Developing an assessment measure for enhancing entrepreneurship education through a metacognitive approach

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This thesis follows discussion among scholars about the need to enhance the level of metacompetencies in students, facilitating problem-solving, self-regulation and the ability to monitor thinking and increase success in terms of employability on the labour market. Metacompetencies in students, including skills and the knowledge how to use them and when and why to use them, also contribute to the abilities necessary for learning to learn. In doing so, metacompetencies improve student learning through facilitating metacognition, metaaffection and metaconation within teaching. Thereby entrepreneurship education can make a significant contribution, as one of the goals of entrepreneurship programmes is to instil in students the importance of learning and developing metacompetencies that enhance their preparedness for an enterprising life.

This thesis focuses more on metacognition in a person and finding ways to support the development of metacognitive abilities in students in the context of learning in universities. The aim of the current thesis is to contribute to the development of an assessment instrument for entrepreneurship education in universities with a new approach to developing student metacompetencies that foster enterprising and entrepreneurial behaviour. The empirical research aims to reveal aspects of entrepreneurship education that contribute more to the development of metacognitive abilities and entrepreneurship competencies in students. The thesis is based on four interconnected research papers, addressing the following research tasks:

Task 1: Developing a new approach to evaluating entrepreneurship education at university

Task 2: Developing a measurement instrument to capture the level of metacognition in students

Task 3: Assessing the impact of entrepreneurship education on the metacognitive abilities and awareness of different groups of students

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Task 4: Enhancing entrepreneurship education for engineering students to increase their metacognitive abilities and employability

Task 5: Developing a model of enterprising and entrepreneurial competencies with the inclusion of metacompetencies for individuals in studies.

The current study presents a new approach to assessing entrepreneurship education at university based on changes in the metacognitive abilities of students. The research is based on the Generalized Measure of Adaptive Cognition (GMAC; Haynie, 2005) measurement instrument tested on a sample of students studying different non-economic disciplines.

The theoretical and methodological contribution of the thesis involves development of a new approach to assessing the impact of entrepreneurship education. Furthermore, a Measure of Metacognitive Awareness (MMA) assessment instrument has been developed. In addition, a model of metacompetencies in entrepreneurship education has been developed. While the model emphasizes metacognition and metacognitive awareness, it provides a foundation for further research regarding the other components of metacompetencies.

The practical contribution of the thesis includes identification of heterogeneity in students in terms of two extreme groups with higher and lower levels of metacognition. Differences have also been presented between students based on study discipline and gender, making it possible to provide evidence of different levels of metacognition. The author has also identified weaknesses in student metacognition and suggested how to improve entrepreneurship education in the future. Aside from this, the MMA measurement instrument helps to widen the set of tools for assessing metacognition.
A cost optimizing model for IT security

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Nowadays it is impossible to manage any business effectively without information systems. IT has become ubiquitous and practically all companies have to view IT as a common, yet highly critical, resource to their success. However, common resources generally do not provide any substantial competitive advantage. Therefore, the new rules for IT management are to spend less and to focus on lowering residual risks.

As a result, all organizations have to be optimal in IT and IT Security. Competitive advantage from IT is ensured mainly by the price and security of IT and its impact on the net cost of the service(s) and product(s) provided by the company.

This thesis describes the development of a graph-based Graded Security Model for IT Security and the cost optimization software prototype called Graded Security Expert System. This is a new and dynamic decision support system that allows IT and IT Security management to make reasoned urgent managerial decisions based on calculated values of interest – the maximum possible IT Security effectiveness or minimum IT Security Total Costs as a function from the IT/IT Security Budget in a given budget range. A Graded Security Model is proposed, which binds security measures with their costs and security effectiveness. In addition, the Graded Security Expert System (a software tool/utility) is proposed, in order to realize bi-objective optimization to calculate the Pareto-optimal curve for IT security costs and security level achieved – providing information to managers in visual and easily understandable form.

The GS Model and the GS Expert System will allow IT Security experts to customize IT Security measures to meet their specific requirements in a way that is optimal for their organization. It will also be easier to justify security expenses to management - i.e. the gap between managers and IT Security experts can be substantially narrowed. GSM/GSES can be used as a decision support tool for IT governance – to make justified decisions about future IT security investments in order to achieve optimal security, i.e. to achieve the required or optional security level for the minimum total cost. In short, this approach saves money. That is, Decision Support Systems (such as ours) could help management to make

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better management decisions and thereby provide a competitive advantage to the institution.

