Competence acquisition in small firms

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Abstract

This paper models competence acquisition in a sample of 842 small firms. The findings indicate how competence is acquired and determines firm performance. The modeling procedures reports better adequacy in sub-samples having high complexity and high uncertainty. A firm’s competence base is a relevant predictor for how competence is acquired in all model tests. Implications for how small firms acquire competence are put forward.
1 Introduction

Most managers face a significant practical problem when it comes to competence acquisition. Unfortunately a review of the literature suggests scholarly study has placed limited attention on how competence acquisition is handled in small firms. Compared to their larger counterparts, managers in small firms need to act differently to manage acquisition of competence (Bellini 2000, Oviatt & McDougall 1994, Tidd & Trewhella 1997). Although different challenges and obstacles, Murray & Worren (2001) actually propose that small firms may be better at competence acquisition than large mature firms based on the notion that small firms are more creative in identifying problems, manage product development processes more flexibly, have a better climate for innovation and use networks of individuals better. This raises an interest in finding out more about how small firms act in their acquisition of competence.

The aim of this study is to test a proposed model of competence acquisition in small firms. We cannot disregard the fact that there could be better and worse ways of handling a need for competence in a firm. Therefore, we not only try to find factors that predict how small firms acquire competence, we also try to model how different modes of acquiring competence can influence firm performance. To our knowledge this is the first attempt to study this complicated issue. The paper is exploratory, whereby post-hoc analyses acknowledge that our model may be more or less robust in different sub-samples. Hence, a contingency approach is recognized, where environmental uncertainty and complexity of technology make up the contingency factors.

Fig. 1 Research model.
2 Research Model

The research model presented in Fig. 1 suggests that competence acquisition can be explained by a firm’s already existing competence base, the firm’s business concept, and the characteristics of the entrepreneur managing the small business. These factors can be related directly to how competence acquisition is handled, and the effects of the acquisition are expected to be found in the firm’s performance. The model is explained below.

Firm Performance. Firm performance include outperforming the firm’s rivals in one or all of the three areas: (1) the product area where the competitive advantage becomes evident in the outcome of new or improved products (Oviatt & McDougall 1994, Chiesa & Coughlan 1994, Kelly & Rice 2001, Tidd & Trehwell 1997), (2) the area of production processes where the performance advantage becomes evident in the new or improved operational processes (see e.g. Souitaris 2002, Chiesa & Coughlan 1994, Oviatt & McDougall 1994), and (3) the market area where the advantage becomes evident in the new or improved ways of approaching (current) markets, and evident in the outcome from entering new markets (Tidd et al. 2001, Oviatt & McDougall 1994, Ansoff 1988).

Competition acquisition. We consider competence acquisition as actions attempting to acquiring (or implementing) abilities that handle situations in a way that serves the productive purposes in the firm. Hence, both successful integration and the productive nature of competence is acknowledged in this definition. Small firms generally seem to be in need of using all variants of modes in order to acquire competence. However, the effects from using different modes may vary. Based on prior literature three modes are identified: internal competence acquisition, acquisition by the social network and acquisition by the market.

Using an internal acquisition mode means using resources that the firm own or tightly control (Bellini 2000, Sanchez et al. 1996). With regard to this mode, Dyke et al. (1992) argue that using an internal acquisition mode is important for creating continuous firm performance. An internal acquisition of competence provides a strong grip of what creates the firm’s firm performance because competence is built inside the firm. (See Claude-Gaudillat 2000, Bellini 2000, Berghlund & Blomquist 1999, Ylinenpää 1997, Sanchez et al. 1996, Liebeskind et al. 1996). Although an internal acquisition can be a long and time-consuming process (Tidd & Trehwell 1997) it has several advantages. Tidd et al. (2001) argue that internal acquisition of competence provides the firm with a potential for a competitive edge since knowledge remains inside the firm and is based from learning by doing, is strategically directed and under the firm’s full control.

Using a social network mode means using resources that the firm does not own or tightly control, but which the firm is able to address and use. Two options of using the social network mode are addressed: to hire (permanently absorb in the firm) or buy (access when needed). Bellini (2000) refers this use to “firm-addressable resources”. Such use of “firm-addressable resources” is connected to the entrepreneur via personal or professional relationships. Tidd et al (2001) suggest that use of a social network mode provides the strengths of easier access to knowledge that has been developed and packaged by someone else and Claude-Gaudillat (2000) suggests that use of a social network mode is a quick way for accessing competence. Winborg (1999) adds the
advantages for lower costs and increased preparation for environmental changes (Johannisson 1983), which increases the firm’s flexibility, and provides the firm with legitimacy (Julien 1998), which in turn provides access to new markets, and thereby, shorten the time needed. All these benefits from using a social network mode are in line with strengthening the firm’s firm performance.

Using a *market mode* means acquisition via purchasing external competence (Bellini 2000, Claude-Gaudillat 2000, Sanchez *et al.* 1996). Two options of using the market are recognized: to hire or to buy the competence needed. Acquiring competence on the market can reduce the time required to access certain competence and time is often emphasized in the quest for firm performance. The rationale behind using a market acquisition mode is to quickly establish a position in that particular area (Tidd & Trewphila 1997, Oviatt & McDougall 1994). Fast positioning is in line with strengthening the firm’s firm performance. A market acquisition mode might also contribute to the firm’s insight into activities taking place in the surrounding environment. Consequently, a greater use of external modes may be expected when new markets are aimed for. (See e.g. Reuber & Fischer 1997, Bijmolt & Zwart 1994). Using a market mode, such as contract research organizations, brings with it the potential of proving credibility and ultimately improving firm performance (Tidd & Trewphilla 1997).

