Nevanperä 2010, Jyväskylän lukiokoulutus 2015).

5.2 Objectives of vocational school education

Vocational schools produce vocational degrees. Objectives for education given in Finnish vocational schools come from the Finnish law 630/1998. The objectives of vocational school education are stated in the second clause of the law. This clause has recently been changed with the statute 787/2014 and the new version of the clause comes into effect 1.8.2015. In the currently valid clause the objective is to raise the level of professional skills of the population, develop

working life and answer to its need for professional skills and foster employment (Finlex 1998a). The new version of the clause is significantly different, it includes the objective to foster entrepreneurship. According the new version of the clause the objective of vocational education is to raise the level of professional skills of the population, to develop working life and answer to its need for professional skills, and to foster employment and entrepreneurship and support lifelong learning. The recent change in the law makes this research important and topical (Finlex 2014a). Some vocational school units have entrepreneurial education in their curriculum, for example Lapin ammattiopisto provides a studying module which includes business planning and placement period in a firm (Lapin ammattiopisto 2015).

5.3 Objectives of university of applied science education

Universities of applied sciences produce Bachelor's and Master's degrees. Objectives for education given in Finnish universities of applied sciences come from the Finnish law 932/2014 and decree 1129/2014. The objectives of vocational school education are stated in the fourth clause of the law 932/2014. According to that, the objective of an university of applied sciences is to provide higher education which is based for the needs of working life and for its development, and education which has its premises in research, arts and education, and to provide this education for tasks of professional expertise and to support student's professional growth. In addition, the objective of university of applied sciences is to exercise research which serves tuition in universities of applied sciences, working life, and regional development, development and innovation activities and artistic activities. In doing so, university of applied sciences have to foster lifelong learning. (Finlex 2014b) In addition to the previous, the objectives of studies in universities of applied sciences are defined in decree 1129/2014. It says that the objective of the studies in universities of applied sciences is that the graduated student has 1) wide-ranging practical basic knowledge and skills and theoretical basics to operate in working life in tasks of an expert in his own field 2) readiness to follow and foster the development of his own professional field 3) prerequisites to develop his own professional skills and to lifelong learning 4) adequate communication and language skills to tasks in his own professional field and to international actions and cooperation. (Finlex 2014c). It is notable that fostering entrepreneurship has not been mentioned at all in the objectives of the tuition provided by universities of applied sciences. However some universities of applied sciences state that their curriculum prepares the student to work as entrepreneur, for example Turku University of Applied Sciences (Turku University of Applied Sciences 2015). It is however notable that most of these courses providing entrepreneurship education are lectured in business and administration degree programs. Therefore it requires some extra interest from a technical degree student to take these courses.

Satakunta University of Applied Sciences (SAMK) however offers an entire "Enterprise Accelerator" studying module which targets to that the student will acquire readiness to recognize business opportunities and entrepreneurship opportunities, and readiness to plan, establish and start his own business already during his studies (Satakunta University of Applied Sciences 2015). There are also many regional and national innovation competitions targeted to students in higher education which the universities of applied sciences promote to their students, for example Ideadrill 2015 and Innosuomi competitions. SAMK also provides several Master's degree programs where entrepreneurship teaching is an essential part of the degree program. This research is however focused to study the students who study in a Bachelor's degree in the program of Mechanical Engineering.

6 RESEARCH METHODOLOGY AND DATA COLLECTION

The aim of science is to acquire new knowledge systematically and rationally. The results of science are clauses that pose claims about state of affairs in the world. These claim clauses should be truthful and correspond with reality. This view to science is called cognitivism. (Haaparanta & Niiniluoto 1986). Research has to be directed by a scientific method in order the research to be scientific and thus accepted in the scientific society. (Haaparanta & Niiniluoto 1986). According to Peirce (in Haapaluoto & Niiniluoto 1986) a proper scientific method is objective, public and self-reconstructive. The rules of scientific reasoning are associated with the aim of science. The aim of scientific discussion is to seek well justified conceptions. According to Platon knowledge is a well justified true belief. (Haaparanta & Niiniluoto 1986).

The process of defining the research methodology of this research has received help from illustration of Saunders et. al (2003) seen if figure 4. Their illustration, the "methodology onion", describes the structure of methodological choices. The methodology of this research is presented in the hierarchical order moving from outer layer of the methodology onion, towards its inner layers.

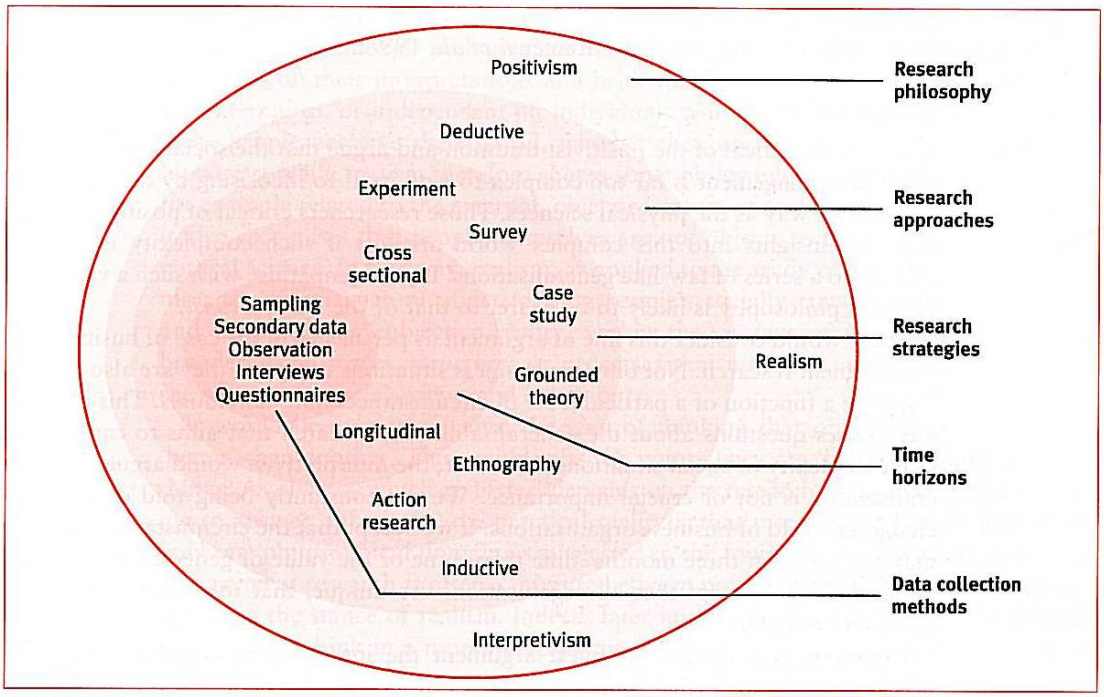

Figure 4. Structure of methodological choices (Saunders et. al 2003)

6.1 Research philosophy

The research philosophy of this research is a mixture of interpretivism and positivism. On the other hand there exists a necessity to discover the details of the cognitive process of the students to understand how their entrepreneurial intention or dis-intention is formed. This is interpretivism. On the other hand this research will be working with an observable social reality and strives to "produce law-like generalizations similar to those produced by the physical and natural sciences" (Saunders et al. 2003). This is positivism.

This research applies dialectic reasoning. In dialectic reasoning the premises are not known to be true, but they are starting points for the debate. (Haaparanta & Niiniluoto 1986).

6.2 Research approach

The research approach of this research is deductive. According to Bolzano and Tarsk (in Niiniluoto 1983) clause C is a logical consequence of clauses P1, P2, …, Pn exactly then, when the following is in effect: always then when clauses P1, P2, …, Pn happened to be true, also clause C has to be true. This is why deductive reasoning is said to be logically valid and it can be called a method that absolutely conserves the truth (Niiniluoto 1983, 21). Deductive approach searches

therefore to explain causal relationships between variables. It uses a highly structured methodology to facilitate replication of the research. In order to pursue the principle of scientific rigor the deductive approach dictates that the researcher should be independent of what is being observed. In deduction concepts need to be operationalized in a way that enables facts to be measured quantitatively. In order to be able to generalize about regularities in human social behavior it is necessary to select samples of sufficient numerical size. (Saunders et. al 2003).

This research will test the theory of planned behavior, especially its extension by Ajzen (2002) which describes the relationship between self-efficacy and perceived behavioral control to behavioral control and their relation to intention. This research follows a hypothetical-deductive method where theory is constructed from the observations that are made from phenomenon existing in the reality. In hypothetical-deductive method hypotheses are derived from the theory, from the world of ideas, to be tested in the world of reality, and the observations made from the reality are used to shape the theory. (Hirsjärvi et. al 2001). Hypothetic-deductive method is illustrated in figure 5.

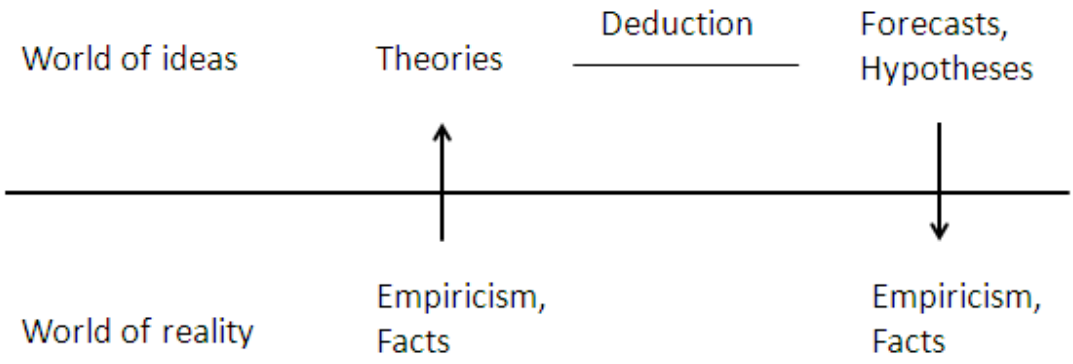

Figure 5. The relationship between theory and empiricism (hypothetic-deductive method) (Hirsjärvi et. al 2001)

6.3 Research strategy and data collection

This research is an explanatory survey study which applies the techniques of quantitative research. This is a cross-sectional study and the research data is collected with paper questionnaires. Explanatory studies establish causal relationships between variables. The emphasis is on studying a situation in order to explain the relationships between variables. (Saunders et. al 2003).

This research gathers and analyses data about the self-efficacy of Mechanical Engineering (ME) students of SAMK and is especially interested in their self-efficacy towards their practical skills. The actual level of practical skills is a difficult to measure, it is impossible to get such data through a survey. Howev-

er, it is possible to get data about individual's perceptions about his practical skills. Individual's reliance on his practical skills tells about the individual's self-efficacy.

The target group of the survey consists of second and third year Mechanical Engineering students in SAMK. Author established a personal contact with a teacher who currently teaches a course form the target group and asked for cooperation in carrying out the survey. In cooperation with the teacher, it was defined how the filling of questionnaires will be conducted. Questionnaires were filled during a certain lesson of a certain course. Similar method has been successfully used by Melin (2001). It was therefore expected that this method of carrying out the survey would yield a high response-rate.

Third year students are selected as a target group because the third year is in practice the last studying year when the students are surely present at the classes. Second year students were selected to the target group to get a larger sample and because it was not possible from the research execution point-of-view to wait a whole year that the current second year students would be at the end of their studies.

The answers, individual's perceived self-efficacy in relation to his practical skills, business/management skills and entrepreneurial skills reflect the individual's perceived self-efficacy and provide explanations to the question why the individual intends or does not intend to start as an entrepreneur.

6.4 Creation and affirmation of hypotheses

Niiniluoto (1983, 127) says that the origin and innovative background of hypotheses is irrelevant, because their destiny will be fully solved through deductive testing. Scientific hypotheses have to be inter-subjectively testable. They have to include such consequences, with apposite additional assumptions, that they can be publicly checked (Haaparanta & Niiniluoto 1986).