However, GSES is also suitable for any business process optimization, if:
• able to describe a corresponding graph-based business process model and
• the sub-processes can be described and implemented with grades, and if the costs and effectiveness values of grades can be defined.

**Keywords:** IT security, IT Security graph-based model, Graded Security Model, Graded Security Expert System, IT security costs optimization.
Measurement of organizational learning of business schools

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This thesis is based on five independent research papers, which are connected by a common theme - organizational learning of business schools. The research papers focus on three aspects of organizational learning. The first aspect relates to the organizational learning rate of business schools and its comparison with the average learning rate of business organizations and of Estonian universities using Watkins and Marsick’s measurement instrument (DLOQ). The second aspect is devoted to how to measure the organizational learning rate of business schools as specific organizations and development of the new special BS learning rate measurement instrument (BSLOQ). The third aspect is about measuring the learning rate of business schools worldwide and its dependence on various characteristics of business schools using the new special business school learning rate measurement instrument elaborated by the author.

Watkins and Marsick’s measurement instrument, DLOQ, which was used in the first and second research paper, was suitable for comparing the learning rate of universities/business schools to those of other business organizations, as well as departments of other higher schools which have a different market participation rate. However, it is not specific enough for studying the organizational learning of business schools and comparing business schools’ learning rates. The author went deep into the theoretical aspects of the area and special literature and found everyday practical management to reveal that business schools have many specific characteristics which the questionnaire used by Watkins and Marsick does not measure.

On that ground the author worked out a special BS learning rate measurement instrument (BSLOQ). She replaced the characteristics in Watkins and Marsick’s questionnaire on the basis of the survey conducted by her. She did not significantly change the structure and hierarchic setup of Watkins and Marsick’s questionnaire since the objective was not to make a completely new questionnaire but to modify Watkins and Marsick’s questionnaire to make it more suitable for measuring BSs as learning organizations. The new characteristics which

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reflect the specific character of business schools were developed on the basis of research on universities and business schools as organizations; the mission, management and organizational structure of a business school were specifically reckoned with. As a result, the author provided 19 new specific characteristics for measuring BSs’ learning rate and on the basis of these drafted a new questionnaire that reflects the specific features of business schools. The new special business school learning rate measurement instrument, BSLOQ, complies with the structure of Watkins and Marsick’s questionnaire: it consists of three levels, which in turn are divided into 7 dimensions and 45 characteristics addressing all learning aspects of BS as organizations.

Using the new special BS learning rate measurement instrument the author measured the learning rate of 105 business schools in 44 countries all over the world. The average learning rate of business schools surveyed was 4.62 on a 6-point scale, while the average rates of individual characteristics varied from 3.99 to 5.09. The characteristics that received the least points were from several dimensions, which enabled the conclusion that the organizational learning weaknesses of BSs are not related to one or a couple of specific aspects of learning. However, a more detailed analysis of the characteristics shows a need to further develop team learning abilities and skills, as well as to improve the ability to create a system to capture and transform learning and knowledge. Information on the BS learning rate would help, in the opinion of the author, to analyse and improve BSs as organizations and as a result increase their global competitiveness.
Differences in psychological contracts in Estonia: the role of individual and contextual factors

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Changes in the field of work have changed the traditional system of industrial relations, and traditional understandings are less able to explain contemporary employment relations and behavior in organizations. Different frameworks are needed to explore these emerged relationships. The concept of psychological contracts gained increasing popularity in the early 1990s and was used to describe, analyze and explain the consequences of these changes in organizational and work contexts. The psychological contract seeks to go beyond the limitations of the legal contract of employment and instead considers some of the subjective and normative elements associated with people management (Arnold, 1996).

The significance of psychological contracts for employers and organizations lies in the fact that the quality of the psychological contract is determined by organizational leadership and human resource practice, rather than its workforce, as employers rather than employees are in a dominant and advantageous position in designing and developing working conditions and employment relationships.

In this thesis employment relations were investigated through psychological contracts at the individual level between employer and employee. This approach permits one to explore and compare the implicit and informal aspects of the employment relationship of both parties. Informal understandings of employment relations usually take the form of perceived obligations (which are the heart of psychological contracts) with strong normative implications about appropriate behavior.

This thesis sets out to explore the psychological contracts of Estonian employees in the changed world of work. The main objective of this research was to explore the differences in psychological contracts of Estonian employees and to find the factors that cause these differences and shape psychological contracts.

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The theoretical model used in this study was feature-oriented and psychological contracts were measured and compared over six discrete dimensions which cover changes in employment relations and also include traditional understandings and expectations. Feature orientation captures more general perceived obligations.