*Inheritance factors.* Three firm-specific factors, or inheritance factors, are suggested to explain how competence acquisition is managed in smaller firms: the existing competence base, the business concept and the entrepreneur’s characteristics. We suggest these inheritance factors strongly influence the firm’s decisions about whether to acquire internally or turn externally to acquire the competence. The inheritance factors also represent constraints under which the entrepreneur must operate. An underlying assumption is that there are systematic differences in the strategies of the business concept, the organizational forms of the competence base, and the characteristics of the entrepreneur, whose specific character shape the distribution of firm development.

With regard to the *competence base*, Bijmolt & Zwart (1994) point out that the firm characteristics, related to the firm’s competence base, is an important explanatory factor for a firm’s firm performance. They argue for indirect effects from the competence base on the firm’s firm performance, via actions in competence acquisition. Initial competences will eventually depreciate, and therefore, future competitiveness depends on actions aimed for renewing the competence base. The structure of a firm’s competence base can be viewed as a basic mean for how competence acquisition can be dealt with and what effects in firm performance the competence base can bring (Kelly & Rice 2001, Collis & Montgomery 1995, Bogner *et al.* 1999, Bijmolt & Zwart 1994, Danneels 2002, Spanos & Lioukas 2001). Tidd *et al.* (2001) argue that managers use an internal acquisition when the firm has a strong internal competence in a competence area since it offers the option to leverage and control competencies. The managers favour what is already in-house. However, Kelly & Rice (2001) found evidence that supports that the more innovative a firm’s competence base, the more likely it is that the firm will use external modes. This finding suggests that firms with a strong competence base, meaning potential for high levels of development are more likely to seek and attract alliance partners. Overall, the argument is that firms with unique and valuable competences are in a better position to add to their stock of competence than firms with low amounts of these resources. For instance, firms, which have a strong competence bases may be approached
by surrounding competence (Tidd & Trewhella 1997). This may, in turn, provide the firm with more options to choose among when acquiring competence, and the potential to create firm performance.

The business concept is a firm specific designed strategy (Normann 1985). A number of authors, discusses the composition of the business concept in a way that can be boiled down to the consistent of three core components; the market (what market to serve and how to serve it), the products (what products to offer that market), and the production (how to produce the product) (Normann 1985, Eriksson 1985, Ekvall 1990). Based on these components a firm can have more or less challenging business ideas. Tidd et al. (2001) argue that there is a need of close alignment between the overall strategy for the business, here referred to as business concept, and the choice of competence acquisition mode for the firm to create firm performance. If the firm has a challenging business concept it will likely need to acquire more competences than a firm in an opposite situation. Although an issue regarding competence is whether to deliberately access external competence when needed by choosing a market or networking strategy, or use internal modes to a greater extent after internalizing fundamental competence (i.e. absorbing competence in line with hierarchy-building or accessing competence in line with networking and buying) the level of challenge in the business concept likely influence them both.

With regard to the entrepreneur's characteristics, we know firms vary in the extent to which they are good at accessing different types of new competences based on the manager’s ability to identify, evaluate, and incorporate new competences into the firm. The background of the entrepreneur, consisting of the entrepreneur’s education, experiences, and personality makes up the arena on which the entrepreneur can take action. These background factors make up the entrepreneur’s filter through which he/she perceives the world, and therefore creates his/hers arena on which he/she can take action. First, when the entrepreneur is educated in particular areas for competence acquisition, the entrepreneur has the potential of being more familiar with choices of modes in that area, and the consequences of using those modes (Tidd & Trewhella 1997). Although education, being of a general nature, seldom offers opportunities for applying specific solutions in specific situations the education level may influence the level of competitive acquisition. Second, in opposite to education, experience is more specific and “hands-on”, and therefore, it can be expected that experiences are easier than education to apply in new, but similar context (Tidd et al. 2001) Therefore, also experience is likely important in the management of competence acquisition. Third, the entrepreneur’s tolerance for ambiguity may also be important for successful management of competence acquisition by its contribution of overcoming uncertainty barriers and thus willingness to acquire competence.

3 Research Methods

The model was tested by using unstandardized data from a stratified sample of Swedish small firms (for advantages of using stratified sampling in small business research see Davidsson 1989, Wiklund 1998). Stratifying was due to several reasons. First, we wanted
to ensure that fast growing firms would also be included. In the Swedish small business population these firms are few. The intention was to pick half of the sampled firms classified as high growth and half classified as low or no growth (less than 25 percent of growth in a year). Second, stratifying ensured focusing on knowledge intensive industries, which were targeted since competence acquisition patterns, and the effects there of were expected to be more distinct than if small firms in general were to be chosen. The survey study was administrated via mail directed to the CEO of the firm. A total of 842 useful answers were received out of the targeted sample of 2766. This corresponds to a response rate of 30.5 percent. The model was tested by Structural equation modelling techniques and the software AMOS 5.0.

The questionnaire was developed based on a pre-study of four interviews and existing measurements. We used the pre-study to test the adequacy of the overall model. The questionnaire was pre-tested in seven rounds where adjustments were made in-between the tests when found essential in order to polish on the design and consequently, try to limit the failure rate. (See Alpar & Spitzer 1989.)