According to Peirce (2001, 246) hypotheses must be stated clearly as a question before making any observations which test the hypothesis and try to see what will follow from the prognostication of the hypothesis. Peirce (2001, 251) says that a hypothesis assumes something which is impossible to observe immediately. According to Niiniluoto (1983, 125) a hypothesis is a true or untrue claim, which has an unknown truth value. A hypothesis should be abandoned if observation evidence falsifies it. When the deductive implications are found to be true, this finding can be seen to support or provide confirmation for the hypothesis. (Niiniluoto (1983, 126). Peirce (2001, 246) says that the procedure of evaluating the predictions has to be fully forthright and unbiased, the failures and successes of prediction must be taken account in honesty. According to Whewell (in Niiniluoto 1983) the hypotheses that are accepted have to

explain the observed phenomenon, and in addition, they have to foretell phenomena similar to those to which the explaining hypotheses were invented.

According to Niiniluoto (1983) and Haaparanta and Niiniluoto (1986) a hypothesis has to 1) explain the facts and logics to which the research is based. It has to be 2) logically consistent and determined precisely as possible and to be compatible with earlier theories. The hypothesis has to be 3) experimentally testable, verifiable or falsifiable, and it must be 4) informative. Its information content has to be as massive as possible. The hypothesis must be 5) simple as possible in order to have a systematic force as massive as possible, to be able to explain a) the facts and logics to which the research is based. The hypothesis also has to have a systematic force in relation to the requirement b) of being logically consistent and determined precisely as possible and being compatible with earlier theories. (Niiniluoto 1983, 133).

In this research the relationship to hypotheses is hypothetical-deductive. Hypothetical-deductive view to science separates the innovating of hypotheses from their justification. (Haaparanta & Niiniluoto 1986). The hypothetic-deductive method has a linkage to methods of analysis and synthesis. The methods of analysis and synthesis seem to alternate in turns in scientific reasoning, they both appear in the process of hypothetic-deductive reasoning, only in different phases of it.

The innovating of a hypothesis resembles an analysis when a proceeding is made from a detectable phenomenon to general assumption of the phenomenon, with an intention to explain the detected phenomenon. If the hypothesis fits together with the observation material, the researcher has succeeded in finding the essence of the phenomenon and presented a synthesis. (Haaparanta & Niiniluoto 1986).

6.5 Operationalization of the variables

Operationalization of the variables in this study leans on to the used theories. This research uses closed, readily standardized questions. Karim (2013) says that entrepreneurial behavior is a skill-based behavior and the behavior should be measured using the skills or competencies required to perform the behavior. Professional skills of an entrepreneur were identified and then used to define the self-efficacy of the respondent towards those professional skills. The respondents have chosen their answers to the skill questions from 7-point Likert scale which were provided with textual descriptions of lower end and higher end definitions. The respondents were also asked yes/no questions considering their educational choices and their preferences of becoming or not becoming entrepreneurs. Questions related to self-efficacy towards the behavior (working as an entrepreneur) and self-efficacy towards being successful in the behavior (working as an entrepreneur) as well as questions concerning the perceived behavior control were asked with questions on a 7-point Likert scale. The ques-

tionnaire was written in Finnish and is attached to this research report as appendix 1.

6.6 Reliability and validity of the study

Reliability of research is directly proportional to reliability of the measurement instrument. Traditionally the reliability has been discussed through two consepts: reliability and validity. (Metsämuuronen 2000b). The concepts reliability (precision) and validity (accuracy), concern the degree to which the measuring instrument is free of measurement error (Karjaluoto 2002).

Reliability means the accuracy or precision of a measuring instrument (Kerlinger 1980). Reliability refers to the degree to which a measure is free of variable error. The less there is error, the greater is the reliability. Reliability refers to the accuracy, consistency, stability over time, and reproducibility of a measurement instrument. Reliability is a necessary but not sufficient condition for validity. (Karjaluoto 2002).

Validity is a measure of the reliability of the study. It answers to the questions, is the study researching those issues it should be researching. Validity can be divided to internal and external validity.

6.6.1 Reliability of the study

There exist four classes of reliability. Each of them measures reliability in a different way. The following definitions have been obtained research methodology knowledge base published by Trochim (2006).

The first class of reliability is inter-observer reliability. It is used to assess the degree to which different observers give consistent estimates of the same phenomenon. This research has only one observer. Therefore the inter-observer reliability measurement is not applicable to this research. The second class of reliability is test-retest reliability. It is used to assess the consistency of a measure between different times of measurement. This research has only one measurement point. Therefore the test-retest reliability measurement is not applicable to this research. The third class of reliability is parallel forms reliability. It is used to assess the consistency of the results of two tests constructed in the same way from the same content domain. This means using parallel measurement instruments in the same research. Using parallel testing requires preparing two or more measurement instruments which are identical by their psychometric qualities, and presenting them two times for same respondents (Metsämuuronen 2000b). Parallel testing measurement was not used is this research. Therefore parallel forms reliability measurement is not applicable to this research. The fourth class of reliability is internal consistency reliability. It is used to assess the consistency of results across items within a test. It evaluates the internal

consistency of a measurement instrument. It is concerned with the homogeneity of items comprising a scale (Karjaluoto 2002).

One widely used type of measuring internal consistency is calculating Cronbach's alpha. Cronbach's alpha is used to measure the consistency of measurement instrument's internal coherence and therefore, it is used as a measure of reliability, which is again a measure of repeatability. (Metsämuuronen 2000c). In calculating Cronbach's alpha the measurement is split into two parts. The correlation of these halves is a measure of reliability of the measurement instrument. (Metsämuuronen 2000b). Cronbach's alpha measures true variance over total variance. According to Nunnally (1978) the alpha of a scale should be greater than 0.70 for the items to be used together as a scale. (Karjaluoto 2002). The formula of Cronbach's alpha is seen in figure 6.

Previous research suggests that the 7-point bipolar scales used in the semantic differential have relatively high reliabilities (Karjaluoto 2002). Responses to probability scales of the semantic differential type (ie. likely-unlikely) tend to yield highly reliable measures of the strength of belief and intention (Karjaluoto 2002, Fishbein 1967). Thus this research is about measuring strength of entrepreneurial intention, a 7-point Likert scale is suitable for the purposes of this study.

$$\text{Cronbach's } \alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i-1}^{k} S_i^{\,2}}{S_p^{\,2}}\right)$$

k = number of items in scale
$S_i^{\,2}$ = variance of item i
$S_p^{\,2}$ = variance of total score

Figure 6. The formula of Cronbach's alpha

In this study the internal consistency of measurement instruments was high, as Cronbach's alpha reached values between 0.802 and 0.931. The reliability of this study is therefore high. High reliability tells primarily that the items of the measurement instrument measure a similar kind of issue. On other hand high reliability tells that same individuals responded in same way on different measurement occasions. High reliability also tells that the measurement instrument does separate the tested individuals from each other in a reliable and efficient manner. (Metsämuuronen 2002).

6.6.2 Validity of the study

Validity is a measure of the reliability of the study. Validity refers to the extent to which an instrument measures what it purports to or is intended to measure (Karjaluoto 2002).Validity can be divided to internal and external validity.

External validity describes how well the research can be generalized, and to which groups of population. This research was conducted in only one learning institution which limits the generalization ability of the research. It can be however estimated, that the impact of learning institution to the answers of the respondents is not high. This raises the generalization ability of the study.

The number of respondents (N=74) is quite low from the generalization point-of-view, if compared for example to sample size of Nevanperä (N=638). (Nevanperä 2003). The size of the sample has however been a deliberate choice and is justified because this research is a bachelor's thesis. A more condensed sample size is justified for a study of this magnitude.

Internal validity means the reliability of the research itself. The following questions consider the internal validity of the study: Are the used definitions correct? Has the theory been chosen correctly? Are the measurement instruments formed correctly? Do the measurement instruments measure what they should be measuring? Internal validity can be divided into 1) content validity, 2) construct validity, and 3) criterion-oriented validity. (Metsämuuronen 2000b).

Content validity is more theoretical quality of a measurement than a calculative quality of measurement. What is valued in defining content validity is, that are the definitions used in the measurement instruments correct and in line with the used theory, are they correctly operationalized, and do the definitions cover widely enough the phenomenon in question. (Metsämuuronen 2000b).

In this self-assessment the content validity of this research is ranked to be high. The definitions used in the measurement instruments have been conducted from the earlier research literature. Their operationalization has followed the example of earlier research, namely certain doctoral dissertations. The research has tested the theory of planned behavior instead of personality traits approach.

The research results of Gartner (1988) and Ajzen (1991) suggest that instead of using the personality trait approach, one should use the behavioral approach instead. Gartner (1988) has examined behavioral and trait approaches to entrepreneurship and reached a conclusion that the personality trait approach should be abandoned because personality traits do not explain the decision to become an entrepreneur. Also Ajzen (1991) has found out that personality traits do not explain behavior. Krueger et. al (2000) say that intentions have proven to be the best predictor of planned behavior, particularly when that behavior is rare, hard to observe, or involves unpredictable time lags. They say that entrepreneurship is exactly the type of planned behavior for which intention models are ideally suited. The findings of the earlier research suggest that the content validity of this research is high. The definitions used in this research cover

widely enough the researched phenomenon. As a whole, the content validity of this research is high.

Criterion-oriented validity is a type of internal validity where the value of measurement is compared to some other value, which functions as a criterion of validity (Metsämuuronen 2002). Criterion oriented validity is not applicable to this research since there is no criterions of validity available for the self-efficacy measures or entrepreneurial intention measures used in this study.

Construct validity is the most important class of validity (Karjaluoto 2002). In defining construct validity, the assessment is targeted to singular definitions and to their operationalization. If the items measuring the definition really measure the latent variable behind the used measurement variables, these variable items should correlate between each other in a more systematic manner than with other variables (Metsämuuronen 2000b). Construct validity can be tested with Structural Equation Modeling (SEM) analysis, for example with the SPSS AMOS program which was used in this research. In this research SEM analysis was performed to the sum variables which represent the ME student's self-efficacy towards his practical / technical skills, business / management skills and entrepreneurial skills. In the analysis the sum variables were the latent variables, and those variable of which the sum variable was formed, were the measurement items.

Below in figure 7 is illustration of construct validity analysis regarding the latent variable "self-efficacy towards management skills". The R^2 values of observed variables vary between 0.30 and 0.76 which indicates that all the measurement items of this latent variable are acceptable. Measurement items are acceptable when their R^2 is above 0.25 (Balapour 2014).

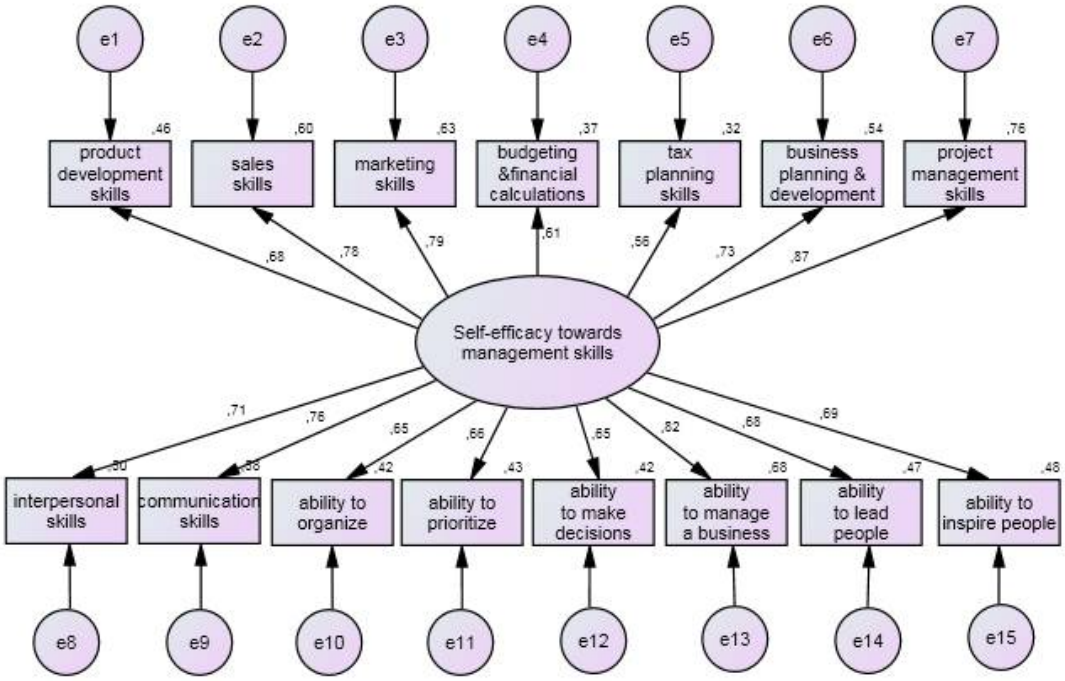

Figure 7. SEM analysis 1. Standardized estimates.

