IT Competence in Internet Founder Teams

An Analysis of Preferences and Product Innovativity

On the basis of a competence model for IT experts in Internet-based ventures we empirically analyze founder preferences. These preferences are examined in dependency of the innovativity of the founders' products. We identify four different competence profiles which correspond to prototypical IT experts with different key activities. The data evaluation suggests that the competence profiles preferred by founders with innovative products differ from those preferred by founders with less innovative products. The results are relevant both for career decisions of IT experts as well as for founders of Internet-based companies.

DOI 10.1007/s12599-010-0109-5

The Authors

Dr. Matthias Häsel (✉)
XING AG
Gänsemarkt 43
20354 Hamburg
Germany
matthias.haesel@xing.com

Prof. Dr. Tobias Kollmann
Chair of E-Business and
E-Entrepreneurship
University of Duisburg-Essen
Universitätsstr. 9
45141 Essen
Germany
tobias.kollmann@uni-due.de

Dipl.-Psych. Nicola Breugst
Max Planck Institute of Economics
Kahlaische Str. 10
07745 Jena
Germany
breugst@econ.mpg.de

Received: 2009-09-14
Accepted: 2010-01-18
Accepted after two revisions by
Prof. Dr. Buhl.
Published online: 2010-07-10

This article is also available in German in print and via http://www.wirtschaftsinformatik.de: Häsel M, Kollmann T, Breugst N (2010) IT-Kompetenz in Internet-Gründerteams. Eine Analyse von Präferenzen und Produktinnovativität. WIRTSCHAFTSINFORMATIK. doi: 10.1007/s11576-010-0228-0.

1 Introduction

Value-added processes of the so-called *Net Economy* rely on the IT-based collection, processing, and transmission of information (Skiera et al. 2006, p. 1; Kollmann 2006, p. 329). Based on this value-added level, there are – independent of a physical value chain – innovative product ideas for whose value the customer is willing to pay and which therefore may form the basis of founding an enterprise (Kollmann 2006, p. 322). Within the scientific discourse there is no doubt that the founding individuals represent a key factor influencing the development of a young enterprise (Chandler and Hanks 1994, p. 77). In terms of Sveiby and Lloyd (1990), successful Internet companies can be characterized as know-how companies that distinguish themselves by their fast pace regarding the development of innovative products (Roithmay and Fink 1997, p. 503). Since the professional and managerial knowledge required in a know-how company rarely meet in one individual (Sveiby and Lloyd 1990, p. 74), these Internet-based ventures are usually managed by interdisciplinary teams whose skills range from the conflicting priorities of business administration to computer science (Kollmann 2006, p. 334).

Literature provides evidence that the product development process in the Net Economy differs from traditional software development in many ways (Coldewey 2002, pp. 238 ff) and therefore involves different requirements for the competence of IT experts (Cash et al. 2004, pp. 54 ff). However, the question of what kind of specific requirements we have to deal with is largely unexplored in the context of Internet-based ventures (Matlay 2004, p. 412). Similarly, the question of what kind of IT competence is important under certain conditions of a project has been barely clarified so far (Niederman 2005, p. 137). Moreover, the perspective of company founders planning to realize a product more or less innovative in terms of the underlying technologies has been scarcely analyzed.

This article addresses the mentioned research gap by analyzing the preferences of Internet founders concerning the competence profile of IT experts. The paper examines to what extent a connection exists between the preference structure and the innovativity of the venture's product. This is interesting as the actual organizational requirements regarding technical competence depend on the characteristics of the product which is to be implemented by means of technology and because it can be assumed that this aspect is reflected in the individual preferences of the founders. From

the perspective of business and information systems engineering (BISE), this question is important in order to be able to understand and to satisfy the demand for interdisciplinary-trained technical and managerial personnel in the globalized environment of the Net Economy (Buhl and König 2007, pp. 241 f). For business practice, an understanding of these issues is central since the selection of suitable partners during the foundation of a company constitutes a key challenge (Kamm and Nurick 1993, pp. 21 f).

The article is structured into five sections. After a competence- and utility-theoretical foundation in the following second section, we present the sample, the study design, and the conduct of the study in Sect. 3. The fourth section is devoted to data analysis and the discussion of results. Section 5 summarizes the results, discusses existing limitations and gives a final outlook.

2 Theoretical Foundation and Formulation of Hypotheses

In the following section we present the competence model which forms the basis of the conducted study. Subsequently, we explain the concept of preference from the perspective of utility theory and illustrate its application in connection with the presented competence model. Finally, the relationship between preferences in terms of IT experts and product innovativity are discussed on the basis of previous research and are finally documented in a research hypothesis.

2.1 Competence Model

Competence can be understood as the degree of conformity between the knowledge of a person and the requirements resulting from this person's task (von Krogh and Roos 1995, p. 62). Since this concept cannot be directly observed, we need a competency model which is able to offer a bridge to empirical observation. Literature provides a wide range of IT related competence models. This includes general work on the required skills of computer science (CS) and BISE experts (Lee et al. 1995), work on the required business competence of IT experts (Bassellier and Benbasat 2004), and work on the necessary IT competence of managers (Bassellier et al. 2003).