**Firm performance.** Six items were used to measure the development rate in relation to important competitors, inspired by Zahra & Covin (1993), Ettlie et al. (1984), Miller & Friesen (1982), and Miller (1988).

**Competence acquisition.** This measure was based on the product of (1) questions covering how common a specific mode was used for solving a specific competence need during the last three-year period and (2) how satisfied the entrepreneur, in general, is with the outcome from using that mode. Both the market and the social network mode were each divided into two variants; to buy and to hire. Accordingly, five variants of modes to acquire competence were measured in each of the three strategic areas. A factor analysis was conducted regarding the variants of modes, which prove that sorting the modes in these particular five variants of competence acquisition modes was empirically supported. Taken together, the index for each variant of mode was based on six items; the sum of frequency in use in the three strategic areas (3 items), and the sum of rated satisfaction from the use in the three strategic areas (3 items). Accordingly, in the model tests, the modes are treated as five separate variants representing use of modes.

**Competence base.** Several attempts have been made to approach a mirroring of the competence base. Common measures for these terms are; level of formal education and skills, which the latter refer to being fully trained for a position or not. The number of years in the work position is also a measure commonly used to indicate the work experiences of the employees. Several authors recognizes the criticism, which has been directed towards using aggregate formal education level to describe the competences of the firm as it disregards the informal development of the competence in the firm operations (see Ylinenepää 1997). To account for this criticism and to avoid the bias of formal education or similar measurements, we used reputation to capture the firm’s competence base. Reputation is viewed in terms of (1) the perceived attractiveness of the firm as a work place (3 items), and (2) the perception of the picture for how the customers’ view the competence base (3 items). This choice is supported by the fact that (1) reputation appears as a measure of a more “objective” nature, since it is a less straightforward way to measure the competence base, (2) having a competence base with a large portion having high degree of university degrees does not, per se, provide a better competence base, the education has to be put to use. Accordingly, as interesting as the
education level and the work experience level of employees are, by stating the formal competence level as well as the informal level, they do not say how these competences come to productive use in the firm. We also checked and found that (3) the content and the capacity aspects (areas and level of the employees’ education and work experience) of the competence base correlates with reputation. Therefore, we measured competence base with the items presented.

Business concept. The core of the business concept is measured by three items. The question is original, but inspired by Normann (1985), and generated to find out how challenging the business concept is (Tidd & Trehwella 1997). The business concept is treated as an index based on the three items measuring the importance aspects of the business concept.

Entrepreneur’s characteristics. The main focus in the entrepreneur’s education is covered by two items; type of education and level of education (Manolova et al. 2002, Wiklund 1998). The entrepreneur’s experiences were measured by six items capturing the scope of work experience within strategic areas, the length of experience from working in the current industry, the length of experience from being in a position as a manager, and length from being in present CEO position. (Davidsson 1989, Wiklund 1998, Manolova et al. 2002, Bjoimolt & Zwart 1994). An index was made from all these items. Four items were used for capturing the entrepreneur’s tolerance for ambiguity and were taken from Westerberg (1996; 2001) which were originally modified from Lorsch & Morse (1974).

Complexity of technology. Four items captured the complexity of technology, where two aimed for capturing aspects of routine tasks, while two dealt with encircling analyzability of tasks (Westerberg 2001, Macintosh 1995, Miller 1993). In order to analyze and test how the model works in different complexity contexts, two separate contexts were set; one characterized by high complexity and one characterized by low complexity regarding technology. The upper 25 percent and lower 25 percent, so-called quartiles, of respondents were used in order to encircle such contexts. The lower quartile, which identifies firms belonging to a context of low complexity, show that firms having an index of 2.5 or lower are such firms. The upper quartile identifies firms having an index of 3.75 or higher as those belonging to a context of high complexity.

Environmental uncertainty. The measures of environmental uncertainty regard the entrepreneur’s perception of the surrounding environment, and has many sources of inspiration (Daft et al. 1988, McKee et al. 1989, Mullins & Cardozo 1992, Child 1972, Zahra & Covin 1993, Hall 1992, Ettlie et al. 1984), but is mainly based on three items from Wiklund (1998). In order to test how the model works in two sets of uncertainty contexts; high and low environmental uncertainty, the upper 25 percent and lower 25 percent of the quartiles were used. Firms having an index of 3.35 or lower were identified as belonging to a context of low uncertainty. Firms having an index of 4.00 or higher were identified as those belonging to a context of high uncertainty.
4 Results and discussion