In figure 8 is illustration of construct validity analysis regarding the latent variable “self-efficacy towards entrepreneurial skills”. Two of the R^2 values have scored under 0.25 which indicates that these two measurement items (tolerance for failure and desire to work independently) do not describe well enough the latent variable in question. The other measurement items score between 0.37 and 0.53 and are therefore acceptable.

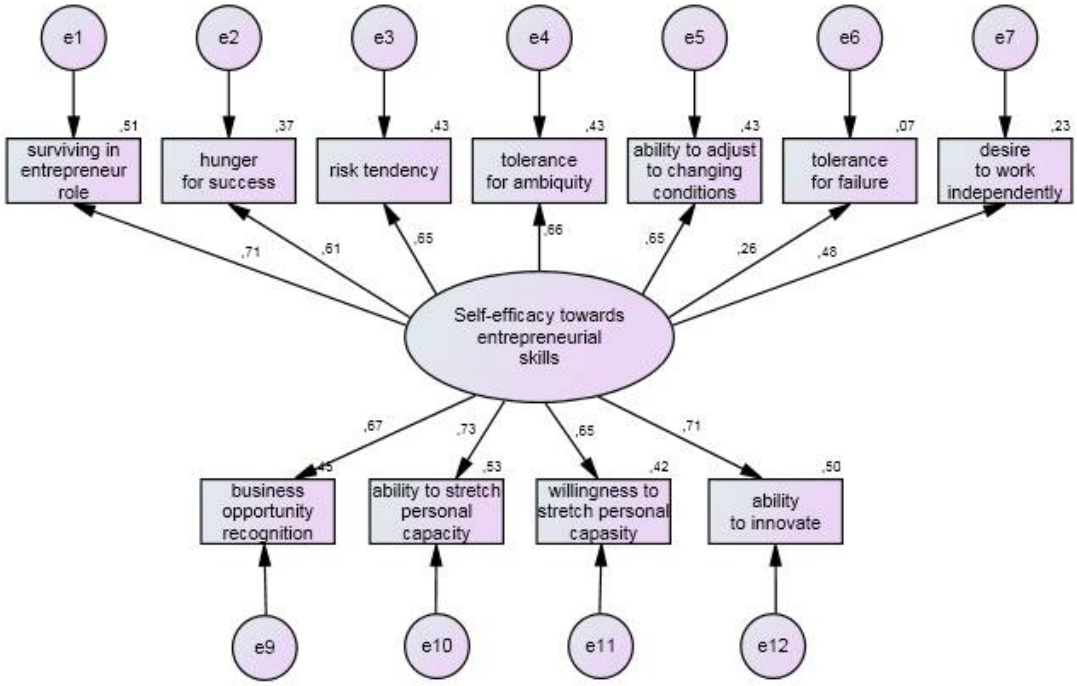

Figure 8. SEM analysis 2. Standardized estimates.

In figure 9 is illustration of construct validity analysis regarding the latent variable “self-efficacy towards practical/technical skills”. One of the R^2 values (design toll skills) has scored under 0.25 which indicates that this measurement item does not describe well enough the latent variable in question. The other measurement items score between 0.41 and 0.95 and are therefore acceptable.

On the basis of the results of SEM analysis, the construct validity of this research is quite high. The construct validity of the study would be even higher if those measurement items that scored under 0.25 in R^2 analysis would be removed from the data. This was not however seen necessary in this study because the original sum variables already reach statistical significance of measurement.

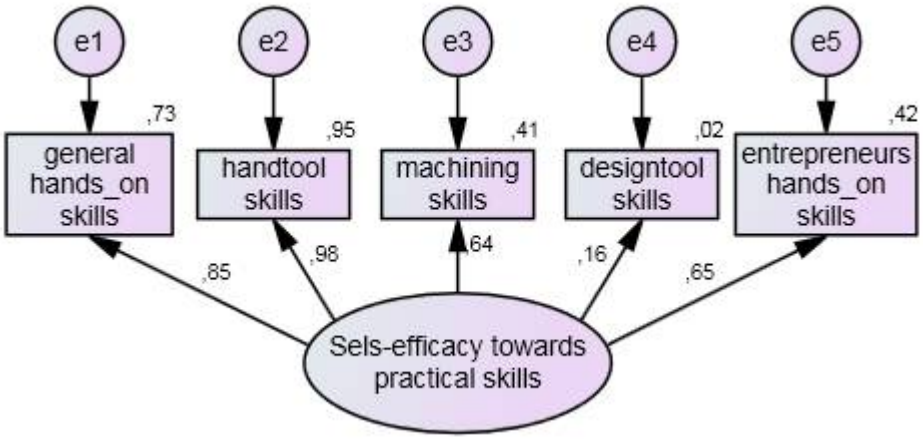

Figure 9. SEM analysis 3. Standardized estimates.

6.7 Interpretation of the results

This study sought correlations between certain variables by doing statistical tests for the research data. The value of the correlation co-efficient is used to interpret the results provided by the statistical analysis. Classification of the correlation has been done according to the table 1 definitions provided by Loughborough University (2015).

Value of the correlation co-efficient	Strength of the correlation
.00 - .19	very weak
.20 - .39	Weak
.40 - .59	Moderate
.60 - .79	Strong
.80 - 1	very strong

Table 1. Strength of correlation matrix

7 REVIEW OF THE SURVEY DATA

The research was targeted to second and third year Mechanical Engineering students in Satakunta University of Applied Sciences (SAMK) studying at Pori and Rauma campuses. The survey data was collected with paper questionnaires during April 2015. Altogether 75 responses were received, out of which 74 responses were accepted for analysis. One response had to be abandoned because the questionnaire had been filled in a non-acceptable manner. Some responses had missing values. Missing values were replaced with mean values of the variable in question, as suggested by Metsämuuronen (2000a). 91.9% of the respondents were male and 8.1% female. 66.2% of respondents were studying in Pori campus and 33,8% in Rauma campus. The average age of the respondents was 24.39 years, 20 being the youngest and 42 being the oldest. 35.1% of the respondents had previous studies in vocational school and 79.7% had previous studies in upper secondary school. 14.9% of the respondents had previous studies in both vocational and upper secondary schools. During their studying history 21.6% of the respondents had attended a course that enhances business skills, and 18.9% of the respondents had attended an entrepreneurship course. Only 1.4% of the respondents had participated to the Enterprise Accelerator studies provided in SAMK. 71.6% of the respondents answered “yes” to the question “have you ever thought of becoming an entrepreneur”. The information value of this variable is however ambiguous due to the somewhat sloppy formatting of the question. 4.1% of the respondents answered that they would start as entrepreneurs right after completing their studies whereas 14.9% answered that they would never start as entrepreneurs. However, the survey tells us that 85.1% of the students intend to become entrepreneurs at some point of their careers, of which 66,3% within 5 years of time and 25,8% within 3 years of time.. The distribution of the answers can be seen in the figure 10. The mean value of the answers was 2.41 in a 8-point Likert scale (from 0 to 7) indicating that the average starting point for entrepreneurial career would be approximately 4 years after completing the studies.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
when_start_as_entrepreneur	74	0	7	2,41	1,790
Valid N (listwise)	74				

Table 2. Timing of entrepreneurial intention: Mean value and standard deviation

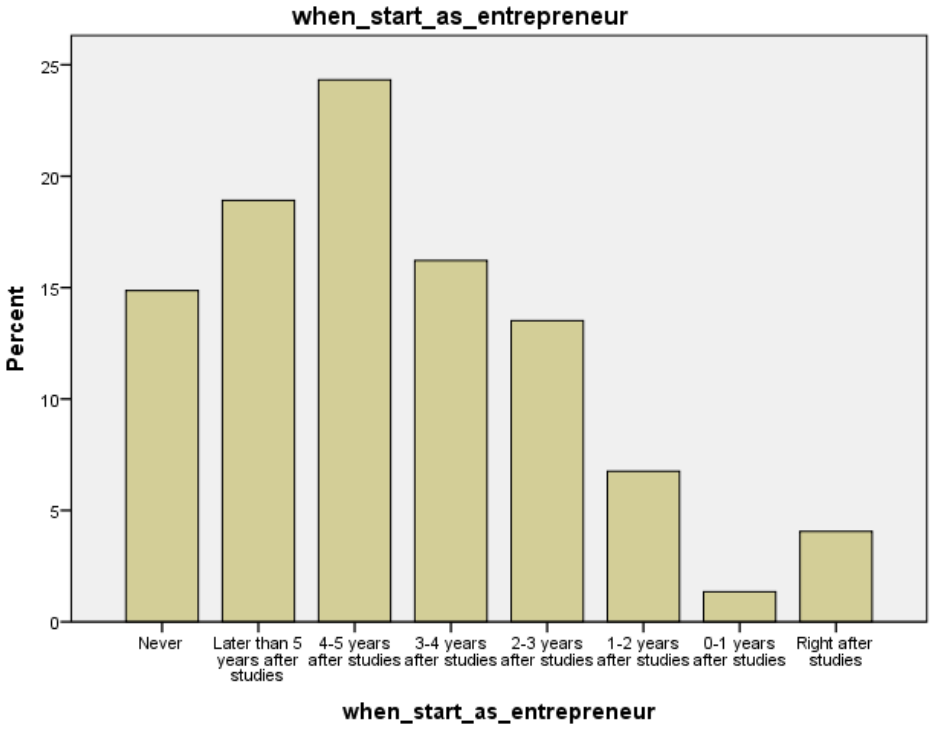

Figure 10. Timing of entrepreneurial intention: Distribution of answers

when_start_as_entrepreneur

	Frequency	Percent	Valid Percent	Cumulative %
Never	11	14,9	14,9	14,9
Later than 5 years after studies	14	18,9	18,9	33,8
4-5 years after studies	18	24,3	24,3	58,1
3-4 years after studies	12	16,2	16,2	74,3
2-3 years after studies	10	13,5	13,5	87,8
1-2 years after studies	5	6,8	6,8	94,6
0-1 years after studies	1	1,4	1,4	95,9
Right after studies	3	4,1	4,1	100,0
Total	74	100,0	100,0	

Table 3. Timing of entrepreneurial intention: Distribution of answers

8 RESULTS

A vast amount of data was collected in this study, 74 respondents answered into 70 questions. The research has provided lots of interesting information related to entrepreneurial intentions of Mechanical Engineering students of SAMK. We will first deal with the stated research hypotheses and then move on to the other results the data has provided.

8.1 Answers to research hypotheses

8.1.1 Hypotheses H1 and H2

Hypothesis H1 was that students who have higher self-efficacy towards their practical skills, have more entrepreneurial intentions. Hypothesis H2 was that students who have completed vocational school have higher self-efficacy towards their practical skills and thus, a higher entrepreneurial intention. It is assumed in this research that highness of entrepreneurial intention might appear an urge or willingness to start entrepreneurial career soon after studies. Therefore it is estimated that the higher the entrepreneurial intention is, the faster the individual is aiming to start as an entrepreneur.