Although the models available in literature provide valuable approaches for the analysis of competence required from IT experts, they do not capture the specific characteristics of IT experts in Internet founder teams. In the context of a large empirical study (Häsel 2009, p. 157; Kollmann et al. 2009, pp. 55 ff) we therefore accomplished an integration and reorganization of existing models and modified and empirically validated the resulting competence model in accordance with the requirements of the Net Economy:

- *Technology knowledge* refers to the broad knowledge of the available standard software, components, and frameworks as well as specific standards, programming languages, and tools that can be relied on in developing the web platform.
- *Conceptual knowledge* concerns basic concepts, methods, and models of CS and includes knowledge about algorithms and data structures, software architectures, design patterns, data modeling, object orientation, and the design of user interfaces.
- *Realization competence* refers to the experience in the design of software development processes and the application of analysis and design methods, to web design skills, to the ability of analytic-structural, critical thinking, and the ability to find specific information on the Internet.
- *Business management knowledge* covers areas such as marketing, organization, and finance and makes it possible to interpret operational problems, to comply with operating conditions, and to actively shape strategy and processes.
- *Entrepreneurial competence* includes the ability to generate ideas in a systematically planned manner, and their implementation, experience in building businesses and in the design of processes, as well as any knowledge that is necessary for the company foundation itself.
- *Interpersonal competence* includes the ability to understand, motivate, and influence others, to explain technical issues to them, to develop and make use of relationships and social networks, to manage projects and delegate tasks.
- *E-business competence* includes technical and non-technical knowledge, largely based on experience, about online business concepts, online marketing, web-based business processes, electronic payment, web security, and legal e-business issues.
- *IT/business vision* makes it possible to take a holistic view of the market and technology, to anticipate change, and thus develop the product strategy, web platform, and one's own competence according to these changes in a foresighted way.

The components of this competence model are described very abstractly and are not completely disjunct. In the context of the present study, however, the study participants confronted with these components do not experience this a problem since in practice broad competence is of greater importance than individual, specific skills such as knowledge about a specific programming language (Bailey and Stefaniak 2001, p. 98). Therefore, the model is suitable to analyze the preferences of Internet founders in terms of the competence profile of IT experts in the context of an empirical survey.

2.2 Preferences from the Perspective of Utility Theory

In micro-economics, a *preference* is the result of a comparison which selects the best from the set of alternatives available for a decision problem. Here, utility theories are a common way to describe the preferences of an actor (Varian 1989, p. 31). Utility-theoretical reasoning can be applied to the problem of assessing competence by considering the competence profile of a potential co-founder as a decision alternative that constitutes a utility for the company in the view of an individual founder.

Decision-making situations with multiple alternatives that are described by multiple attributes can be explained with the prescriptive decision model of multi-attribute utility theory (Von Winterfeldt and Edwards 1986, p. 273). This theory assumes that a decision alternative is not considered as a whole, but instead its individual attributes are evaluated in terms of their utility. The total utility of a decision alternative is derived from the sum of the part worth utilities that are weighted based on attributes. In view of the described competence model, the utility of a competence profile consists of the sum of the part worth utilities of the individual components. The competence profile preferred by an actor is that with the largest sum of part worth utilities.

2.3 Preferences Regarding IT Experts and Product Innovativity

The degree of innovation generally is a multidimensional phenomenon, which, among other things, is based on the two classic dimensions of market and technology (Hauschildt and Salomo 2005, p. 11). In the present study, the term product innovativity solely includes the technology dimension, i.e. the product's *technical* degree of newness. Market-induced innovations in terms of Gerpott (1999, p. 52), whose perceived degree of novelty are less technical and more psychological (Benkenstein 2001, p. 696), will be neglected. This makes sense as it can be assumed that technical innovation particularly induces a need for technical competence.

A venture's product can be positioned on a continuum based on its technical innovativity whose extremes are made up by *initiation* and *imitation* (Amason et al. 2006, p. 128). In the Net Economy, the transition between these extremes is seamless since a variety of established technologies is available that can be relied on for product development (Reifer 2000, p. 58). Companies can develop a completely new software technology to realize their products or rely on existing standards, frameworks, and components. This has implications for the activities of IT professionals in that in the latter case the focus is less on technical research and development but on the effective use of existing technologies. It is true that such systems may become very extensive and complex, but they result in the integration of existing components or functionality (Bills and Biles 2005, p. 45). Thus, for example, the opening of an online store often only involves a minimal development effort as already a number of established solutions exist for such a business concept. The founding team therefore requires less knowledge in the field of traditional software development but more competence to implement the relevant purchasing and sales processes. In contrast, the initiation of an entirely new technology always involves a high demand for technical research and development (Zahra and Bogner 1999, p. 139). A founder team dealing with a highly innovative product – such as Google at the time of the company's foundation – has to focus on the perfection of its own technology apart from questions of marketing and the generation of revenues (MacInnes 2005, p. 7).