Two studies were conducted to achieve the objective. In the first study, psychological contracts were investigated from the employee perspective. Research focused on control variables to assess the independent impact of these variables on the formation of individual psychological contracts. It is important to collect information about the features and impact on psychological contract obligations of individual background and context factors, as this information may help managers make decisions about employing persons and consider to what extent they seek arrangements that are mutually beneficial to both employees and organizations.

The second study explored psychological contracts from both the employee’s and the employer’s perspectives. This is important since employers’ assumptions about employees’ and employers’ obligations affect how the workers in an organization are treated.

The findings of the study revealed the importance of position (work status) in an organization in shaping employees’ psychological contracts. The biggest differences in psychological contracts were revealed between work status groups. Lower-skilled workers showed the most different pattern of employee and employer obligations, which means that they relate differently to the organization from other employees. The second important fact is that work values and job involvement have a substantial influence on the strength of employee obligations. The explanatory power of work values and job involvement in explaining variances was relatively high in employee obligations and low in employer obligations. These findings have two implications. First, it is important to understand how psychological contracts are formed, the roles of pre-employment factors and the information and feedback employees get in their current employment relationship. The nature of one’s work is important to consider. The second implication concerns how these different psychological contracts are managed. To get the desired contributions from their employees, employers must provide appropriate inducements. Without knowing the preferred psychological contracts of employees, it is not easy for managers to know what kinds of inducement will influence employees to perform in the desired way.

The third issue to be aware of is the possibility that employee expectations in regard to employer obligations are more influenced by broader social and economic factors, which are difficult if not impossible for organizations to control. This finding has an important implication for human resource practices that should include inducements valued by wider social beliefs/values but choices should be made based on organizations’ employee-organization relationship strategies.
The second study finding was that managers’ own psychological contracts influence evaluation of an employer’s psychological contracts with employees. The latter causes big differences in psychological contracts between lower-skilled workers, specialists and managers groups as employer representatives and as employees. This incongruence in psychological contracts has implications for employment relationships.

**Keywords:** employment relationship, psychological contract, employee and employer obligations, the state of psychological contracts, managers as representatives of the organization.
Assessment of the contribution of safety knowledge to sustainable safety management systems in Estonian SMEs

Marina Järvis

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The thesis is available digitally at http://digi.lib.ttu.ee/i/?952
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This research focuses on safety management challenges within small and medium-sized manufacturing enterprises (SMEs) in Estonia. A status picture of safety culture and safety knowledge, interrelationships between safety management systems and organizational factors are presented. In this thesis a safety management system (SMS) is a key concept, which plays a vital role in the success of a manufacturing organization.

There is a critical and essential link between safety culture and safety management systems (SMS) through shared values and beliefs that guide behavior patterns and health and safety activities in the organization. Despite growing interest in knowledge management (KM) studies, only a few studies have been conducted in the field of occupational health and safety (OH&S); furthermore, relatively little is known about how organizations influence and deal with the formation of safety culture with respect to KM.

The aim of this doctoral thesis is to contribute to enhanced understanding of the role and importance of knowledge management to safety management systems as a tool for improving safety culture in Estonian SMEs. The thesis is a collection of seven original publications. The study scrutinizes safety KM at enterprise and state levels from the perspective of safety culture.

RESEARCH METHODOLOGY
The current research is exploratory and aims to provide an understanding of contemporary SMSs in organizations. It discovers and captures realities about SMSs within the context of industrial SMEs by focusing on safety culture elements. Inductive research was conducted using qualitative case study approaches to explore the issues studied based on social constructivism. Since OH&S is a multidisciplinary and complex field embracing organizational studies and applied research, the present study applied triangulation forms related to data (cross-checking information by using multiple empirical sources), to multiple methods of data collection (mixed methods) and data analysis (several researchers examined the materials).

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MAIN RESULTS AND CONTRIBUTIONS

The main contribution of the study is a developed and empirically tested innovative conceptual Model of Safety Culture with Knowledge Management Dimensions that incorporates both tacit and explicit safety knowledge and understanding based upon “Communities of Practice (CoP)”. The author emphasizes that two main factors are essential in the process of managing safety knowledge and organizational learning for strengthening and enhancing SMS: development of a CoP (enables learning and transmitting practical safety knowledge and, thus, collective learning) and a supportive and harmonized safety culture where knowledge-sharing is valued by everyone in the organization. The thesis research sheds new light on the existing understanding of the current OH&S system and on the changes occurring in this field in the context of Estonian accession to the EU. The dissertation provides conceptual clarification of the role of KM in the field of OH&S.