Test in full sample. In a first step, the model was tested on the full sample. We found that some direct effects from the inheritance factors were evident, whereby we acknowledge these in our model test to avoid misspecification error. We notice the model fit measures suggest that the data does not fit the theoretical model perfectly. The p-value of the chi-square statistics ($\chi^2$) is .000, which indicates a non-acceptable fit. Also the CMIN/DF is 12.540, which can be regarded as quite high when considering the recommendations from Wheaton et al. (1977) and Carmines & McIver (1981). These measures are known to have shortcomings, whereby we turned to measures that are more stable for complexity and sample size. The root mean square error of approximation (RMSEA) is suggested by Steiger & Lind (1980) to compensate for the effect of model complexity, where a value of about 0.1 or less for the RMSEA would indicate a reasonable error. The RMSEA in this model test is .117, which is also above the limit, and therefore, too high to indicate a reasonable error of approximation. The NFI and IFI, which are less dependent on sample size (see Bollen 1989, Loehlin 1987), are also indicating a model that does not perfectly fit the data. Bentler & Bonett (1980) suggest that models with (NFI) overall fit indices of less than .9 can usually be improved substantially. In this model test the NFI is below that limit, it is .801, but still closer to perfect fit than to no fit. According to Bollen (1989), IFI values close to 1 indicate a very good fit. In this model test, the IFI reaches .814, which also could be considered rather low. Therefore, we conclude that better explanations than the proposed model could be found with regard to the data at hand. Below, Fig. 2 illustrates the results of the model test.
Use of two out of five variants of competence acquisition modes relate to firm performance, the internal mode and the social network variant, to hire. The relation with the internal mode is strongly significant but report a small coefficient ($b = 0.018; p <.001$). The relation with the social network variant, to hire is weakly significant but also with a small coefficient ($b = 0.009; p <.05$). The competence base relates to all variants of competence acquisition modes. Of these relations, three are strongly significant; the relations with use of the internal mode ($b = 1.451; p <.001$) and use of the social network variant, to hire ($b = 1.328; p <.001$) have large coefficients, meanwhile, the relation with the social network variant, to buy, has a quite large coefficient ($b = 0.917; p <.001$). The relations with the two variants of market mode, to hire ($b = 0.479; p <.05$) and to buy ($b = 0.381; p <.05$), are both significant with moderate sized coefficients. The competence
base proves a direct relation to firm performance, which is strongly significant, but the coefficient is small ($b = 0.145; p<.001$). The business concept has visible relations with use of two out of five variants of competence acquisition modes, namely with use of the internal acquisition mode ($b = .813; p<.01$) and with use of the market mode variant, to hire ($b = .626; p<.01$). Both relations are significant and the coefficients are between moderate-sized and large. In addition, the business concept has a direct relation with firm performance, which is strongly significant but with a small coefficient ($b = .145; p<.001$).

The entrepreneur’s education proves no visible relations with any variant of modes, or with firm performance. The entrepreneur’s experience has visible relations with three out of five variants of competence acquisition modes; the social network variant, to hire ($b = .735; p<.001$), the market mode variant, to hire ($b = .403; p<.05$), and the market mode variant, to buy ($b = .531; p<.01$). The entrepreneur’s tolerance for ambiguity has visible relations with four of five variants of competence acquisition modes; use of the internal mode ($b = .814; p<.001$), use of the social network variant, to hire ($b = .961; p<.001$), and use of both variants of market mode, to hire ($b = .397; p<.05$) and to buy ($b = .426; p<.05$). The relations with the internal mode and the social network variant, to hire, are strongly significant with large coefficients. The relations with the two variants of a market mode are both weakly significant and with moderate-sized coefficients. The entrepreneur’s tolerance for ambiguity also relate directly to firm performance, a relation which is strongly significant but with a small coefficient ($b = .116; p<.001$).

Discussion of test in full sample. There is of course much that could be discussed, but we choose some prominent notations. Firstly, the use of modes cannot be disregarded from when addressing small firms and their ability to improve their firm performance. In addition, the use of competence acquisition modes that result in competence being tightly connected to the firm (internal or social network modes), are those modes that proves the greatest potential for a positive influence on firm performance. Secondly, the firm’s competence base appears to have a positive impact on use of all variants of modes. Accordingly, the results on the competence base appear to agree with the ideas of the competence based view. Thirdly, the relations between the variants of modes used and firm performances are surprisingly few, and the visible relations’ coefficients appear to be weak. However, the competence base appears to have a direct effect on firm performance, which, in fact, explicitly notifies us that competence does matter for firm performance. This result is also in line with how Bijmolt & Zwart (1994) argue. In order to gain and sustain a viable competence base, competence needs to be acquired. Accordingly, we argue that though the visible effects from use of acquisition modes are small in the present model test, it still does not make the discussion senseless.

Test on sub-samples. Table 1 reveals that the four context models prove considerably better model fit than the test of the first overall model. All have CMIN/DF below 6, and three of the models have measures around or below five. What is interesting to note is that the model fit tends to be better in a context of high complexity or a context of high uncertainty. This implies that the model, as such, work better in contexts characterized by high complexity levels, and characterized by high uncertainty levels.
Table 1. Model fit measures.

<table>
<thead>
<tr>
<th>Measures</th>
<th>CMIN</th>
<th>DF</th>
<th>P</th>
<th>CMIN/DF</th>
<th>IFI</th>
<th>NFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model test – low complexity</td>
<td>71.621</td>
<td>12</td>
<td>.000</td>
<td>5.968</td>
<td>.817</td>
<td>.787</td>
<td>.127</td>
</tr>
<tr>
<td>Model test – High complexity</td>
<td>31.230</td>
<td>13</td>
<td>.003</td>
<td>2.402</td>
<td>.901</td>
<td>.841</td>
<td>.081</td>
</tr>
<tr>
<td>Model test – low uncertainty</td>
<td>66.284</td>
<td>13</td>
<td>.000</td>
<td>5.099</td>
<td>.777</td>
<td>.737</td>
<td>.141</td>
</tr>
<tr>
<td>Model test – High uncertainty</td>
<td>56.883</td>
<td>12</td>
<td>.000</td>
<td>4.740</td>
<td>.829</td>
<td>.792</td>
<td>.107</td>
</tr>
</tbody>
</table>