To test the interaction between the two (H1) or three (H2) variables it would be ideal to run ANOVA (Analysis of Variance) test. To run ANOVA the values of variable “When start as entrepreneur” should be normally distributed. A test of normality was run with SPSS program and the results can be seen in the table 4. Both Kolmogorov-Smirnov and Shapiro-Wilk test show that the values of the variable are not distributed normally as the significance value of both tests is below 0.05.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
when_start_as_entrepreneur	,171	74	,000	,925	74	,000

a. Lilliefors Significance Correction

Table 4. Tests of Normality

ANOVA test cannot be performed reliably when values are not normally distributed. In Spearman's correlation analysis (Spearman's rho) the values of the variables do not have to be normally distributed. The Spearman's correlation analysis can be executed between three variables with ordinal values, or between ordinal and categorical values as it is the case here.

Part of the Mechanical Engineering (ME) students had attended to studies in vocational school and the other part of the students had not. The answers of attendance and non-attendance were coded into SPSS as the variable "vocational school". ME student's self-efficacy towards his practical skills was measured with four questions to which the students answered on 7-point Likert scale. The reliability of the five variables was tested with Cronbach's alpha analysis, and the result was 0.802 which indicates that the reliability is high enough, as it is greater than 0.70. (Nunnally 1978, Karjaluoto 2002). The answers received to these five questions were coded in to SPSS and transformed to a sum variable "SE_practical" (Self-efficacy towards practical skills). The Spearman's correlation analysis for variable "when to start as entrepreneur" was performed with the variables "vocational school" and "SE_practical". The results of this Spearman's correlation analysis can be seen in table 5.

Spearman's correlation analysis shows a positive correlation between attendance to vocational school education and timing of the entrepreneurial intention (variable "when start as entrepreneur") but the appeared correlation 0.215 is not statistically significant as the p-value 0.065 is greater than 0.05. The result is almost statistically significant, but even if the result would be statistically significant, the correlation would still be considered to be weak. The analysis also shows positive correlation between attendance to vocational school education and individual's self-efficacy toward his practical skills. These results indicate that with this sample population the hypothesis H2 has to be abandoned. The analysis however shows a positive and statistically significant correlation between vocational school education and self-efficacy toward one's practical skills. The correlation is weak (0.334) but statistically significant at p-level 0.01.

Correlations

Spearman's rho		entrepreneurial_intention	when_start_as_entrepreneur	vocational school	SE_practical
entrepreneurial_intention	Correlation Coefficient	1,000	,626**	,069	,351**
	Sig. (2-tailed)	.	,000	,560	,002
	N	74	74	74	74
when_start_as_entrepreneur	Correlation Coefficient	,626**	1,000	,215	,334**
	Sig. (2-tailed)	,000	.	,065	,004
	N	74	74	74	74
vocationalschool	Correlation Coefficient	,069	,215	1,000	,394**
	Sig. (2-tailed)	,560	,065	.	,001
	N	74	74	74	74
SE_practical	Correlation Coefficient	,351**	,334**	,394**	1,000
	Sig. (2-tailed)	,002	,004	,001	.
	N	74	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5. Spearman's correlation analysis between entrepreneurial intention, timing of the entrepreneurial intention, vocational school attendance and self-efficacy towards practical / technical skills

The variable "when start as entrepreneur" also includes the information whether there exists entrepreneurial intention at all. A new variable was coded into SPSS on basis of the answers to question "If you are going to start as an entrepreneur, when will you start as entrepreneur?" which resulted a classification variable "entrepreneurial intention". It has a value either 0 or 1. A Spearman's correlation analysis was executed to the variables "entrepreneurial intention", SE_practical and "vocational school". The sum variable SE_practical was formed in a similar manner to the sum variable SE_practical out of 15 variables. Cronbach's alpha for these 15 variables was 0.931.

Spearman's correlation analysis resulted a weak (0.351) but statistically significant correlation between entrepreneurial intention and self-efficacy towards one's practical skills. There was no correlation found between vocational school studies and entrepreneurial intention. Hypothesis H2 has therefore to be abandoned. Also hypothesis H1 has to be abandoned because the correlations between entrepreneurial intentions and self-efficacy towards practical skills (0.334 and 0.351) are so weak, as seen in table 5.

It is worth noticing that vocational school studies are not the only source of developing practical / technical skills. In this study ME students were asked about the sources of their practical skills in a 7-point Likert scale and the results can be seen in table 6. While learning of practical / technical skills in vocational school education achieved a mean value of 4.55, several other sources achieved higher values. Learning through working achieved highest mean value (5.65), and was followed by learning by doing alone (5.39), doing with relatives (5.10) and friends (5.08). Learning through studies in University of Applied Sciences achieved the lowest mean value of 2.96.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
hands_on_skills_learning_AMIS	20	2	7	4,55	1,669
hands_on_skills_learning_SAMK	74	1,0000	6,0000	2,958904	1,4659454
hands_on_skills_learning_friends	74	1,0000	7,0000	5,095891	1,5803969
hands_on_skills_learning_alone	74	1	7	5,39	1,488
hands_on_skills_learning_relatives	74	1	7	5,08	1,653
hands_on_skills_learning_hobby	74	1	7	3,15	1,928
hands_on_skills_learning_working	74	1	7	5,65	1,574
hands_on_skills_learning_groundschool	74	1	7	4,30	1,541
Valid N (listwise)	20				

Table 6. Sources of practical skills

8.1.2 Hypothesis H3

Hypothesis H3 was that students who have received entrepreneurship education, have higher entrepreneurial intention compared to those who have not received entrepreneurship education. According to data gathered in this research there is no correlation between student's attendance to entrepreneurship courses and timing of the intention to start as entrepreneur. This can be seen in the results table 7. Spearman's correlation analysis did not either find a correlation between entrepreneurial intention and attendance to entrepreneurial courses as seen in table 7. Therefore the research hypothesis H3 has to be abandoned.

Correlations

Spearman's rho		entrepreneurial_intention	when_start_as_entrepreneur	attendance_entrepreneurship_education
entrepreneurial_intention	Correlation Coefficient	1,000	,626**	,105
	Sig. (2-tailed)	.	,000	,374
	N	74	74	74
when_start_as_entrepreneur	Correlation Coefficient	,626**	1,000	,158
	Sig. (2-tailed)	,000	.	,180
	N	74	74	74
attendance_entrepreneurship_education	Correlation Coefficient	,105	,158	1,000
	Sig. (2-tailed)	,374	,180	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention and attendance entrepreneurship education

8.1.3 Hypothesis H4

Hypothesis H4 was that students who have attended business and management studies have higher self-efficacy towards their professional skills, and thus, higher level of entrepreneurial intention. The variable "SE_professional" represents ME student's total self-efficacy towards his professional skills, which consist of self-efficacy towards practical/technical skills, business/management skills, entrepreneurial skills and self-efficacy towards engineering skills. These three categories together with the variable measuring self-efficacy towards ME student's engineering skills were used to form a sum variable SE_professional which is a mean value of all the mentioned self-efficacy measures, added with ME students perception of his engineering skills. Cronbach's alpha for these variables was 0.806. The sum variable SE_professional represents the self-efficacy that ME students has towards his professional skills, including practical, technical, business, management and entrepreneurial skills. When executing Spearman's correlation analysis on variables entrepreneurial intention, attendance to courses that developing business skills, and self-efficacy towards professional skills as seen in table 8, there is a weak (0.284) statistically significant correlation between self-efficacy towards one's professional skills and entrepreneurial intention, and a weak (0.293) statistically significant correlation to timing of the intention to start as entrepreneur.

According to data gathered in this research there is no direct correlation between attendance to courses that develop business skills and entrepreneurial intention as seen in table 8. Hypothesis H4 can't therefore be approved. However, there is a weak (0.307) but statistically significant correlation between at-

tending to courses that develop business skills and self-efficacy towards one's professional skills, as seen in table 8.

Correlations

Spearman's rho		entrepreneurial_intention	when_start_as_entrepreneur	attendance_business_education	SE_professional
Entrepreneurial_intention	Correlation Coefficient	1,000	,626**	,127	,284*
	Sig. (2-tailed)	.	,000	,280	,014
	N	74	74	74	74
when_start_as_entrepreneur	Correlation Coefficient	,626**	1,000	,033	,293*
	Sig. (2-tailed)	,000	.	,782	,011
	N	74	74	74	74
attendance_business_education	Correlation Coefficient	,127	,033	1,000	,307**
	Sig. (2-tailed)	,280	,782	.	,008
	N	74	74	74	74
SE_professional	Correlation Coefficient	,284*	,293*	,307**	1,000
	Sig. (2-tailed)	,014	,011	,008	.
	N	74	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 8. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, self-efficacy towards professional skills, and attendance to education that develops business management skills

In total, the result of the research is that all the represented hypotheses have to be abandoned.

An important issue to be investigated in this research was whether individual's self-efficacy towards his skills has a correlation with the intention to start as entrepreneur. The self-efficacy variables used in the analysis are sum variables which were formed out of variables measuring individual's self-efficacy towards a certain skill. Self-efficacy was surveyed in three categories: entrepreneurial skills, business/management skills and practical/technical skills. In previous chapter we investigated the correlation between ME student's self-efficacy towards his professional skills and intention to start as entrepreneur. It has been recognized that ME student's skills self-efficacy towards his professional skills has a weak statistically significant correlation to entrepreneurial intention. Now we will have closer look at the subcategories of professional self-efficacy.

8.2 The impact of self-efficacy to entrepreneurial intention

Table 9 shows that ME student's self-efficacy towards his entrepreneurial skills has a weak (0.389) but statistically significant correlation to entrepreneurial intention and a weak (0.290) but statistically significant correlation to timing of the intention to start as entrepreneur. The sum variable SE_entrepreneur is a sum variable consisting of 9 variables. Cronbach's alpha for these 9 variables was 0.823.

Table 10 shows that ME student's self-efficacy towards his business / management skills has a weak (0.279) statistically significant correlation to timing of the intention to start as entrepreneur but there is no statistically significant correlation between self-efficacy towards business / management skills and entrepreneurial orientation.

Correlations

Spearman's rho		when_start_as_ entrepreneur	entrepreneurial _intention	SE_entrepreneur
when_start_as_ entrepreneur	Correlation Coefficient	1,000	,626**	,290*
	Sig. (2-tailed)	.	,000	,012
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,389**
	Sig. (2-tailed)	,000	.	,001
	N	74	74	74
SE_entrepreneur	Correlation Coefficient	,290*	,389**	1,000
	Sig. (2-tailed)	,012	,001	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 9. Spearman's correlation between entrepreneurial intention, timing of entrepreneurial intention and self-efficacy towards entrepreneurial skills

As seen in table 11, ME student's self-efficacy towards his practical / technical skills has a weak (0.351) statistically significant correlation to entrepreneurial intention, and a weak (0.334) statistically significant correlation to timing of the entrepreneurial intention.

Highest statistically significant correlation (0.394) was found between attendance to vocational school education and timing of the intention to start as entrepreneur, as seen in table 5. This is in line with the working hypothesis which originally gave the starting spark for this research.

