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François Therin

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François Thérin

Carol Dalglish

Grenoble Ecole de Management

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Pour plus d'informations :
For further information:

Rahim BAH
Grenoble Ecole de Management
12 Rue Pierre Sémard
38003 Grenoble Cedex 01
rahim.bah@grenoble-em.com

**Title: Leadership, Organizational Learning and Performance
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Authors:

François Thérin, Grenoble Ecole de Management – 12, rue Pierre Sémard, 38000

GRENOBLE – France. E-mail: therin@esc-grenoble.fr

Carol Dalglish, Brisbane Graduate School of Business – Australia. E-mail:

c.dalglish@qut.edu.au

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Abstract:

CEO's leadership is an organizational dimension that has not been carefully studied in the literature on small firms. Particularly, as organizational learning is now anchored as an important part of the building and sustaining of the small and medium firm's competitive advantage, how leadership characteristics may moderate the positive link between organizational learning and performance is important for managers and researchers. We could hypothesize that, combined with organizational learning processes, some leaders' characteristics and behaviours are more important than others to lead the development of an organizational climate oriented toward innovation or performance. This paper presents the theoretical framework and hypotheses of this on-going research on the links between organizational learning, leadership and performance in small and medium firms.

Key words: Learning, Absorptive capacity, Leadership

1. Introduction

This paper presents the first part of an on-going research on the impact of learning on innovation and performance.

If the link between learning and innovation or performance has recently received some empirical validations (Calantone et al., 2002; Therin, 2002), research still needs to be done to understand the criteria favouring or impeding this relationship (Damanpour, 1991). We focus on small firms evolving in high-tech environments. Small firms are often opposed to larger ones on two dimensions: the relative lack of resources and their relative faster reactivity. Thus, we can expect that the development of learning capabilities is crucial for them. As such, they are very good candidates for the study of organisational learning processes.

In line with previous research, this paper explores two dimensions. First, based on recent theoretical and empirical research on the operationalisation of learning dimensions, this paper tries to deepen the measurement of learning by introducing the operationalisation of the four dimensions of absorptive capacity. Second, in term of factors surrounding learning and performance, it suggests a model integrating leadership issues that have not been well studied to date in the learning literature.

This paper presents the theoretical issues around learning, absorptive capacity, innovation, performance and leadership. It then suggests a general model of study and develops hypothesis that would need empirical validation.

2. Organisational learning

The notion of learning, labelled either as knowledge management, organisational learning or learning organisation, is now well anchored in the literature as an important part of building and maintaining the firm's competitive advantage (e.g. Winter, 1987, Easterby-Smith et al., 1998). Organisational learning appears along with the development of core competences (Prahalad and Hamel, 1990) or dynamic capabilities (Teece et al., 1997) appears.

We define organisational learning as the set of capabilities aimed at collecting, adding value to and using effectively the internal and external knowledge gained by the firm. As such, this meta-construct encompasses several different dimensions or sub-constructs and is positioned transversely inside and outside the boundaries of the firm.

Learning is linked also with experience (Nevis et al., 1995) in terms of corrective (or single-loop), generative (double-loop) or meta-learning (McKee, 1992). It is the idea of "learning-by" associated with the notion of transferability (Grant, 1996) of tacit and explicit knowledge (Nonaka, 1994; Kogut and Zander, 1992). As such, learning is viewed

as a dynamic process in the sense that each component of the learning process will reinforce the others without predominance of one on the others or unidirectional causal links. As an example, the collecting capability will influence the “adding-value” capability but the reverse is also hypothesised.

2.1 Organisational learning and absorptive capacity

Over the last ten years, the concept of absorptive capacity has emerged in the literature as linked with organisational learning processes. It was first used in the explanation of technology transfers across nations (Kedia and Bhagat, 1988) or inside industries (Hakam and Chang, 1988), and it became more popular through Cohen and Levinthal’s work (1989, 1990, 1994). An interesting observation is that, in their earlier work, learning and absorptive capacity were not differentiated: “[...], we argue that while R&D obviously generates innovation, it also develops the firm’s ability to identify, assimilate, and exploit knowledge from the environment- what we call a firm’s *learning*’ or *absorptive*’ capacity” (Cohen and Levinthal, 1989:569, emphasis put by author).