Test in low complexity. Only one out of five variants of competence acquisition modes proves a visible relation with firm performance in a context of low complexity, and that is use of an internal mode ($b = .017; p<.01$). There are four visible relations between the competence base and use of variants of modes in a context of low complexity. Two of these relations are strongly significant with coefficients between large and very large, namely, the relations with use of the internal mode ($b = 1.547; p<.001$) and use of the social network variant, to hire ($b = 2.661; p<.001$). In addition, the relation with the social network variant, to buy ($b = 1.044; p<.01$), has a large coefficient and has a moderately strong significance level. The relation with the market mode variant, to buy ($b = .882; p<.01$), has a moderately strong significance level and a quite large coefficient. In addition, the competence base has a visible direct relation with firm performance, which has a moderately strong significance level and a small to medium-sized coefficient ($b = .139; p<.01$). The business concept has only a visible relation with one out of five variants of competence acquisition modes; an internal mode ($b = 1.184; p<.01$). The business concept also relates directly to firm performances ($b = .139; p<.01$). The entrepreneur’s education has a visible relation with one of the five variants of modes, which is with use of the market mode variant, to hire ($b = -.447; p<.05$). This relation has a negative semi-large coefficient and the significant level is weak. In addition, the entrepreneur’s experiences do also show one visible relation that is negative, which is with use of the social network variant, to hire ($b = -.919; p<.01$). Though both negative relations regard hiring new employees, they differ as the entrepreneur’s education relates to a market mode and the entrepreneurs experience relate to a social network mode. The sub-variable, the entrepreneur’s tolerance for ambiguity has visible relations with use of two out of five variants of modes; the internal acquisition mode ($b = .822; p<.05$) and the social network variant, to hire ($b = .879; p<.05$).
Fig. 3. Results from testing of research model in a context of low complexity. (The figure illustrates a simplified model where measurements errors are not included. An arrow between two of the boxes indicate a relationship. The exogenous variables are open for correlation. Dotted lines refer to negative coefficients. * = p<.05; ** = p<.01; *** = p<.001. Unstandardized values are reported on the coefficients.).

Test in high complexity. Only use of the internal acquisition competence acquisition mode proves a visible relation with firm performances in a context of high complexity (b .013; p<.05). The competence base has only visible relations with two out of five variants of mode. One of those relations is with use of the internal acquisition mode (b 1.263; p<.05), the other relation with use of the market mode variant to hire (b 1.016; p<.05). The competence base has also a visible direct relation with firm performance (b .177; p<.001). The business concept has one visible relation, which is with use of the social network variant, to hire (b 1.116; p<.05). There are no visible relations between the entrepreneur’s education and use of variants of modes in a context of high complexity. On the contrary, the entrepreneur’s experience relates to three of the five variants of competence acquisition modes. The relation with use of the market mode variant, to buy
has a large coefficient (b 1.377; p<.01). The other two relations, with the social network variant, to hire (b -.988; p<.05) and the market mode variant, to hire (b -.908; p<.05) are both negative. The entrepreneur’s tolerance for ambiguity has visible relations with three out of five variants of modes; the internal acquisition mode (b 1.116; p<.05), the social network variant, to hire (b .911; p<.05), and the social network variant, to buy (b .893; p<.05) in a context of high complexity. The entrepreneur’s tolerance for ambiguity shows a visible direct relation with firm performance, with a small to medium-sized coefficient, which has a semi-strong significance level (b .177; p<.001).

Fig. 4. Results from testing of research model in a context of high complexity. (The figure illustrates a simplified model where measurements errors are not included. An arrow between two of the boxes indicate a relationship. The exogenous variables are open for correlation. Dotted lines refer to negative coefficients. *= p<.05; **=p<.01; ***=p<.001. Unstandardized values are reported on the coefficients.)
Discussion of tests in high and low complexity. We notice several areas worthwhile discussing. It appears as in a context of high complexity, the driving forces behind use of competence acquisition modes are more spread between the inheritance factors compared to the spread in a context of low complexity. In the context characterized by high complexity, the competence base appears to influence fewer variants of modes compared to how the competence base seems to work in a context characterized by low complexity. Instead the entrepreneur appears to fill a greater function in use of modes in a context of high complexity. Both the entrepreneurs’ experiences and the entrepreneurs’ tolerance for ambiguity appear to influence more variants of modes compared to how the two sub-variables work in a context of low complexity. Accordingly, there is a tendency that the entrepreneur becomes more central for use of variants of competence acquisition modes in a context of high complexity, which appears to be a shift compared to a context of low complexity. Thus, the central driving force in use of competence acquisition modes tends to shift from the competence base to the entrepreneur, when the character of the context shifts from low to high complexity. In fact, when the context is difficult to understand and hard to interpret, management by “gut-feeling” appears to become both a driving force and a compass in firm actions. While in a context, where it is easy to understand and interpret the surrounding, the competence base appears to work as a driving force guiding firm action. The gap between what competence the firm has, and what competence the firm needs or expect to need, appear to drive for firm actions in use of competence acquisition modes in a context of low complexity.

In both types of complexity contexts tested in the present study, there are indications that the competence acquisition modes, which offer tight connection with the firm, are emphasized by the relations with the inheritance factors. This result differs from what was suggested by both Tidd & Trehwella (1997) and Kelly & Rice (2001), who maintain that with high complexity comes more incentives for using more external modes. Further, the results show no visible relations between use of external modes and firm performance. Aldrich & Fiol (1994) may offer an explanation to the lack of relations. They argue that when core competence is at hand, which are of crucial importance for firm performance, focus is on use of an internal mode due to the possibility to remain the barriers to imitation. Tidd et al. (2001) argue in line with the above by suggesting that external modes are only used when the type of competence being acquire is not directly related to the core competencies of the firm. Accordingly, the incentives for using external modes may increase as the complexity level increases. However, if external modes are used regardless of the complexity level, the use appears to be focused on non-core competitive issues, which may be one reason for the lack of relations between external modes and firm performance.