The dissertation contributes important empirical evidence on how SMEs address OH&S. Differences in assessment between ‘formal’ safety and ‘real’ safety in Estonian SMEs indicate some important safety flaws and attention is drawn to contextual variables in the development of SMS and improving safety culture. Another important contribution of the thesis consists in providing conceptual clarification of incorporated conflict management as a learning instrument and its possible effect on safety culture and for knowledge exchange. In addition, the dissertation contributes to theory by opening new research perspectives in the field of SMS and safety research, especially on the management of psychosocial risk, as well as for health and safety promotion within enterprises. The present dissertation has also made two major contributions to the existing methodology for evaluation of safety culture.
Mobile phone based data in human travel behaviour studies: new insights from a longitudinal perspective

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Defended on December 10, 2013 at the University of Tartu.
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Our understanding of individual travel behaviour in space and time has been a constant subject since Hägerstrand (1970), and has been thoroughly examined in the short-term (i.e., 1–3 days) perspective. However, human travel behaviour for prolonged time horizons has not been studied extensively. This is mainly due to the inadequacy of available data collection methods and a predominant focus on daily travel behaviour, such as the home-work link. In light of societal developments in the age of the “mobilities turn” (Urry, 2000), initial indications of different temporal rhythms of human travel behaviour (Schönfelder and Axhauusen, 2010) and acknowledging the importance of human spatial mobility (Urry, 2007; Kwan, 2013), there is a growing need to fill research gaps in terms of human travel behaviour in the longer perspective.

The aim of this dissertation was threefold and sought to make conceptual, methodological and empirical contributions. First, one aim was to complement existing methodology for data collection and measurement by conceptualising the identification and measurement of spatial characteristics of travel behaviour and using novel mobile phone based CDR data. The proposed methodology provides tools to study human travel behaviour in short- and long-term perspectives at both individual and aggregate levels. Second, existing empirical knowledge of travel behaviour in the longitudinal perspective was extended by complementary evidence from daily, monthly and yearly perspectives, with special attention given to monthly variance. Third, this dissertation demonstrates three case studies on how the proposed methodology could provide complementary insights on social phenomena that are difficult to examine with traditional data collection methods, such as questionnaires, activity-travel diaries or register and census data. In summary, this dissertation aimed to ascertain how mobile phone based data can help us to understand human travel behaviour. This is obtained by answering five refined research questions; the main results were introduced (Section 3), and the findings were thoroughly discussed (Section 4).

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First, to identify and measure human activity locations and movement between these locations based on a large volume of CDR data, the anchor point model was developed (Article II). The model was developed based on knowledge achieved from the first experiment using active mobile phone positioning data that investigated the applicability of mobile phone data for measuring human travel behaviour (Article I). In general, the anchor point model identifies four types of activity location, with the two most important activity locations defined as home and work-time anchor points. These anchor points are identified and located with high accuracy at the base station level, although several aspects can be improved in the future. Based on identified activity locations, it is possible to derive individual movements and to analyse traffic flows (Article III). The anchor point model is further improved by implementing the MLA technique to better extract meaningful daily activity locations from other random activity locations relative to the individual’s mobile phone usage pattern (Article IV).

Second, the implementation of mobile phone based data to extend our understanding of human travel behaviour over a prolonged time period was achieved by analysing individual “typical” daily, monthly and annual travel behaviour in terms of the number of unique activity locations visited and the spatial extent of activity spaces (Articles IV and V). To the author’s knowledge, monthly and annual activity spaces have not yet been analysed. The prolonged perspective is important because it reveals spatial behaviour beyond daily habitual routine behaviour, and to some extent, the realised spatial mobility could reflect actual spatial mobility potential. At the very least, this perspective provides a quantitative indicator for assessing individuals’ mobility potential.

Third, despite the limited individual background attributes that were available to these studies, it was found that the influence of individuals’ socioeconomic factors describing spatial characteristics of human travel behaviour are generally weak, except for the significant effect of language as a proxy for ethnicity (Articles I and V). However, it was found that individual mobile phone usage patterns vary significantly between individuals in spatial and temporal perspectives, describing significant interpersonal variability in human travel behaviour (Articles IV and V). Therefore, one must consider this aspect while using CDR data in human travel behaviour studies to avoid potential biases in the results due to peculiarities of the data.