Thus, the requirements for the founder team change depending on the position of the product in the described continuum (Amason et al. 2006, pp. 130 ff). The development of products with higher innovativity generally requires a higher need for technical efficiency and technical competence (Casper and Whitley 2004, p. 91). In addition, the development of new technologies requires fundamentally different skills than the effective use of existing technologies (Bills and Biles 2005, p. 45). This suggests that innovative products imply other requirements for the competence profile of an IT expert than less innovative products, which accordingly affects the founders' formation of preferences. Since literature bears no evidence of relationships between product innovativity and the need for specific competence components, an exploratory orientation seems appropriate for this study. As a basic research hypothesis we therefore postulate:

> *There is a relationship between the product's innovativity and the founder's preferences as to the competence profile of an IT expert.*

3 Data Collection and Methodology

In this section, the methodical approach of the study is described. First, we describe the sample. Subsequently, the chosen method is explained. This is an adaptive conjoint analysis to obtain individual part worth utilities for the various competence components. Moreover, the operationalization of product innovativity is illustrated. Finally, a possible distortion of results through a non-response or common-method bias will be discussed.

3.1 Sample

The survey was initiated in early November 2007 and ended on December 4th, 2007. As at the time of data collection the population of interest for the study was small in the German-speaking area as a result of the small Internet start-up movement (Hüsing 2008), it seemed appropriate in regard to the sample to come as close to a total population survey as possible. The identification of potential study participants was carried out on the database of *deutsche-startups.de*, which included most of the Internet-based ventures at the time of the survey. Overall, we identified 388 founders in the database, of which 91 were omitted from the sample because they could not be contacted in person or decided not to participate on the phone. An invitation to the survey was mailed to a total of 297 founders, of which 68 did not participate. This results in a net sample of a total of 229 founders. Of these participants 182 completed the questionnaire, representing a completion rate of 46.9%. Of the present sample of 182 subjects, another six cases were removed due to low reliability of the conjoint analysis, so that the adjusted sample contains $N = 176$ cases. The companies of the subjects have an average age of three years ($M = 3.02$; SD $= 3.04$; median $= 2.00$).

3.2 Survey Design

Conjoint analysis is an accepted approach for determining individual utility structures for multi-attributive objects (Green and Rao 1971). Since conjoint analysis represents a real-time method, it is excellently suited to investigating the unobservable cognitive structures of founders without post-hoc rationalization biases in the course of founding a business (Shepherd and Zacharakis 1997, pp. 231 ff). Especially in the context of the assessment of the other individuals' characteristics, a survey based on a conjoint analysis is not subject to the limitations of self-reported appraisal (Moy 2006, p. 735).

A special feature of conjoint analysis is provided by the realistic decisions of the participants since different alternatives are evaluated as a whole. In terms of multi-attributive utility theory, the overall utility is composed additively of the utility of the part worth utilities. The data basis is composed by the inquired global preference orders of different alternatives, which are used for determining individually valid part worth utilities. In this investigation, the alternatives represent competence profiles from whose individual preference orders part worth utilities can be calculated for each of the eight competence components.

Subjects need to be able to relate the decisions made in the course of the conjoint analysis to decisions he or she would take in the real world (Shepherd and Zacharakis 1997, p. 213). In the survey, therefore, the study participants were asked to imagine that a fictional team consisting of a business manager and an IT expert intend to found their actual

business within a short time. The participants should decide from the business manager's perspective as to which IT expert they would consider appropriate for setting up the company. We used an adaptive conjoint analysis (ACA) which calculates the decisions the participants are confronted with in the course of the study based on already given answers, and thus achieves a maximum of gained information (Green and Krieger 1991a, p. 216). The survey was conducted with the survey software *EFS Survey* by *Global Park* whose conjoint module allows the creation of an online survey.

In the course of the paired comparisons, which are characteristic for the ACA, always two competence profiles were presented simultaneously. The competence profiles contained (within the meaning of ACA) not all but only a selection of competence components, varying from paired comparison to paired comparison. The number of attributes was constant at three. In modeling the attribute levels we proceeded in accordance with Moy (2006, p. 742) following the scheme of *fair technology knowledge* versus *excellent technology knowledge* to avoid exclusion criteria for a particular IT expert (**Fig. 1**). Subsequent to the paired comparisons a calibration phase was conducted with four calibration concepts bearing six attributes. On a survey page two concepts were presented to the subjects which were asked to state a percentage stating the extent to which the business manager should opt for a foundation with the particularly displayed IT expert.

Subsequent to the ACA part the product innovativity was queried by means of four attributes, each of which being collected with a 5-point Likert scale (**Table 1**). The attributes were derived from the literature mentioned above during the formation of the hypotheses (Bills and Biles 2005, p. 45; Zahra and Bogner 1999, p. 139) so that a given content validity can be assumed. For the verification of the reliability, we calculated the internal consistency of the scale (Cronbach's alpha). With $\alpha = 0.74$ the attributes form a reliable scale so that we combined them to a scale value ($M = 3.22$) by means of averaging.