Tidd & Trehwella (1997) argue that when the overall technology is sufficiently complex the firm must be prepared to access enabling competence externally even though all strategic competence can be retained internally. Such a difference between contexts of high and low complexity is not obvious in these model tests. The present model tests prove a slight tendency indicating that in a context of low complexity, the coefficients between the inheritance factors and use of tightly connected modes are stronger. The strengths of the coefficients are in line with how Wernerfelt (1984) argues. He reasons that one barrier of imitation can be found in the degree of complexity in the process of offering products and services to the market. Thus, the higher the complexity level, the
greater the opportunities for creating and maintaining barriers to imitation. This presumed relation might be one reason why there is a tendency that the modes, besides an internal mode, appear to be used in a less structured way in a context of high complexity compared to a context of low complexity. In a context of high complexity it may not be necessary, in order to protect from imitation, to act as structured. In both types of complexity contexts, use of an internal mode is emphasized why use of an internal mode might primarily be for other reasons than for building barriers to imitations.

Further, in a context of high complexity, the business concept appears to drive for use of the social network in order to hire personnel, which is in contrast to how it works in a context of low complexity. The two settings allow for different mechanisms to work regarding the use of the social network. The difficulty in understanding the competence need in all areas of the business concepts may vary with the degree of complexity. When the context is characterized by high complexity, the difficulty in understanding the competence need is great, and using the social network in order to acquire competence might prove to be beneficial. On the contrary, when the context is characterized by low complexity, the competence need in all areas are more easily interpreted and understood. As a consequence, use of the social network to acquire the “right” competence might be considered risky as it might allow outsiders to obtain insight into important issues of the firm.

Test in low uncertainty. Only one of the five variants of competence acquisition modes, namely use of the internal mode, proves a visible relation with firm performance in a context characterized by low uncertainty ($b = .02; p<.01$). The competence base proves to have strong relations with use of both variants of a social network mode in a context of low uncertainty. The coefficients are large in both relations with the social network variant, to hire ($b = 1.312; p<.01$), and the variant, to buy ($b = 1.516; p<.01$). The competence base also relates directly with firm performance in a context of low uncertainty ($b = .176; p<.01$). There exist no visible relation between the business concept and use of any variant of modes in a context characterized by low uncertainty. In this context, the business concept only relates directly to firm performance ($b = .114; p<.05$). There exist no relations between the entrepreneur’s education and use of variants of modes or with firm performance in a context of low uncertainty. The entrepreneur’s experience has one visible relation, which is a negative relation with use of the social network variant, to hire ($b = -.836; p<.05$). The entrepreneur’s tolerance for ambiguity proves to have most relations with use of variants of modes compared to the other inheritance factors in a context of low uncertainty. The entrepreneur’s tolerance for ambiguity relates with use of the internal mode ($b = 1.450; p<.01$), use of the social network variant, to hire ($b = 1.044; p<.05$), and use of the variant of a market mode, to buy ($b = 1.331; p<.01$).
Test in high uncertainty. In a context characterized by high uncertainty, only use of the internal mode proves a visible relation with firm performance \((b \ 0.017; \ p<.01)\). The competence base has visible relations with two of the five variants of modes. One relation is with the internal mode \((b \ 2.027; \ p<.001)\), and the other relation is with the market mode variant, to hire \((b \ 0.900; \ p<.05)\). In addition, the competence base has a direct relation with firm performance in a context of high uncertainty \((b \ 0.139; \ p<.01)\). The business concept has a visible relation with one of the five variants of modes in a context of high uncertainty, which is with the market mode variant, to hire \((b \ 0.922; \ p<.05)\). In addition, the business concept also proves a visible direct relation with firm performance \((b \ 0.155; \ p<.001)\). The entrepreneur’s education has no visible relation with any variant of mode, or with firm performance. The entrepreneur’s experience has two negative relations...
relations and one positive with use of variants of modes in a context of high uncertainty. The negative relations are with use of the internal mode ($b = -0.778; p < 0.05$) and with use of the social network variant, to hire ($b = -0.850; p < 0.05$). The positive relation is with use of the market mode variant, to buy ($b = 0.859; p < 0.05$). The entrepreneur’s tolerance for ambiguity has two visible relations with use of variants of modes in a context of high uncertainty. More specifically, the entrepreneur’s tolerance for ambiguity relates with use of the internal mode ($b = 0.868; p < 0.05$), and use of the social network variant, to hire ($b = 1.183; p < 0.001$). The entrepreneur’s tolerance for ambiguity proves a visible direct relation with firm performance ($b = 0.078; p < 0.05$).