Fourth, special attention was given to assessing intrapersonal variability in monthly travel behaviour over twelve consecutive months (Article IV). Monthly intrapersonal variability was predominantly explained by intrapersonal variance, whereas the seasonal effect, per se, remained weak. However, while the seasonal effect was weak for the daily activity space, it was still significant. Moreover, on a monthly basis, some 5–10% of the spatial behaviour of the individuals studied is markedly non-typical, which thus indicates the need to investigate this phenomenon further in the future. Otherwise, seasonal variability was the most evident in the case of variety seeking behaviour.

Fifth, three different empirical case studies were conducted to demonstrate how mobile phone based data are able to provide complementary knowledge on social phenomena that is difficult to reveal otherwise. The proposed methodology provides information on short-term population mobility (Article II), which can complement up-to-date census or register based data. However, in cases for which the latter data are not available, mobile phone based methodology may be the only suitable data source to reveal population distribution information.
Similarly, this is the case with transportation planning (Article III). The proposed methodology can provide knowledge such as the composition of road users and their trip purpose, to some extent, and it can also provide a rough estimate of the distribution of traffic flows in the transportation network. Finally, in the case of person based activity space segregation, the findings demonstrate distinct ethnic differences in the spatial behaviour of individuals in both geographical and relative perspectives (Article V). Hence, this study emphasises the importance of delving into person-based segregation to better understand segregation phenomenon in general.

In conclusion, based on the main findings presented and discussed above, this dissertation argues that (i) the call detail records (CDR) of mobile phone users are a valuable addition to traditional data collection methods for revealing the spatial characteristics of human travel behaviour at the individual level, allowing us make a contribution to forming the smart cities of tomorrow at the aggregated level; (ii) the proposed methodology enables us to capture and provide insights on human travel behaviour in the longer (monthly, yearly) perspective and narrow the research gap on both the inter- and intrapersonal variability of human spatial behaviour; and (iii) the proposed methodology is suitable for providing complementary knowledge to better understand social processes and to solve problematic social phenomena in terms of population short-term mobility, transportation planning and socio-spatial segregation.

The empirical findings of this dissertation provide a fruitful premise for future research by highlighting several new avenues to explore. For the conceptual and methodological perspective, additional personal attributes should be included in future studies based on CDR data, the anchor point model should be integrated with land use data and combined with questionnaire-based data to further downplay current methodological weaknesses. Another future direction is to add long-term anchor points to the anchor point model and to determine the type of activity and its duration to improve the reliability of the model. This, in turn, would improve the explanatory power for describing human spatial behaviour in the longitudinal perspective and would provide more knowledge. For example, it would be interesting to focus on intrapersonal variability and on the variability of daily spatial behaviour in particular. Improvements to the methodology would further explain social phenomena up to the point where the underlying causal factors of human spatial behaviour could be revealed.

Verification of how well the spatial extent of daily, monthly and annual activity spaces coincide with the actual use of space and its error assessment would certainly be a relevant direction for future research in human spatial behaviour research.
Internationalization processes of Chinese firms: the role of knowledge

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Using both quantitative and qualitative methods, and combining comparative studies and longitudinal analysis, the aim of this dissertation is to identify the role of knowledge in internationalization processes of Chinese firms. By systematically reviewing the literature on internationalization studies in the Chinese context, and by using first-hand firm-level data, five original publications result. These are united under the same goal yet have separate research tasks that focus on different aspects using various methodologies.

The theoretical part of this thesis is based on internationalization literature, particular on streams of the Uppsala model and the Born global model. It also focuses on literature regarding firms’ foreign experiential knowledge and its acquisition. The author concludes that foreign market knowledge is important to firms’ internationalization. Lack of it may slow down the internationalization process and cause firms to initially enter the closest countries, using the simplest entry modes. Firms may acquire foreign market knowledge not only through direct market experience, but also by hiring certain types of personnel, cooperation, and so on. Foreign market knowledge may positively affect firms’ internationalization processes, but does not guarantee success. Firms’ internationalization is not necessarily a smooth path, but rather a wave-shaped process that involves expected and radical changes.

Through mixed methods, by using first-hand firm level data, this research discovers that both Chinese BGs and NBGs initially internationalize successfully, despite lacking knowledge. Low knowledge levels do not affect their speed of internationalization, but firms all use exporting as their foreign operation mode. Both BGs and NBGs select culturally and geographically more distant countries that have a higher population and more advanced economic development. After entering their first three foreign markets, firms start to gain knowledge, which affects their onward foreign expansion strategy. During periods of radical change and crisis, knowledge level determines decisions relating to firms’ exit from foreign markets, and the success of re-entry.

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