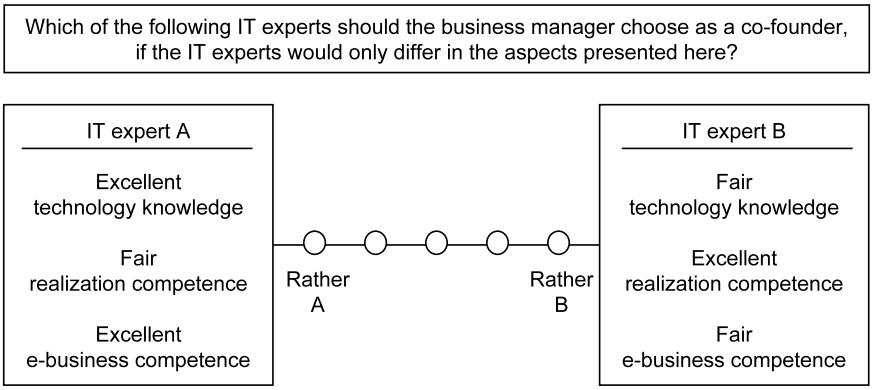

Fig. 1 Example of a paired comparison

Table 1 Operationalization of product innovativity

1.	During the realization of our platform(s), many features were implemented which had not yet been realized by other platforms.
2.	Through the development of our platform(s) we actively pushed the technological progress in our industry.
3.	The development of our platform(s) required a certain level of IT research.
4.	During the development of our platform(s), many and often entirely new technological problems had to be solved.

3.3 Non-Response and Common Method Bias

In order to check whether the collected sample is distorted by non-responses (non-response bias), we carried out a comparison of early and late responses (Armstrong and Overton 1979, p. 397). Under the assumption that late responders differ little from non-responders, all respondents can be arranged on a motivational continuum in which early and late responders are to be compared. T-tests between the upper and lower quartile with regard to the length of time between the invitation to the survey and the completion of the questionnaire showed no significant differences for all variables. Therefore it is assumed that a non-response bias does not play a significant role in the present data record.

To ensure that a majority of the observed variance does not result from the measurement method (common-method bias), the sample was subjected to the one-factor test of Harman (1967). The test resulted in more than one factor, with the first extracted factor being able to explain only 11% of the variance. This suggests that the existence of a common-method bias is not a crucial reason for possible differences.

4 Data Analysis and Discussion of Results

In order to be able to compare the individual utility structures of the study's participants, we first ensured through an appropriate normalization that the estimated part worth utilities are based on the same zero point and the same scale units for all subjects (Backhaus et al. 2006, p. 580). Normalization aims at always assigning a part worth utility of zero to the least preferred attribute level, while all other part worth utilities take positive values. As diametrically opposed preferences (i.e. preference for fair instead of excellent competence) form the exceptional case in the present sample, the average normalized part worth utility of the level *fair* takes a value close to zero. This corresponds to the ratio that a fair level of competence generally entails a lower utility compared to an excellent level of competence, i.e. that an excellent level of competence is preferred compared to a fair one.

At the same time, the normalized part worth utilities of the level *excellent* give an indication of the relative importance of a competence component on an aggregated level (Srinivasan 1988, p. 296). Thus, a high value indicates that the level of the corresponding competence component on average greatly influences the

Table 2 Part worth utilities of all levels

Level		Technology knowledge	Conceptual knowledge	Realization competence	Business management knowledge	Entrepreneurial competence	Interpersonal competence	E-business competence	IT/business vision
Fair	*M*	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	SD	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Excellent	*M*	0.14	0.11	0.15	0.05	0.08	0.09	0.11	0.11
	SD	0.07	0.06	0.05	0.05	0.06	0.06	0.05	0.05

Table 3 Part worth utilities of the level *excellent* for the identified clusters

Cluster		Technology knowledge	Conceptual knowledge	Realization competence	Business management knowledge	Entrepreneurial competence	Interpersonal competence	E-business competence	IT/business vision
1 ($n = 43$)	*M*	0.09	0.12	0.15	0.05	0.07	0.15	0.10	0.12
	SD	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.06
2 ($n = 40$)	*M*	0.11	0.08	0.16	0.06	0.16	0.09	0.09	0.09
	SD	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05
3 ($n = 50$)	*M*	0.19	0.16	0.17	0.02	0.05	0.07	0.10	0.09
	SD	0.05	0.04	0.05	0.03	0.04	0.04	0.04	0.04
4 ($n = 38$)	*M*	0.18	0.08	0.12	0.07	0.05	0.06	0.14	0.14
	SD	0.05	0.05	0.06	0.06	0.03	0.04	0.03	0.05

acceptance or denial of an IT expert. In contrast, a low value indicates that the corresponding component is less important for the formation of the preferences. **Table 2** shows the arithmetic averages of the normalized part worth utilities of all levels. To check whether the participants' preferences are influenced by their own competence, participants were asked to assess their own levels in terms of the competence dimensions. Since the average of these correlations is less than 0.02, it can be assumed that the preferences of the participants are largely independent of their own competence.

An aggregation of preference patterns across the entire sample is not useful for an investigation based on conjoint analysis, since in the calculation of averages essential information is lost in the case of heterogeneous individual preference structures (Backhaus et al. 2006, p. 583). The aggregated part worth utilities would relate to an average founder that does not exist in this form. However, valuable insights can be gained if the sample is split into smaller groups which are characterized by homogeneous preference structures. In such an *a-posteriori* segmentation, the clustering is done on the basis of individual part worth utilities where usually a cluster analysis is used (Green and Krieger 1991b, p. 25).