Fig. 5. Results from testing of research model in a context of high uncertainty. (The figure illustrates a simplified model where measurements errors are not included. An arrow between two of the boxes indicates a relationship. The exogenous variables are open for correlation. Dotted lines refer to negative coefficients. *= $p < 0.05$; **= $p < 0.01$; ***= $p < 0.001$. Unstandardized values are reported on the coefficients.).
Discussion of tests in high and low uncertainty. A strong competence base seems to have a direct effect on firm performance in both a context of high uncertainty and a context of low uncertainty, which in fact is a visible relation apparent in all five model tests. This indicates that the strength of the competence base matters for firm performances regardless of the uncertainty level of the context. Still, there seems to be a tendency of a shift towards use of modes, which offer more tightly held competence in a context of high uncertainty compared to a context of low uncertainty. A strong competence base appears to have visible relations with both an internal acquisition mode and the social network variant, to hire, in the context of high uncertainty. Meanwhile, in the context of low uncertainty, a strong competence base appears to have relations with the two variants of a social network mode. Accordingly, a strong competence base appears to drive for tightening the boundaries for competence acquisition actions as to be handled in closer control of the firm in contexts of high uncertainty compared to contexts of low uncertainty. This result is in contrast to what was suggested in the literature (Kelly & Rice 2001, Tidd & Trehwhella 1997, Covin & Slevin 1989). However, the results might still be natural since a context characterized by low uncertainty might allow for “wider turns in actions” in terms of solving competence needs.

Overall, the inheritance factors appear to influence more variants of modes in a context of high uncertainty compared to in a context of low uncertainty. One point of difference between the contexts of high and low uncertainty is the number of the total relations being visible. In the context of low uncertainty fewer relations (8) are visible compared to the context of high uncertainty (11). This difference may be viewed as an indication of the level of watchfulness of the firms. In contexts of high uncertainty, the firms may need to stay on their “toes” and be prepared for changes. Meanwhile, in contexts of low uncertainty, there is a lesser need for alertness as it is easier to foresee environmental changes. It has been suggested that using external modes means provision of “windows” on emerging or rapidly advancing areas (Tidd & Trehwhella 1997, Moreau 2000, Durand & Quelin 2000, Sanchez et al. 1996), which is why the reasoning on “watchfulness” seem natural. This result can further be viewed in the light of the results presented by Berglund & Blomquist (1999). They conclude that firms acting in a simple and stable environment (cf. low uncertainty) invest small efforts into competence acquisition compared to firms acting in a complex and dynamic environment (cf. high uncertainty). In fact, Berglund & Blomquist tie the characteristic of the environment with the focus of competence building or competence leveraging by suggesting that a simple environment involves mainly preservation of competence, relating to competence leveraging, while a complex and dynamic environment involves mainly renewal of competence in line with competence building.

A challenging business concept appears to have a direct effect on firm performance in both uncertainty contexts. However, only in the context of high uncertainty do a challenging business concept seems to have an impact on any variant of modes. In fact, a challenging business concept appears to have a relation with the market mode variant, to hire. Accordingly, in a context of high uncertainty, firms with a challenging business concept seems to promote use of a market mode to expand the own competence base, in line with keeping the firm’s “tentacles” active, as suggested by Covin & Slevin (1989). The use of an internal acquisition mode appears to be of some importance for firm performance in both uncertainty contexts, as in all model tests. On the other hand, there
are no obvious direct effects from the other variants of modes on firm performance in either of the uncertainty contexts. This implies that regardless of the uncertainty level of the context, the use of external modes do not show visible relations with firm performance. This unexpected result was addressed in a previous model test in the context of complexity. Although the results can be discussed in similar ways, complexity is not the same as uncertainty.

The entrepreneur’s tolerance for ambiguity appears to have impact on more variants of modes in a context of low uncertainty compared to the visible impact of the entrepreneur’s tolerance for ambiguity in a context of high uncertainty. However, in a context of high uncertainty, the entrepreneur’s tolerance for ambiguity seems to have a direct effect on firm performance, which is not visible in the context of low uncertainty. It seems natural that high tolerance for ambiguity has a direct relation with firm performance in a context of high uncertainty. The underlying reasoning is that the nature of the context requires the entrepreneur to have high tolerance for ambiguity in order to also perceive the comfort level needed for pursuing competence acquisition action. Otherwise, an entrepreneur with low tolerance for ambiguity might be “handicapped” by the high uncertainty level in a context.

On the contrary, in a context of low uncertainty, the level of tolerance of ambiguity appear to be of no direct visible consequence for firm performance, perhaps due to that the context itself allow for a certain comfort level for entrepreneurs regardless of the level of tolerance for ambiguity. The idea that the context allows for a broader sense of comfort in the entrepreneur’s actions might also provide some insight into the more spread use of variants of modes in a context of high uncertainty compared to a context of low uncertainty. Suggesting that in a context of low uncertainty, a higher level of comfort is perceived, which requires a lower need to keep a wide variety of options open.

The results in this study also indicate that in a context of high uncertainty, an entrepreneur with low tolerance for ambiguity avoid taking actions in use of competence acquisition modes, and has no direct relation with firm performance. These results are somewhat in line with a conclusion made by Westerberg (1996). He suggests that high tolerance for ambiguity is positive in uncertain environments, while high tolerance for ambiguity seems negative in stable environments. He reasons that persons with high tolerance for ambiguity might take too many risks in a stable environment when the rewarding actions may be to “play it safe”, as he puts it. Still, it needs to be noted that in a context of low uncertainty, high tolerance for ambiguity matters for use of the market mode variant, to buy, which do not appear in a context of high uncertainty. Consequently, entrepreneurs with high tolerance for ambiguity do access competence in contexts of low uncertainty in a structured way, which is different from entrepreneurs with low tolerance for ambiguity. This difference is not visible in a context of high uncertainty.