As seen in table 12, there is no correlation between ME student's self-efficacy towards his engineering skills and entrepreneurial intention.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	SE_business
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,279*
	Sig. (2-tailed)	.	,000	,016
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,149
	Sig. (2-tailed)	,000	.	,206
	N	74	74	74
SE_business	Correlation Coefficient	,279*	,149	1,000
	Sig. (2-tailed)	,016	,206	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 10. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention and self-efficacy towards business / management skills

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	SE_practical
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,334**
	Sig. (2-tailed)	.	,000	,004
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,351**
	Sig. (2-tailed)	,000	.	,002
	N	74	74	74
SE_practical	Correlation Coefficient	,334**	,351**	1,000
	Sig. (2-tailed)	,004	,002	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 11. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention and self-efficacy towards practical / technical skills

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	SE_engineering skills
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,106
	Sig. (2-tailed)	.	,000	,367
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,139
	Sig. (2-tailed)	,000	.	,236
	N	74	74	74
SE_engineeringskills	Correlation Coefficient	,106	,139	1,000
	Sig. (2-tailed)	,367	,236	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 12. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention and self-efficacy towards engineering skills

8.3 The impact of locus of control to entrepreneurial intention

Hofer and Sandberg (1987) say that locus of control, a psychological variable, can be used to predict the likelihood that someone will seek to start a new venture. In this research data there was found a weak (0.295) but statistically significant correlation between internal locus of control and entrepreneurial intention, and also weak (0.247) but statistically significant correlation between internal locus of control and timing of the intention to start as entrepreneur, as seen in table 13. The variable Locus_internal was computed from variables that measured internal control towards surviving in the role of an entrepreneur and internal control towards being able to gather enough financing to start as entrepreneur. Also opposite questions were asked in the questionnaire to survey the tendency for external locus of control. The variable Locus_external was computed from variables that measured ME student's tendency to think that ability to gather enough financing or surviving in the role of an entrepreneur would be in control of someone else than himself. Spearman's correlation analysis found no correlation between external locus of control and entrepreneurial intention or timing of the intention to start as entrepreneur, as seen in table 13 These findings support the assumption of the theory of planned behavior, according to which individuals who intend to start as entrepreneur have internal locus of control instead of external locus of control.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	Locus_internal	Locus_external
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,247*	,007
	Sig. (2-tailed)	.	,000	,034	,955
	N	74	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,295*	,129
	Sig. (2-tailed)	,000	.	,011	,275
	N	74	74	74	74
Locus_internal	Correlation Coefficient	,247*	,295*	1,000	-,130
	Sig. (2-tailed)	,034	,011	.	,269
	N	74	74	74	74
Locus_external	Correlation Coefficient	,007	,129	-,130	1,000
	Sig. (2-tailed)	,955	,275	,269	.
	N	74	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, internal locus of control, and external locus of control

8.4 The impact of risk propensity to entrepreneurial intention

Many authors, for example Ferreira et. at (2012) say that propensity to take risk is often linked to entrepreneurs. It is therefore interesting to look at how risk taking propensity is correlated with timing of the intention to start as entrepreneur in the data of this research. As table 14 shows, there is a weak (0.287) statistically significant correlation between ME student's risk propensity and entrepreneurial intention, and a weak (0.319) statistically significant correlation between risk propensity and timing of the intention to start as entrepreneur.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	risk_tendency
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,319**
	Sig. (2-tailed)	.	,000	,006
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,287*
	Sig. (2-tailed)	,000	.	,013
	N	74	74	74
risk_tendency	Correlation Coefficient	,319**	,287*	1,000
	Sig. (2-tailed)	,006	,013	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 14. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention and risk-taking propensity

In figure 11 we can see how ME students answered to question how much there is risk included in working as entrepreneur, value 1 being very little and value 7 being very much. In figure 12 we can see how they answered to how much risk they feel working as an entrepreneur brings to their economical subsistence.

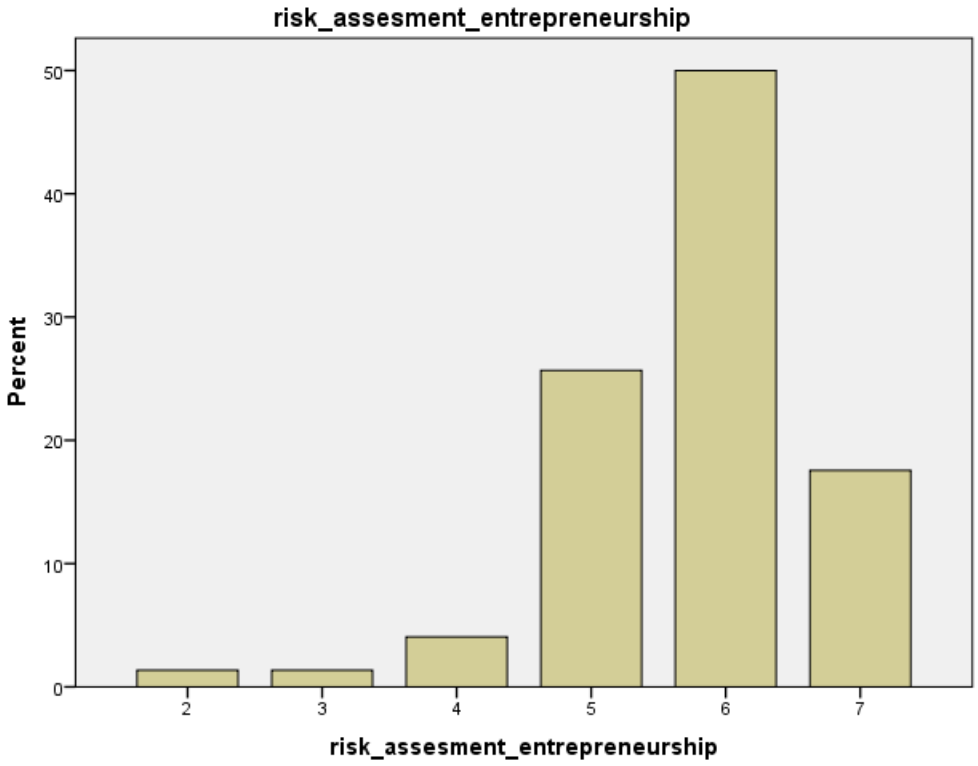

Figure 11. Risk assessment of entrepreneurial career choice

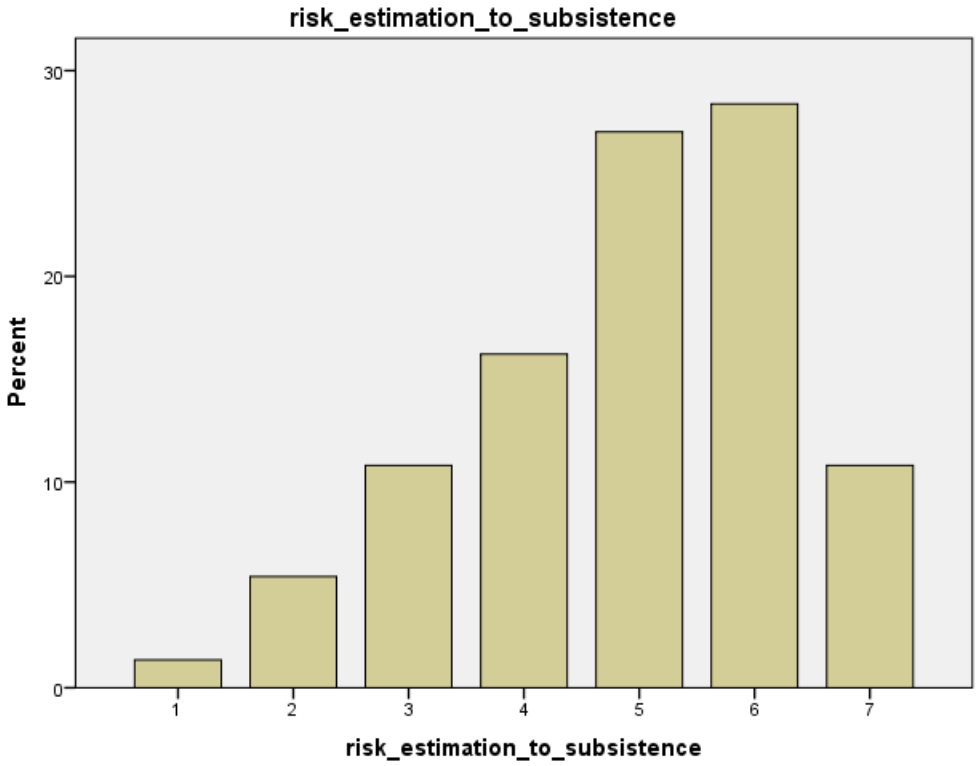

Figure 12. Risk estimation: The impact of entrepreneurial career choice to economical subsistence

8.5 The impact of tolerance for uncertainty and impact of tolerance for failure to entrepreneurial intention

Hofer and Sandberg (1987) say tolerance for ambiguity, here uncertainty, is one of those psychological variables that can be used to predict the likelihood that someone will seek to start anew venture. According to this research data there is no correlation between tolerance for failure and entrepreneurial intention, or between tolerance for failure and timing of the intention to start as entrepreneur, or between tolerance for uncertainty and entrepreneurial intention. But there exists a weak (0.266) statistically significant correlation between tolerance for uncertainty and timing of the intention to start as entrepreneur, as seen in table 15.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	tolerance_for_uncertainty	tolerance_for_failure
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,266*	,006
	Sig. (2-tailed)	.	,000	,022	,957
	N	74	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,124	,178
	Sig. (2-tailed)	,000	.	,294	,130
	N	74	74	74	74
tolerance_for_uncertainty	Correlation Coefficient	,266*	,124	1,000	,194
	Sig. (2-tailed)	,022	,294	.	,098
	N	74	74	74	74
tolerance_for_failure	Correlation Coefficient	,006	,178	,194	1,000
	Sig. (2-tailed)	,957	,130	,098	.
	N	74	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 15. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, tolerance for uncertainty, and tolerance for failure

8.6 The impacts of risk estimation and uncertainty estimation to entrepreneurial intention

According to this research data there is no correlation between ME student's risk estimation and entrepreneurial intention and no correlation between ME

student's uncertainty estimation and entrepreneurial intention. Therefore, even if the student sees entrepreneurship as risk entailing or entailing uncertainty, this has no effect on the student's entrepreneurial intention or to the timing of when to start as entrepreneur. However, as illustrated in table 16 there is a low (0.231) but statistically significant correlation between risk estimation and uncertainty estimation. It tells that those who see entrepreneurship as risk entailing, tend to see entrepreneurship also entailing uncertainty.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	risk_assesment_entrepreneurship	uncertainty_assesment_entrepreneurship
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	-,180	-,090
	Sig. (2-tailed)	.	,000	,126	,444
	N	74	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,009	-,022
	Sig. (2-tailed)	,000	.	,942	,854
	N	74	74	74	74
risk_assesment_entrepreneurship	Correlation Coefficient	-,180	,009	1,000	,231*
	Sig. (2-tailed)	,126	,942	.	,048
	N	74	74	74	74
uncertainty_assesment_entrepreneurship	Correlation Coefficient	-,090	-,022	,231*	1,000
	Sig. (2-tailed)	,444	,854	,048	.
	N	74	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 16. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, risk estimation, and ambiguity estimation

8.7 The impact of ability to gather financing to entrepreneurial intention

According Kerr and Nanda (2009) liquidity constraints, the difficulties in accessing the needed capital to start a business venture, are one of the biggest concerns impacting potential entrepreneurs around the world. Our research data does not support this assumption since there was not a statistically significant correlation between ME student's estimation of ability to gather financing

and entrepreneurial intention or timing of starting as entrepreneur. This result is seen in table 17.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	difficulties_in_raisingfinancing
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	-,196
	Sig. (2-tailed)	.	,000	,095
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,022
	Sig. (2-tailed)	,000	.	,854
	N	74	74	74
difficulties_in_raisingfinancing	Correlation Coefficient	-,196	,022	1,000
	Sig. (2-tailed)	,095	,854	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 17 Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, and difficulties in gathering financing

8.8 Impact of the need for independence

Brockhaus (1982) says that the need for independence has been recognized as a factor which may effectively distinguish successful entrepreneurs from the general population. It is therefore interesting to look data of this research from that point of view. The data of this research does not show correlation between the desire to work independently and entrepreneurial intention, as seen in table 18.