4.1 Cluster-Analytical Determination of the Preference Structures

In a first step of the cluster analysis and using the single-linkage method we identified five outliers (Bortz 2005, p. 572) that were excluded from the following analysis steps. In a second step, the optimal cluster number and cluster centers were identified (Ward 1963). In a last step, the computed cluster centers were used as starting points for the k-means algorithm (Hartigan and Wong 1979). The clusters resulting from this final step bear a strength of 43, 40, 50, and 38 subjects. To check the relative validity of the identified cluster solution this was replicated using a discriminant analysis and the replicated solution was compared with the initial solution (Blashfield 1976, p. 383). In doing so, 98% of all subjects could be classified correctly, indicating a very high validity.

By aggregating the individual preference structures of the subjects within each cluster, four competence profiles result from averaging the part worth utilities of the level *excellent* (**Table 3**). These profiles can be assigned a posteriori to prototypical roles which are mainly carried out by IT experts in Internet-based start-ups. The competence profiles that are preferred by the different clusters are visualized in **Fig. 2** and are described and compared below.

The subjects in cluster 1 prefer competence profiles which are particularly characterized by high levels of realization competence and interpersonal competence. All other competence components have medium utilities in comparison to the other clusters, however, the subjects attach the lowest importance to business management knowledge and entrepreneurial competence. The preferred competence profile may characterize a prototypical *IT manager*, i.e. a leadership position with a technical focus. The IT manager is able to design e-business architectures, manage development processes, and lead technical staff.

Cluster 2 is also characterized by a high utility of realization competence, while there is an additional preference for IT professionals with a highly distinctive entrepreneurial competence. All other competence components are assessed by the subjects as being less important overall but almost equally important in relation to each other, where technology knowledge slightly stands out and business

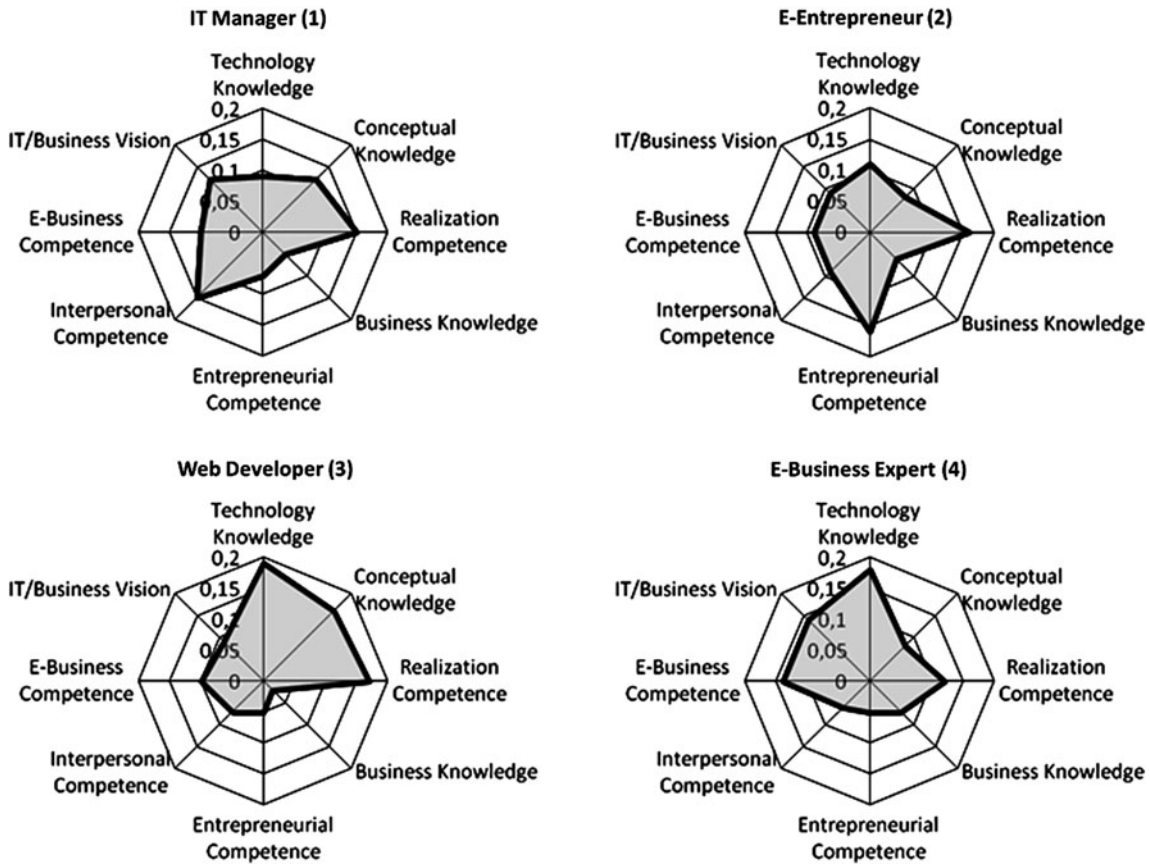

Fig. 2 Prototypical competence profiles

management knowledge shows the lowest utility. The resulting prototype profile could correspond to an *e-entrepreneur* whose strength on the one hand is the development of Internet-based business ideas, but on the other hand also is their technical implementation in an entrepreneurial environment.