There is an indication of a frequency level difference in use of the two variants of social network mode as there tends to be a slightly greater use in a context of high uncertainty compared to the use in a context of low uncertainty. These tendencies indicate that the uncertainty level in the context works as a contingency aspect on use of a social network mode.
5 Concluding remarks and study limitations

What appears to be valid in all five model tests is the importance of the strength of the competence base for understanding how competence is acquired. Also, all five model tests prove that an internal competence acquisition mode relates to firm performance, and that a strong competence base relate to firm performance. The model tests point out that firms do stretch their business arena via acquiring competence by using external modes. However, the use of external modes does not prove visible effects on the firms’ performance. This lack of visible effects indicates that the stretch, despite the fact that it involves competence acquisition, do not revolve around those competencies that are directly related to a firm’s competitive core. The nature of the stretch could rather be referred to support activities for the internal acquisitions and the firm’s competence base, which both appear to relate to firm performance.

The suggestion that a strong competence base leads to more competence investments by using more modes is supported by the results from these model tests. The following suggestions that a strong competence base would mean that internal modes are favoured or that a strong competence base leads to more extensive use of external modes are not clearly supported by the model tests. The results appear to provide a more complex picture regarding use of modes and relations with a strong competence base. The opposite suggestion, that a weak competence base would mean that internal modes are favoured, or that a weak competence base would mean that external modes are favoured are more clear as none of the suggestions are supported. The results suggest that a weak competence base prove no sign of any structure in use of competence acquisition modes. Accordingly, a weak competence base does not seem to lead to a particular focus in use of modes.

The entrepreneur’s experiences appear to, in many contexts, prove negative relations. This means that the more experienced an entrepreneur is, the less the entrepreneur uses a particular mode. In fact, the only mode with which the entrepreneur’s experiences prove a positive relation is with the market mode variant, to buy. All the other visible relations appear to be negative. Accordingly, the inexperienced entrepreneur holds more options of modes to use open. Perhaps Tidd & Trewhella (1997) reasoning can offer some insights into this result. They state that an experienced entrepreneur will have a greater level of comfort in how to deal with competence acquisition. This is why the experienced entrepreneur holds fewer options open by using a narrow range of modes. Instead, the experienced entrepreneur will acquire competence in a stable manner by using fewer variants of modes compared to an inexperienced entrepreneur. This is in line with how Bowman & Hurry (1993) argue as they suggest that people seek to keep options open in situations that involve an unforeseeable future. Keeping options open is in line with use of a wide variety of modes.

Both Souitaris (2002) and Reuber & Fischer (1997) suggest that with experience comes the potential of more use of the social network variants. However, the results suggest that the actual use is the opposite; the more experience, the less use of the social network modes. Accordingly, the actual use of the social network variants appears to decrease with increased experience. Increased experience, leading to increased comfort level, might decrease the need for using the social network. But quite logically, the
opportunities to use the social network mode might still increase with increased experience. The suggestion that long experienced and highly educated entrepreneurs would use an internal acquisition mode to a greater extent could not be supported by the results in these model tests. Further, the results from these model tests do not show visible support for what Souitaris (2002) and Dyke et al. (1992) found, namely that experience relate directly to better firm performance. Education appears to be a factor that show the fewest (one) visible relations with any modes, and have no direct relation with firm performance. This result is in line with the arguments of Tidd et al. (2001) and Dyke et al. (1992).

Generally, the results prove that entrepreneurs with high tolerance for ambiguity use more variants of modes compared to entrepreneurs with low tolerance for ambiguity, which was expected. This result is also in line with the suggestion that an entrepreneur with low tolerance for ambiguity have a lower use of external modes. In addition, the results indicate that entrepreneurs with high tolerance for ambiguity do relate directly and positively to firm performance, which is suggested in the frame of references. However, the assumption that entrepreneurs' with a low tolerance for ambiguity would prefer use of an internal mode can not be supported by the results as such a visible relation cannot be found.

Like any study, this research has limitations. A response rate of around 30 percent as in this study is not in line with the statistical dream scenario. Consequently, the study has a rather large non-response rate to deal with. In order to handle the fact that two third of the sample did not respond, non-response analysis were carried out, were no significant differences of relevance for the results from this study were found. Still, it’s a fact that we cannot know how the non-response firms act regarding competence acquisition. The few and weak relations between used modes and firm performance raises the question of should we bother with the discussion on use of acquisition modes at all. We think so. First, this model is tested on an aggregated level where the different competence types are treated jointly. Instead, by analyzing the competence types separately, a more in-depth and less blurred picture on use of modes and outcome might be provided. However, such a sophisticated test on each competence type would not only make the five types of modes into fifteen, the number of independent variables would triple as well, and the complexity of the model would increase to a level where it would be difficult to interpret and comprehend the results, and thus, not serve the purpose of what a model is meant for.

Also, perhaps the integration of competence into the firm’s productions, products and services needs to be viewed in a longer perspective, as so the effects from the actions during the past three years needs to be interpreted a few years forward when the competence have had a more reasonable chance of being incorporated into the productions, products and services. Still, the choice to use a three year period in the present study is not unreasonable.

In addition, variables could be chosen differently and be focused on a different level, which might be of consequence for how the model works. The acquisition of competence could be size dependent, where larger or smaller competence items could be acquired dependent on the cost related to the acquisition. One possible consequence of other choices in how variables are studied might be a provision of a refined picture regarding the phenomenon of competence acquisition, and opportunities to verify the results in this
thesis. The explicit relations with firm performance provide some indications on contingency aspects on use of modes between the contingency contexts.

References

Browne MW & Mels G (1992) RAMONA User’s Guide. The Ohio State University, Columbus, OH.