Correlations

Spearman's rho		when_start_as_entrepreneur	entrepreneurial_intention	desire_to_work_independently
when_start_as_entrepreneur	Correlation Coefficient	1,000	,626**	,082
	Sig. (2-tailed)	.	,000	,489
	N	74	74	74
entrepreneurial_intention	Correlation Coefficient	,626**	1,000	,197
	Sig. (2-tailed)	,000	.	,093
	N	74	74	74
desire_to_work_independently	Correlation Coefficient	,082	,197	1,000
	Sig. (2-tailed)	,489	,093	.
	N	74	74	74

**. Correlation is significant at the 0.01 level (2-tailed).

Table 18. Spearman's correlation analysis between entrepreneurial intention, timing of entrepreneurial intention, and desire to work independently

8.9 The impact of Campus to entrepreneurial intention

Entrepreneurial intentions among ME students at Satakunta University of Applied Sciences is almost identical at Pori and Rauma campuses. As it can be seen from table 19, 85.1% of ME students have entrepreneurial intentions, 84% at Rauma campus and 85,7% at Pori campus.

entrepreneurial_intention * Campus Crosstabulation

% within Campus

		Campus		Total
		Pori	Rauma	
entrepreneurial_intention	No	14,3%	16,0%	14,9%
	Yes	85,7%	84,0%	85,1%
Total		100,0%	100,0%	100,0%

Table 19. Entrepreneurial intention: Differences between campuses

Mean values of the timing of entrepreneurial intention were practically the same between those who study in Pori campus and those who study in Rauma campus. Standard deviation is high in the both groups, but even higher among the respondents from Rauma campus, as seen in table 20. The distribution of

the answers to the timing of entrepreneurial intention by the campus where the ME student is studying is seen in table 21.

Descriptive Statistics

Pori	N	Minimum	Maximum	Mean	Std. Deviation
when_to_start_ entrepreneur	49	,00	7,00	2,4082	1,68224
Valid N (listwise)	49				

Descriptive Statistics

Rauma	N	Minimum	Maximum	Mean	Std. Deviation
when_to_start_ entrepreneur	25	,00	7,00	2,4000	2,02073
Valid N (listwise)	25				

Table 20. Entrepreneurial intention and timing of entrepreneurial intention

when_start_as_entrepreneur * Campus Crosstabulation

% within Campus

		Campus		Total
		Pori	Rauma	
when_start_as_ entrepreneur	Never	14,3%	16,0%	14,9%
	Later than 5 years after studies	16,3%	24,0%	18,9%
	4-5 years after studies	24,5%	24,0%	24,3%
	3-4 years after studies	22,4%	4,0%	16,2%
	2-3 years after studies	10,2%	20,0%	13,5%
	1-2 years after studies	8,2%	4,0%	6,8%
	0-1 years after studies	2,0%		1,4%
	Right after studies	2,0%	8,0%	4,1%
Total		100,0%	100,0%	100,0%

Table 21. Timing of the entrepreneurial intention: Distribution of answers by campus

8.10 Single vs. team entrepreneurship

The respondents were also asked how pleasant it would be to start as a single entrepreneur, alone without any business associates. The mean value of pleasantness for starting alone was 4.16 on a 7-point Likert scale, as seen in table 23. Standard deviation is however high among the answers which can be seen from

the distribution of values in figure 16. There was one missing value in the answers of this question, which was replaced with the mean value of the variable in question, as suggested by Metsämuuronen (2000a). This missing value can be seen as value 4.1644 in figure 13. The distribution of the answers by the campus where the ME student is studying is seen in table 23.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
single_entrepreneur	74	1,0000	7,0000	4,164384	1,6303096
Valid N (listwise)	74				

Table 22. Pleasantness to start entrepreneurship alone

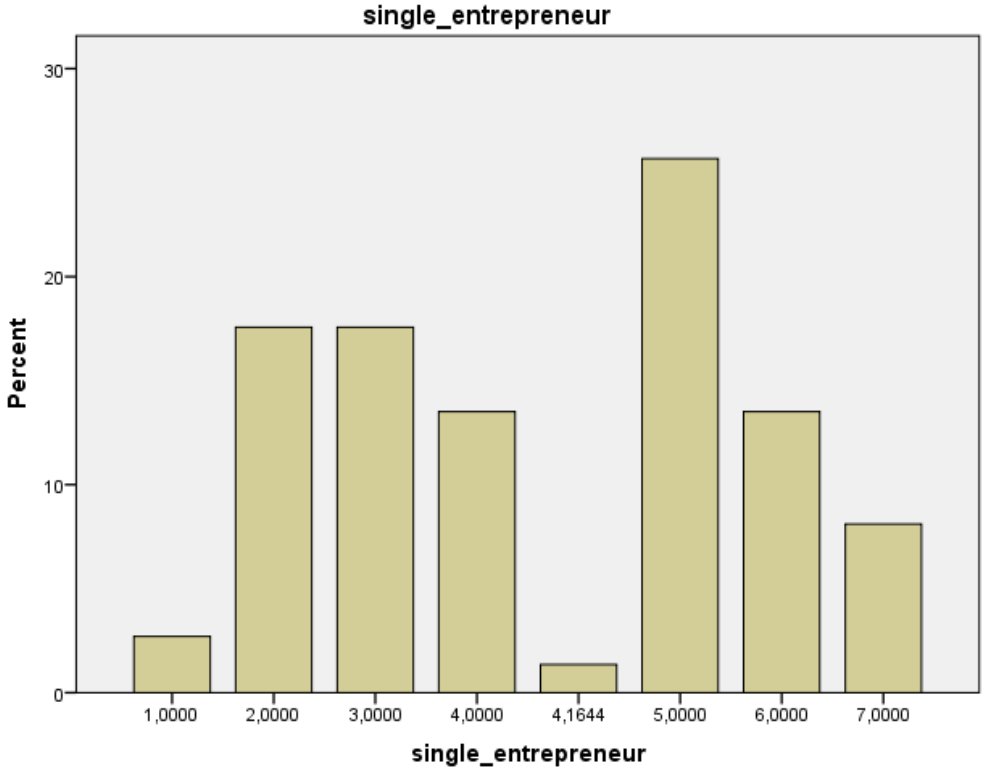

Figure 13. Pleasantness to start entrepreneurship alone: Distribution of answers

single_entrepreneur * Campus Crosstabulation

			Campus		Total
			Pori	Rauma	
single_entrepreneur	1,0000	Count	2	0	2
		% within Campus	4,1%	0,0%	2,7%
	2,0000	Count	9	4	13
		% within Campus	18,4%	16,0%	17,6%
	3,0000	Count	11	2	13
		% within Campus	22,4%	8,0%	17,6%
	4,0000	Count	2	8	10
		% within Campus	4,1%	32,0%	13,5%
	4,1644	Count	1	0	1
		% within Campus	2,0%	0,0%	1,4%
	5,0000	Count	13	6	19
		% within Campus	26,5%	24,0%	25,7%
	6,0000	Count	6	4	10
		% within Campus	12,2%	16,0%	13,5%
	7,0000	Count	5	1	6
		% within Campus	10,2%	4,0%	8,1%
Total		Count	49	25	74
		% within Campus	100,0%	100,0%	100,0%

Table 23. Pleasantness to start entrepreneurship alone: Distribution of answers by campus

The respondents were also asked how pleasant it would be to start team entrepreneurship, with business associates who have similar mindsets with the respondent. The mean value of pleasantness for starting entrepreneurship as a member of team was 5.64 on a 7-point Likert scale, as seen in table 24. Standard deviation is however high among the answers which can be seen from the distribution of values in figure 14. The distribution of the answers by the campus where the ME student is studying is seen in table 25.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
team_entrepreneur	74	1	7	5,64	1,320
Valid N (listwise)	74				

Table 24. Pleasantness to start entrepreneurship as a member of a team

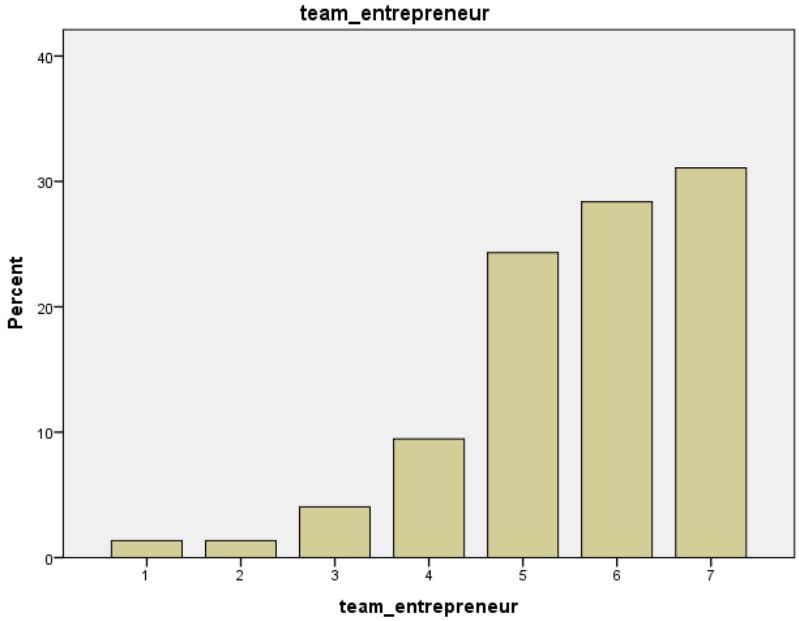

Figure 14. Pleasantness of starting team entrepreneurship: Distribution of answers

team_entrepreneur * Campus Crosstabulation

			Campus		Total
			Pori	Rauma	
team_entrepreneur	1	Count	1	0	1
		% within Campus	2,0%	0,0%	1,4%
	2	Count	0	1	1
		% within Campus	0,0%	4,0%	1,4%
	3	Count	3	0	3
		% within Campus	6,1%	0,0%	4,1%
	4	Count	3	4	7
		% within Campus	6,1%	16,0%	9,5%
	5	Count	12	6	18
		% within Campus	24,5%	24,0%	24,3%
	6	Count	15	6	21
		% within Campus	30,6%	24,0%	28,4%
	7	Count	15	8	23
		% within Campus	30,6%	32,0%	31,1%
Total		Count	49	25	74
		% within Campus	100,0%	100,0%	100,0%

Table 25. Pleasantness to start entrepreneurship as a member of team: Distribution of answers by the campus

8.11 Choice between unemployment and entrepreneurship

When asked if the student would rather be unemployed or start as an entrepreneur, the mean value of the answers was 4.99 on a 7-point Likert scale indicating that on average the ME students would rather start as entrepreneurs instead of remaining unemployed, as seen in table 26. Standard deviation is however high among the answers, which can be seen from the distribution of values in figure 15.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Unemployment vs. Entrepreneurship	74	1	7	4,99	1,787
Valid N (listwise)	74				

Table 26. Choice between unemployment and entrepreneurship

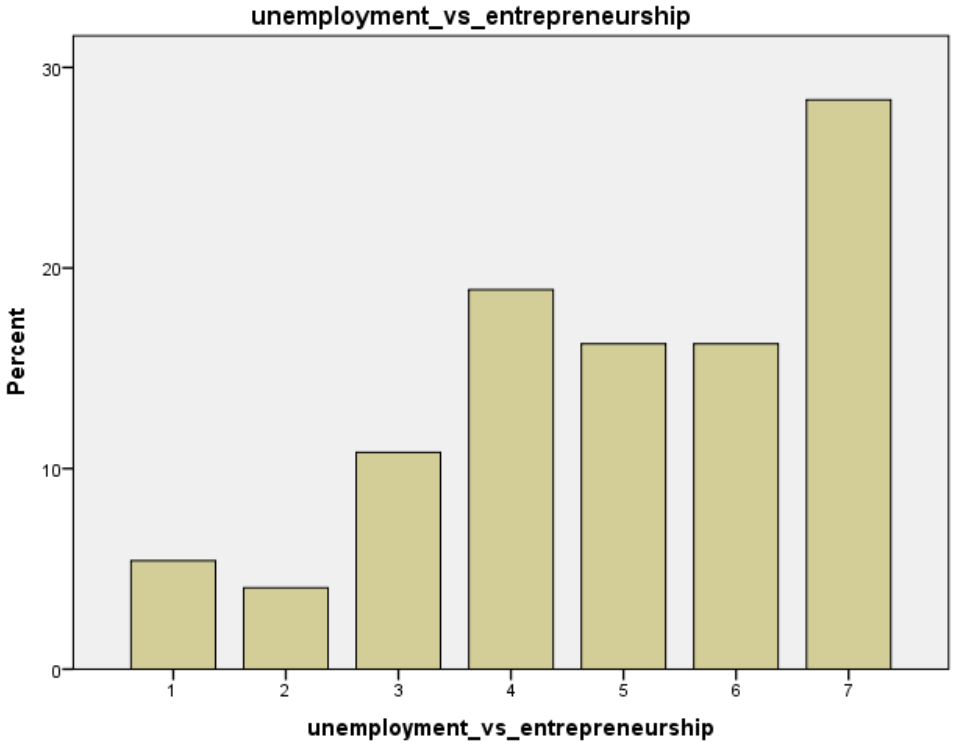

Figure 15. Choice between unemployment and entrepreneurship: Distribution of answers