The subjects in cluster 3 differ from the other subjects in that they attach a particular importance to the more technical components (technology knowledge, conceptual knowledge, realization competence). E-business competence and IT/business vision are perceived as of an average value, while the non-technical components bear a low utility. This profile prototypically characterizes a *web developer*, i.e. a specialist focusing on the development of web applications.

Similarly, cluster 4 is characterized by a significantly high utility of technology knowledge, while the subjects consider e-business competence and IT/business vision as particularly important at the same time. With the exception of realization competence, the other components are less emphasized, with business management knowledge, however, bearing the highest average utility in comparison to all other clusters. This competence profile could reflect the competence profile of an *e-business expert* who is capable of interpreting the trends and technologies of the e-business environment from both a technical and a managerial perspective.

Across the clusters it strikes that all computer science components are more preferred than business management knowledge. This is understandable as the subjects were asked to put themselves in the role of a business manager who is choosing an IT expert for his Internet-based venture. Since he is likely to have a large degree of business management knowledge himself, this low weighting seems comprehensible. Therefore, business management knowledge is not generally undesirable for an Internet-based venture, but has not to be necessarily provided by IT experts.

4.2 Relationship Between Preference Structures and Product Innovativity

To verify the postulated relationship between preference structures and product innovativity, we examined whether the previously identified clusters differ significantly from each other as regards product innovativity by means of an analysis of variance (ANOVA). We found that significant differences exist between the clusters in terms of innovativity; $F(3.167) = 2.84$, $p < 0.05$. To determine the clusters which differ significantly from each other, we conducted a posthoc test according to Scheffé (1953). In doing so, we found significant differences between cluster 2 and cluster 4 with a mean difference of 0.61 ($p < 0.05$). For cluster 2, the average innovativity is 3.50 ($SD = 0.92$), while it is 2.90 ($SD = 0.89$) for cluster 4. Founders of companies whose products are characterized by high levels of innovation, therefore, prefer the competence profile of an e-entrepreneur compared to that of an e-business expert. The other two clusters have an average level of product innovativity ($M = 3.14$ and $SD = 0.91$ for cluster 1, $M = 3.25$ and $SD = 1.01$ for cluster 3). Thus, they neither differ significantly from each other nor from the other two clusters. Differences in the preferences of the participants thus appear depending on the extent of product innova-

tivity, but not consistently across all clusters. This may be due to the fact that founders in cluster 2 and cluster 4 differ to a great extent in terms of their requirements for IT experts which result from the product's innovativity.

The difference between cluster 2 and cluster 4 results from the fact that a product based on novel technologies poses different requirements to IT professionals than a product that mimics an existing product concept and relies on established technologies. In case of an innovative product, the IT expert has to develop the product concept until marketability is reached and to systematically design processes for its technical implementation. Here, the profile of an e-entrepreneur is advantageous, which is particularly characterized by an excellent entrepreneurial competence (concept development and implementation) and an excellent realization competence (design of development processes and analytic-structural, critical thinking). In case of a less innovative product, however, the IT expert rather has to implement processes which already exist in a similar form in the e-business environment and thereby make use of already available standard software, components, and frameworks. In this case, the profile of an e-business expert is of advantage, which is characterized by excellent technology knowledge and an excellent e-business competence (knowledge of web-based business processes and online marketing based on experience). Although not all of the clusters preferring different prototype IT experts differ significantly in the innovativity of their products, the identified difference suggests that the postulated research hypothesis must not be discarded.

5 Summary, Limitations, and Outlook

The present study suggests that preferences of Internet founders regarding the IT experts' competence profiles are related to the innovativity of the founders' respective products. On the one hand, the result implies that IT experts with an interest in contributing to an Internet-based venture should keep in mind their own competence profile to identify the business idea to which this profile fits best and is most valued by co-founders. On the other hand, the result indicates that founders make different decisions regarding the team composition in dependence of product innovativity. While founders in companies with more innovative products prefer IT experts with high entrepreneurial competence (profile of an e-entrepreneur), founders in less innovative companies especially emphasize interdisciplinary competence components (profile of an e-business expert). This suggests the recommendation that the founder should always consider his products' innovativity when selecting an appropriate IT expert. While for a product based on a novel technology an e-entrepreneur is desirable who is responsible for technical research and development, in the case of a less innovative product an e-business expert is more advantageous, who is able to quickly transfer his knowledge of established technologies and business processes to the product planned.

An important limitation of this work is that the experimental design of the conjoint analysis represents an oversimplification of reality. Thus, the founder team described in the experiment consisting of IT experts and business managers is to be regarded as an ideal type; in reality, however, this is not the rule. Moreover, it cannot be assumed that decisions regarding the choice of a partner or the team composition depend exclusively on issues of competence; rather, they may also be influenced by financial or social-psychological factors (Kamm and Nurick 1993, p. 21). However, during the experiment the subjects were instructed to take their decisions solely on the grounds of the competence profile of the IT professional and to neglect other factors. This approach has established itself in the context of conjoint analyses in order to create a context common to all subjects to keep all irrelevant relevant factors constant (Shepherd and Zacharakis 1997, p. 208).