8.12 Impact of the general economic trend

When asked how much the general economic trend affects to the student's willingness to start as entrepreneur, the mean value of answers was 4.45 on a 7-point Likert scale as seen in table 27. This indicates that general economic trend affects to the entrepreneurial career choice, but it does not dominate the decision. Standard deviation is however high among the answers, which can be seen from the distribution of values in figure 16.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Impact of general economic trend	74	1	7	4,45	1,554
Valid N (listwise)	74				

Table 27. Impact of general economic trend

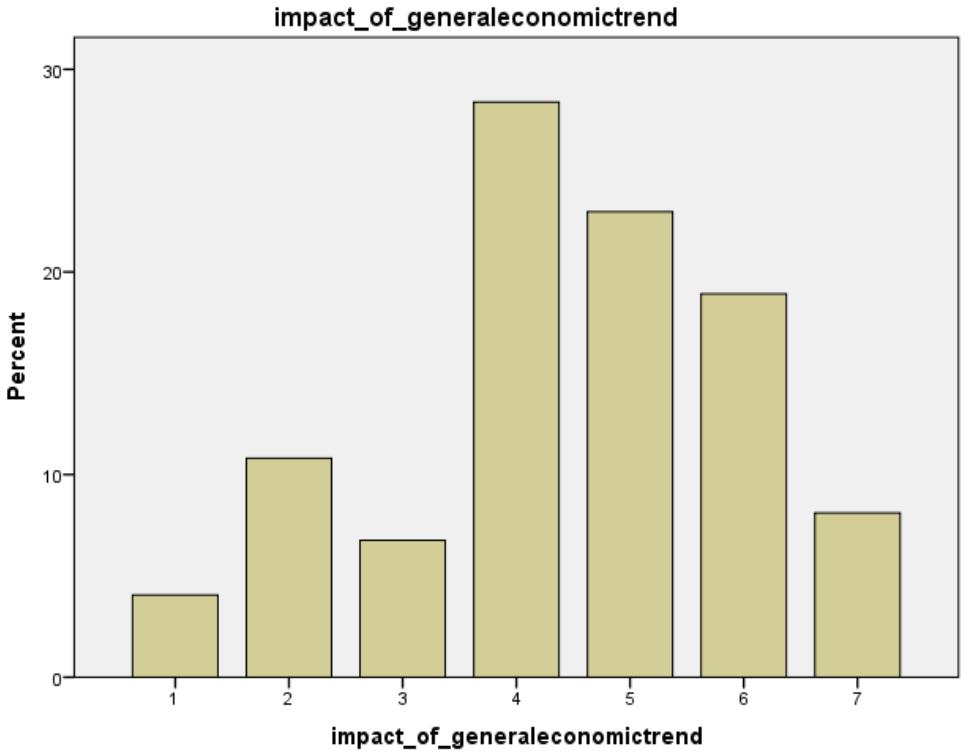

Figure 16. Impact of general economic trend to the decision to start as entrepreneur: Distribution of answers

8.13 Impact of starting money

When asked how much getting a starting money from government (770-1232eur / month over a period of 6-12 months, on average for 8 months) has impact on the desirability of starting as an entrepreneur the mean value of answers was 4.42 on a 7-point Likert scale as seen in table 28. This indicates that on average getting a starting money has some influence on the desirability of entrepreneurial career choice but the influence is moderate. Standard deviation is however high among the answers, which can be seen from the distribution of values in figure 17.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
impact_of_ startingmoney	74	1	7	4,42	1,535
Valid N (listwise)	74				

Table 28. Impact of starting money

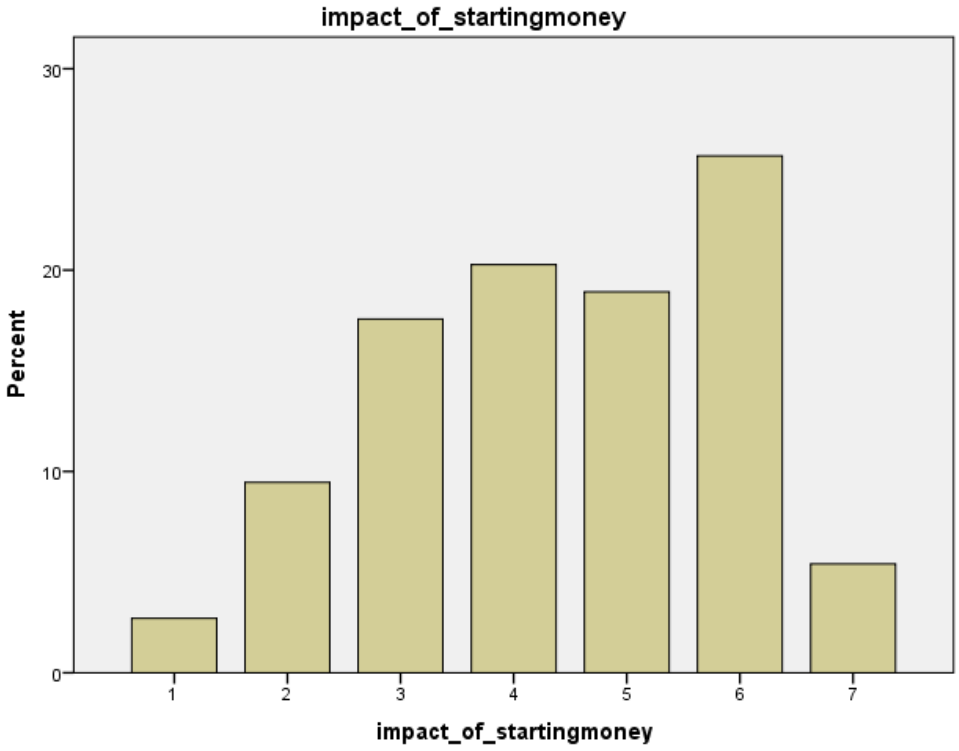

Figure 17. Impact of starting money to the decision to start as entrepreneur: Distribution of answers

8.14 Self-efficacy towards being successful as entrepreneur

When the respondents were asked how they believe they would succeed as entrepreneurs, the respondents were given a norm of a successful entrepreneur. This norm was divided in to two parts, 1) the business of a successful entrepreneur is profitable and 2) the business produces at least a monthly gross wage of 2488 eur for the entrepreneur.

Distribution of the answers is seen in figure 18. One respondent had no answer for this question, and thus the missing value was replaced with mean value of the variable in question, as suggested by Metsämuuronen (2000a). This answer is seen as value 4,6575 in figure 18.

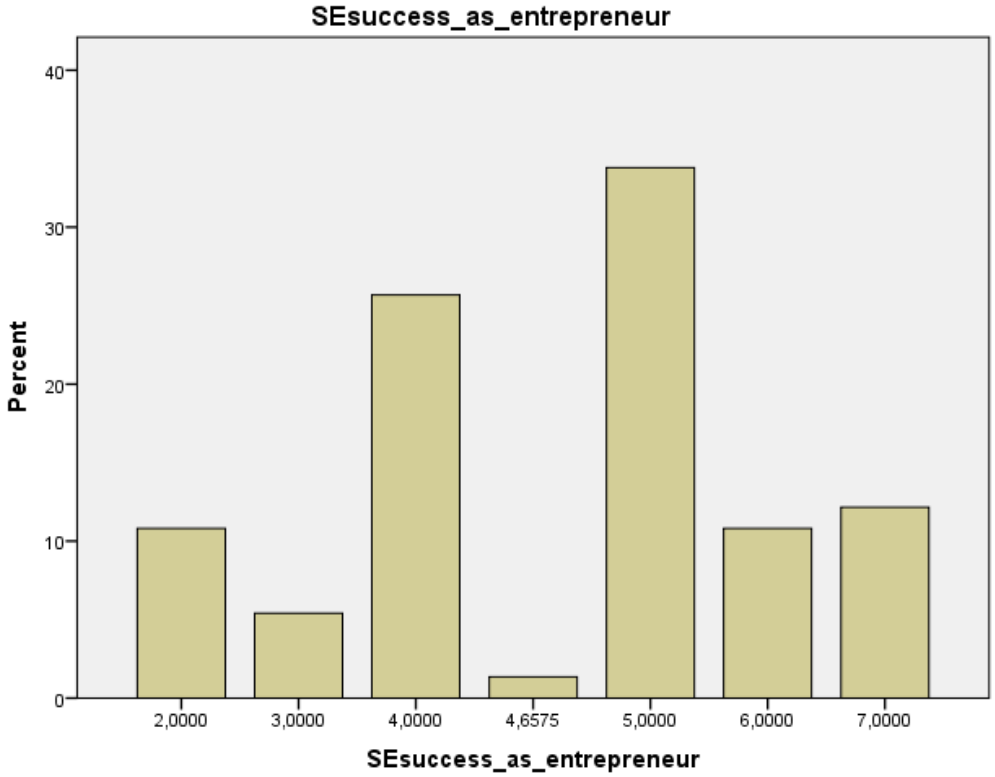

Table 18. Success estimation

9 CONCLUSIONS

This research revealed a striking and surprising result: 85,1% of the surveyed Mechanical Engineering students of Satakunta University of Applied Sciences have entrepreneurial intentions. This is a very high percentage, much higher than the results reported in other studies that have been investigating the entrepreneurial intentions of university students or students of universities of applied sciences. The results of Pori and Rauma campuses were very close to each other, 84% at Rauma and 85,7% at Pori.

This research tested the theory of planned behavior, especially its subpart, perceived behavioral control. Perceived behavioral control consists from two separate components, perceived self-efficacy and perceived controllability. In this research individual's self-efficacy towards his skills has a statistically significant but still quite low (0.279-0.351) correlation to the entrepreneurial intention of the individual. Also perceived controllability, internal locus of control, has a statistically significant but still quite low (0.295) correlation to the entrepreneurial intention of the individual. It was also found out that individual's risk taking tendency had a statistically significant but rather weak correlation with entrepreneurial intention (0.287) and with the timing of entrepreneurial intention (0.319). This finding is in line with the earlier research. Tolerance for uncertainty was found to have statistically significant but weak (0.266) correlation with the timing of entrepreneurial intention.

If the *attitudes* towards the behavior, starting as an entrepreneur, would have been studied in this research, the research would have provided more explanations to the high rate of entrepreneurial intention of the studied population. As the measures of perceived controllability did not explain adequately the high level of entrepreneurial intention, and subjective norm, according to earlier research, has been recognized to explain entrepreneurial intention quite poorly, the attitudes towards the behavior is the only category left that can provide the explanations. Unfortunately this subpart of the planned behavior theory was left unexplored in this research.

This research did however point out that self-efficacy towards practical skills has such explanation power that has not been identified in earlier studies.

Practical skills, or self-efficacy towards practical skills, have not been noticed as a predictor of entrepreneurial behavior in earlier research. In this research self-efficacy towards one's practical skills ranked the second best of all self-efficacy related measures. The highest self-efficacy related correlation in relation to entrepreneurial behavior was found between entrepreneurial intention and self-efficacy towards one's entrepreneurial skills (0.389). The second-highest self-efficacy related correlation in relation to entrepreneurial behavior was found between entrepreneurial intention and self-efficacy towards one's practical skills, being 0.351. Although the value (0.351) may be low but it is very close to the highest value, self-efficacy towards entrepreneurial skills, which are well-established and recognized in the earlier literature. This tells that individual's self-efficacy towards his *practical skills* shall be counted as one of the "must" indicators in future research.