Other limitations result from the restricted number of attributes or attribute levels that are a consequence of the survey design. In the interpretation of the components' contents there is substantial individual scope for the participants. Since in practice, however, rather broad competencies are important as mentioned above, this is less problematic in the context of this analysis. The interpretation of the attribute levels is also by affected by subjectivity. Thus, the concepts *fair* and *excellent* are only conditionally able to uniformly quantify the competence level for all study participants. For the measurement model of the conjoint analysis, however, the difference in rank is important above all, which is clearly defined by the choice of terms. Similarly, it is clear that a fair competence is not synonymous with non-existent competence (and thus may be quite sufficient in some cases). Since additional attribute levels would have led to many more paired comparisons, we also had to omit the verification of complex, non-linear relationships.

Despite its limitations, the study makes an important contribution for BISE in several respects. First, it represents one of the first works that explicitly deal with the requirements of IT experts in Internet-based companies. The study highlights the decision-making behavior of Internet founders, which underlines the high practical relevance of the derived requirements. An understanding of which competence profiles are actually preferred in this environment is helpful for the curricular design of BISE at universities. Given that small and medium sized companies provide two thirds of jobs in the European Union (Eurostat 2006), an explicit consideration of their needs appears to be of particular importance. Second, the study rejects the assumption prevailing in IT competence research that the importance of competence components concentrates on a specific, correct value from which one only departs by random error. The indication that differences in preferences are associated with product innovativity and thus have a systematic nature implies further research needs regarding the effect of organizational conditions on the competence requirements for IT experts. Third, the research approach described is suitable to generally investigate the perceived requirements IT experts are confronted with in different contexts, thereby shedding light on personnel decisions in these contexts.

The study complements existing studies on the competence of IT professionals in the Internet environment (Häsel 2009; Kollmann et al. 2009) by focusing less on the characteristics of company founders but on the properties of the company's product. Here, the relationship between preferences and product innovativity is emphasized. Nevertheless, our study implies the need for further research on this issue. Thus, the question arises to what extent the results are applicable for IT experts in more mature Internet companies or traditional companies. In addition to the generality of the identified

Abstract

Matthias Häsel, Tobias Kollmann, Nicola Breugst

IT Competence in Internet Founder Teams

An Analysis of Preferences and Product Innovativity

In the Net Economy, numerous start-ups relying on Internet-based business models have been founded in the recent years. In these ventures IT experts are confronted with different requirements to those of traditional software development. It can thus be assumed that founders in the Net Economy prefer IT experts with a different competence profile. Based on an elaborate competence model for IT experts in Internet-based ventures, founder preferences are empirically analyzed and related to the novelty of the venture's product. An adaptive conjoint analysis is applied to obtain utility values for single components of competence. Using cluster analysis, four different competence profiles are identified which correspond to prototypical IT experts bearing different core functions. Data analysis suggests that founders with more innovative products differ from founders with less innovative products in their perception of the optimal IT expert's competence profile. The results have implications both for career decisions of IT experts and for founders of Internet start-ups who are looking for co-founding IT experts. This study is one of the first to explicitly focus on IT competence in Internet-based ventures. It therefore extends existing research on IT competence to a new and dynamic industry.

Keywords: Competence profile, Preference, IT expert, Net Economy, Founder, E-entrepreneurship, Innovativity, Conjoint analysis, Cluster analysis

competence profiles is has to be examined to what extent the observed relationship is valid outside of Internet-based ventures. Moreover, the relationship between the selection of an IT expert, who corresponds to a certain prototype, and the success of the company could be determined. In doing so, the actual importance of certain preference structures for Internet founders could be investigated.

References

Amason A, Shrader R, Tompson G (2006) Newness and novelty: relating top management team composition to new venture performance. Journal of Business Venturing 21(1):125–148

Armstrong JS, Overton TS (1979) Estimating nonresponse bias in mail surveys. Journal of Marketing Research 14(3):396–402

Backhaus K, Erichson B, Plinke W, Weiber R (2006) Multivariate Analysemethoden. Eine anwendungsorientierte Einführung. Springer, Berlin

Bailey J, Stefaniak G (2001) Industry perceptions of the knowledge, skills, and abilities needed by computer programmers. In: Proceedings of the 2001 ACM SIGCPR conference on computer personnel research. ACM, San Diego

Bassellier G, Benbasat I (2004) Business competence of information technology professionals: conceptual development and influence on IT-business partnerships. MIS Quarterly 28(4):673–694

Bassellier G, Benbasat I, Reich B (2003) The influence of business managers' IT competence on championing IT. Information Systems Research 14(4):317–336

Benkenstein M (2001) Besonderheiten des Innovationsmanagements in Dienstleistungsunternehmen. In: Bruhn M, Meffert H (eds) Handbuch Dienstleistungsmanagement, 2nd edn. Gabler, Wiesbaden, pp 687–702

Bills D, Biles J (2005) The role of programming in IT. In: SIGITE'05: proceedings of the 6th conference on information technology education. ACM, Newark

Blashfield R (1976) Mixture model tests of cluster analysis: accuracy of four agglomoretative hierarchical methods. Psychological Bulletin 83(3):377–388