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APPENDIX 1

Tässä tutkimuksessa selvitetään SAMK:in konetekniikan opiskelijoiden aikomuksia yrittäjäksi ryhtymisestä. Tutkimuksessa selvitetään myös opiskelijoiden käsityksiä omasta osaamisestaan koskien käsillä tekemisen taitoa, liiketoimintaosaamista ja yrittäjätaitoja.

Ympyröi vastausvaihdoista parhaiten näkemystäsi kuvaava numero asteikolla 1-7

tai ympyröi oikea väittämä (kyllä / en)

Merkitsethän vastauksen jokaiseen kysymykseen, se on tärkeää.

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1. Oletko opiskellut ammattikoulussa?

   Kyllä En

2. Oletko opiskellut lukiossa?

   Kyllä En

3. Kuinka vanha olet?

   _____ vuotta

4. Sukupuolesi

   Mies Nainen

5. Missä ryhmässä opiskelet? (Esim. NME13 Pori tai NME13 Rauma)

   _____

6. Oletko koskaan miettinyt yrittäjäksi ryhtymistä?

   Kyllä En

7. Aiotko ryhtyä yrittäjäksi heti opiskelun jälkeen?

   Kyllä En

8. Jos vaihtoehtona on työttömänä oleminen tai yrittäjäksi ryhtyminen, ryhdytkö mielummin yrittäjäksi vai oletko mielummin työttömänä?

olen mielummin työttömänä 1 2 3 4 5 6 7 ryhdyn mielummin yrittäjäksi

9. Kuinka paljon yleinen taloustilanne vaikuttaa haluusi ryhtyä yrittäjäksi?

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

10. Uskotko että sinulla olisi vaikeuksia saada kasaan yritystoimintaan tarvittava rahoitus?

erittäin vähän vaikeuksia 1 2 3 4 5 6 7 erittäin paljon vaikeuksia

11. Miten paljon arvioit tarvittavan rahoituksen kasaan saamisen olevan sinusta itsestäsi riippuvaista?

Erittäin vähän minusta itsestäni riippuvaista 1 2 3 4 5 6 7 erittäin paljon minusta itsestäni riippuvaista

12. Miten paljon arvioit tarvittavan rahoituksen kasaan saamisen olevan riippuvaista muista kuin itsestäsi?

erittäin vähän muista riippuvaista 1 2 3 4 5 6 7 erittäin paljon muista riippuvaista

13. Kuinka paljon starttirahan saaminen vaikuttaa haluusi ryhtyä yrittäjäksi?

Starttirahan suuruus on 770-1232 eur/kk 6-18 kuukauden ajan (keskimäärin 8kk ajan)

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

14. Miten hyvin arvioisit onnistuvasi yrittäjänä? Mieti tässä yrittäjänä menestymistä. Menestyneeksi yrittäjäksi katsotaan tässä tutkimuksessa henkilö, jonka yritystoiminta on voitollista ja tuottaa yrittäjälle vähintään 2488 euron bruttopalkan kuukaudessa.

erittäin huonosti 1 2 3 4 5 6 7 erittäin hyvin

15. Kuinka paljon arvioit yrittäjänä menestymisen olevan itse yrittäjästä riippuvaista?

Erittäin vähän yrittäjästä itsestään riippuvaista 1 2 3 4 5 6 7 erittäin paljon yrittäjästä itsestään riippuvaista

16. Miten arvioisit selviytyväsi yrittäjän roolissa toimimisesta? Mieti tässä omaa osaamistasi suhteessa yrittäjältä vaadittaviin ominaisuuksiin. Älä mieti sitä menestyykö yritys vai ei.

erittäin huonosti 1 2 3 4 5 6 7 erittäin hyvin

17. Miten paljon arvioit yrittäjän roolissa selviytymisen olevan sinusta itsestäsi riippuvaista?

erittäin vähän minusta itsestäni riippuvaista 1 2 3 4 5 6 7 erittäin paljon minusta itsestäni riippuvaista

18. Miten paljon arvioit yrittäjän roolissa selviytymisen olevan riippuvaista muista kuin itsestäsi?

erittäin vähän muista riippuvaista 1 2 3 4 5 6 7 erittäin paljon muista riippuvaista

19. Kuinka voimakkaaksi arvioit halusi menestyä?

erittäin matalaksi 1 2 3 4 5 6 7 erittäin korkeaksi

20. Kuinka mielelläsi ryhtyisit yrittäjäksi yksin, ilman yhtiökumppaneita?

erittäin vastahakoisesti 1 2 3 4 5 6 7 erittäin mielelläni

21. Kuinka mielelläsi ryhtyisit yrittäjäksi jos saisit kasatuksi sopivan samanhenkisen tiimin henkilöitä, jotka olisivat yhtiökumppaneitasi?

erittäin vastahakoisesti 1 2 3 4 5 6 7 erittäin mielelläni

22. Jos ryhdyt yrittäjäksi, milloin aiot ryhtyä yrittäjäksi? (merkitse rasti sopivaan kohtaan)

__ heti opiskelun jälkeen

__ 0-1 vuotta opiskelun päättymisen jälkeen

__ 1-2 vuotta opiskelun päättymisen jälkeen

__ 2-3 vuotta opiskelun päättymisen jälkeen

__ 3-4 vuotta opiskelun päättymisen jälkeen

__ 4-5 vuotta opiskelun päättymisen jälkeen

__ myöhemmin

__ en aio ryhtyä yrittäjäksi koskaan

23. Kuinka riskialttiiksi koet yrittäjäksi ryhtymisen toimeentulosi kannalta? Yrittäjä voi saada työttömyyskorvausta vasta 4 kuukautta sen jälkeen kun yritystoiminta on loppunut. Yrittäjällä sairaspäivärahan omavastuuaika on 4 päivää.

erittäin vähän riskejä sisältäväksi 1 2 3 4 5 6 7 erittäin riskialttiiksi

24. Kuinka mielelläsi otat elämässä riskejä?

erittäin vastahakoisesti 1 2 3 4 5 6 7 erittäin mielelläni

25. Kuinka paljon yrittäminen mielestäsi sisältää riskejä?

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

26. Kuinka hyvin mielestäsi siedät epävarmuutta?

erittäin huonosti 1 2 3 4 5 6 7 erittäin hyvin

27. Kuinka paljon epävarmuutta yrittäjäksi ryhtyminen mielestäsi sisältää?

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

28. Kuinka hyväksi arvioit kykysi mukautua uusiin tilanteisiin?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

29. Kuinka hyvin mielestäsi siedät epäonnistumisia?

erittäin huonosti 1 2 3 4 5 6 7 erittäin hyvin

30. Kuinka voimakkaaksi arvioit halusi työskennellä itsenäisesti?

erittäin matalaksi 1 2 3 4 5 6 7 erittäin korkeaksi

31. Oletko osallistunut liiketoimintaosaamista kehittäville kursseille ammattikoulussa, lukiossa tai ammattikorkeakoulussa?

Kyllä En

32. Oletko osallistunut yrittäjyyden opintojaksoille ammattikoulussa, lukiossa tai ammattikorkeakoulussa?

Kyllä En

33. Oletko osallistunut SAMK:in yrityskiihdyttämön toimintaan?

Kyllä En

34. Kuinka hyväksi arvioit insinööriosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

35. Kuinka hyväksi arvioit tuotekehitysosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

36. Kuinka hyviksi arvioit tekniset kädentaitosi? Teknisillä kädentaidoilla tarkoitetaan käsillä tekemisen taitoa

erittäin huonoiksi 1 2 3 4 5 6 7 erittäin hyviksi

37. Kuinka hyvä olet käyttämään käsityökaluja? Esim. metallin käsittely kulmahiomakoneella, metallin hitsaaminen, puun höyläämineen sähköhöylällä, elektroniikkakomponenttien juottaminen piirilevyyn, tms.

erittäin huono 1 2 3 4 5 6 7 erittäin hyvä

38. Kuinka hyvä olet käyttämään konepajan tyypillisiä tuotantolaitteita? Esimerkiksi metallisorvia tai numeerisesti ohjattua jyrsinkonetta?

erittäin huono 1 2 3 4 5 6 7 erittäin hyvä

39. Kuinka hyvä olet käyttämään teknisiä suunnitteluohjelmistoja? Esim. Auto CAD, SolidWorks, FeatureCam, Fluidsim

erittäin huono 1 2 3 4 5 6 7 erittäin hyvä

40. Kuinka riittäväksi arvioit teknisten kädentaitojen opettamisen SAMK:issa?

erittäin riittämättömäksi 1 2 3 4 5 6 7 erittäin riittäväksi

41. Oletko osallistunut johonkin konetekniikan opiskelijaprojekteista?

Kyllä En

42. Kuinka riittäväksi arvioit kädentaitojen opettamisen ammattikoulussa?

erittäin riittämättömäksi 1 2 3 4 5 6 7 erittäin riittäväksi

___ en ole suorittanut ammattikouluopintoja

43. Mieti missä olet oppinut käden taitoja ja vastaa alla oleviin kohtiin. Kuinka paljon olet oppinut teknisiä käden taitoja alla mainituissa yhteyksissä?

a) ammattikouluopinnoissasi

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

___ en ole opiskellut ammattikoulussa

b) ammattikorkeakouluopinnoissasi

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

c) kavereiden tms. kanssa yhdessä tehden ja opetellen

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

d) itse yksin tehden ja opetellen

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

e) vanhempani, sukulaisen tms. henkilön kanssa hänen ohjauksessaan

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

f) harrastukseni kautta ohjaajan ohjauksessa

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

g) kesätöiden tai muun työnteon kautta

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

h) peruskoulussa teknisen työn tunneilla

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

44. Kuinka paljon yrittäjä mielestäsi tarvitsee kädentaitoja?

erittäin vähän 1 2 3 4 5 6 7 erittäin paljon

45. Kuinka riittäviksi arvioit kädentaitosi yrittäjäksi ryhtymisen kannalta?

Erittäin alhainen 1 2 3 4 5 6 7 erittäin korkea

46. Kuinka hyväksi arvioit myyntiosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

47. Kuinka hyväksi arvioit markkinointiosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

48. Kuinka hyväksi arvioit budjetoinnin ja rahoituslaskelmien tekemisen osaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

49. Kuinka hyväksi arvioit verosuunnitteluosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

50. Kuinka hyväksi arvioit liiketoiminnan suunnittelun ja kehittämisen osaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

51. Kuinka hyväksi arvioit projektinjohtamisosaamisesi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

52. Kuinka hyväksi arvioit ihmissuhdetaitosi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

53. Kuinka hyväksi arvioit viestintäosaamisesi? (kirjoitusviestintä ja puheviestintä)

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

54. Kuinka hyväksi arvioit kykysi tunnistaa liiketoimintamahdollisuuksia?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

55. Kuinka korkeaksi arvioit kykysi venyttää voimavarasi äärimmilleen työnteossa?

erittäin matalaksi 1 2 3 4 5 6 7 erittäin korkeaksi

56. Kuinka korkeaksi arvioit halusi venyttää voimavarasi äärimmilleen työnteossa?

erittäin matalaksi 1 2 3 4 5 6 7 erittäin korkeaksi

57. Kuinka hyväksi arvioit innovaatiokykysi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

58. Kuinka hyväksi arvioit organisoimistaitosi?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

59. Kuinka hyväksi arvioit kykysi priorisoida asioita?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

60. Kuinka hyväksi arvioit kykysi tehdä päätöksiä?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

61. Kuinka hyväksi arvioit kykysi johtaa liiketoimintaa?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

62. Kuinka hyväksi arvioit kykysi johtaa muita ihmisiä?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

63. Kuinka hyväksi arvioit kykysy innostaa muita ihmisiä?

erittäin huonoksi 1 2 3 4 5 6 7 erittäin hyväksi

Kiitos vastauksistasi!

Tarkista vielä että olet vastannut jokaiselle sivulle