Bortz J (2005) Statistik für Human- und Sozialwissenschaftler. Springer, Berlin

Buhl HU, König W (2007) Herausforderungen der Globalisierung für die Wirtschaftsinformatik-Ausbildung. WIRTSCHAFTSINFORMATIK 49(4):241–243

Cash E, Yoong P, Huff S (2004) The impact of e-commerce on the role of IS professionals. The Data Base for Advances in Information Systems 35(3):50–63

Casper S, Whitley R (2004) Managing competences in entrepreneurial technology firms: a comparative institutional analysis of Germany, Sweden and the UK. Research Policy 33(1):89–106

Chandler GN, Hanks SH (1994) Founder competence the environment, and venture performance. Entrepreneurship Theory & Practice 18(3):77–89

Coldewey J (2002) Agile Entwicklung Webbasierter Systeme. WIRTSCHAFTSINFORMATIK 44(3):237–248

Eurostat (2006) Key figures on European business. Office for official publications of the European Communities, Luxembourg

Gerpott T (1999) Strategisches Technologie- und Innovationsmanagement. Schäffer-Poeschl, Stuttgart

Green PE, Krieger AM (1991a) Adaptive conjoint analysis: some caveats and suggestions. Journal of Marketing Research 28(2):215–222

Green P, Krieger A (1991b) Segmenting markets with conjoint analysis. Journal of Marketing 55(4):20–31

Green P, Rao V (1971) Conjoint analysis for quantifying judgmental data. Journal of Marketing Research 8(3):355–363

Harman HH (1967) Modern factor analysis. University of Chicago Press, Chicago

Hartigan J, Wong M (1979) A K-means clustering algorithm. Applied Statistics 28(1):100–108

Häsel M (2009) Kompetenz von IT-Experten in internetbasierten Gründungsunternehmen: Eine conjointanalytische Untersuchung von Präferenzen und Wertwahrnehmung. Gabler, Wiesbaden

Hauschildt J, Salomo S (2005) Je innovativer desto erfolgreicher? Eine kritische Analyse des Zusammenhangs zwischen Innovationsgrad und Innovationserfolg. Journal für Betriebswirtschaft 55(1):3–20

Hüsing A (2008) Gründerboom in Deutschland. http://www.deutsche-startups.de/2008/02/26/gruenderboom-in-deutschland/. Accessed 2009-11-19

Kamm J, Nurick A (1993) The stages of venture formation: a decision-making model. Entrepreneurship Theory & Practice 17(2):17–28

Kollmann T (2006) What is e-entrepreneurship? – fundamentals of company founding in the net economy. International Journal of Technology Management 33(4):322–340

Kollmann T, Häsel M, Breugst N (2009) Competence of IT professionals in e-business venture teams: the relationship of experience, expertise and preference structure. Journal of Management Information Systems 25(4):51–79

Lee D, Trauth E, Farwell D (1995) Critical skills and knowledge requirements of IS professionals: a joint academic/industry investigation. MIS Quarterly 19(3):313–340

MacInnes I (2005) Dynamic business model framework for emerging technologies. International Journal of Services Technology and Management 6(1):3–19

Matlay H (2004) E-entrepreneurship and small e-business development: towards a comparative research agenda. Journal of Small Business and Enterprise Development 11(3):408–414

Moy J (2006) Are employers assessing the right traits in hiring? Evidence from Hong Kong companies. International Journal of Human Resource Management 17(4):734–754

Niederman F (2005) Staffing and management of e-commerce programs and projects. In: Proceedings of the 2005 ACM SIGMIS CPR conference on computer personnel research. ACM, Atlanta

Reifer D (2000) Web development: estimating quick-to-market software. IEEE Software 17(6):57–64

Roithmay F, Fink K (1997) Know-how-Unternehmen. WIRTSCHAFTSINFORMATIK 39(5):503–506

Scheffé H (1953) A method of judging all contrasts in the analysis of variance. Biometrika 40:87–104

Shepherd D, Zacharakis A (1997) Conjoint analysis: a window of opportunity for entrepreneurship research. In: Katz J (ed) Advances in entrepreneurship, firm emergence, and growth. JAI, Amsterdam, pp 203–248

Skiera D, Soukhoroukova A, Günther O, Weinhardt C (2006) Internetökonomie. WIRTSCHAFTSINFORMATIK 48(1):1–2

Srinivasan V (1988) A conjunctive-compensatory approach to the self-explication of multiattributed preferences. Decision Sciences 19(2):295–305

Sveiby K, Lloyd T (1990) Das Management des Know-how: Führung von Beratungs-, Kreativ- und Wissensunternehmen. Campus, Frankfurt

Varian H (1989) Grundzüge der Mikroökonomik. Oldenbourg, Munich

Von Krogh G, Roos J (1995) A perspective on knowledge competence and strategy. Personnel Review 24(3):56–76

Von Winterfeldt D, Edwards W (1986) Decision analysis and behavioral research. Cambridge University Press, New York

Ward J (1963) Hierarchical grouping to optimize an objective function. Journal of the American Statistical Association 58(301):236–244

Zahra SA, Bogner WC (1999) Technology strategy and software new ventures' performance: exploring the moderating effect of the competitive environment. Journal of Business Venturing 15(2):135–137