The dual role of R&D, not only generation of internal knowledge but also assimilation of external knowledge, is explained by this mediating capacity. The main implication, which will be discussed later, is that internal R&D will be used in subsequent studies to measure the absorptive capacity (Cohen and Levinthal, 1990; Veugelers, 1997; Liu and White, 1997; Stock et al., 2001).

Questions arise about the similarity between learning capacity and absorptive capacity. Cohen and Levinthal (1990) have offered the most utilised definition of absorptive capacity. This definition encompasses the processes of identification, assimilation and exploitation of new information. Thus, it is very close to the issues of transferability, aggregation and appropriability (Grant, 1996), the assimilation process used to define learning organisations (Huber, 1991; Nevis et al., 1995), and the transformative capacity of core competencies (Garud and Nayyar, 1994). In subsequent works on absorptive capacity, researchers tried to escape from the synonymy by refining the concept and its measurements. Mowery and Oxley (1995) define it as a set of skills to manage both the tacit dimension of technology transfer and the modification for internal uses. Nevis et al. (1995) adopt a three-stage model with knowledge acquisition, knowledge sharing and knowledge utilization. Gilbert and Cordey-Hayes (1996) used a double dichotomy (or tetratomy) to describe knowledge transfer processes through the phases of acquisition, communication, application and assimilation, further refining it by adding the acceptance phase.

In a very similar vein, Zahra and George (2002) provide the latest definitions by distinguishing between potential absorptive capacity (PACAP) and realised absorptive capacity (RACAP). PACAP encompasses the acquisition and assimilation phases and RACAP the transformation and exploitation phases. These definitions are very close to Cohen and Levinthal's work but also incorporate and reconcile the different contributions of the literature.

Absorptive capacity encompasses a set of organizational processes aimed at maximizing the added value of externally acquired knowledge for the firm. We defend the idea that it is not ontologically different from what other researchers label organizational learning or knowledge management. Nevertheless, by refining the existing concepts and introducing several dimensions/capabilities for absorptive capacity (four in the case of Zahra and George, 2002), researchers help in the understanding of the multi-dimensional phenomenon. As such, we think that this set of four constructs is an improvement and needs development from an empirical point of view.

2.2 Definitions of the four constructs

Absorptive capacity includes potential absorptive capacity and realised absorptive capacity. Secondly, potential absorptive capacity encompasses the acquisition and assimilation capabilities.

Acquisition is defined as the capability to identify and acquire externally generated knowledge (Zahra and George, 2002) with a particular emphasis on the intensity and speed of the associated processes. In a case study on a semi-conductor company, Kim (1997) showed that the speed of identification influences the speed of acquisition.

Assimilation encompasses the processes of analysing, processing, interpreting and understanding the knowledge acquired. This part is particularly crucial as it will allow the correct use of the knowledge. Particularly, if the knowledge gained is not understood in

the light of the firm's needs, pertinent knowledge may be rejected or useless knowledge may be incorporated. At this stage, value is added to knowledge.

Transformation refers to the processes aimed at combining the knowledge acquired with the existing knowledge. The same issue for assimilation may arise. Finding the right way to integrate new knowledge with the firm's knowledge base to enhance the existing competencies or create new ones is critical.

Finally, exploitation deals with the processes of refinement, extension and leverage of existing competencies or the creation of new ones by incorporating the knowledge acquired (Zahra and George, 2002). It implies the transfer into the routines of the organisation (Gilbert & Cordey-Hayes, 1996).

2.3 Role of R&D

R&D is presented as the by-product of absorptive capacity (Cohen and Levinthal, 1990; Veugelers, 1997; Liu and White, 1997; Stock et al., 2001) and used as a proxy to measure it. If it cannot be denied that internal R&D plays a role in the innovation and performance of the firm, using it as a valid measure of a complex phenomenon such as absorptive capacity certainly is reducing. Moreover, we argue that specifically the interplay between absorptive capacity and internal R&D is crucial. If the knowledge gained from outside the company cannot be melded with the internal one, it will have consequences on the efficiency of the learning processes and thus on performance. As such, the two

dimensions, R&D and absorptive capacity, have to be investigated as two separate constructs in term of performance implications.

As stated before, several studies have stated the theoretical link between learning and performance, but only a few have studied this link from an empirical point of view (Calantone, 2002; Therin, 2002) and in our knowledge none of them have empirically studied absorptive capacity, apart from using the internal R&D proxy.

3. Leadership issues

Innovation studies have also focused on individual CEO characteristics, as a motivator for innovation (Papadakis and Bourantas, 1998; Lefebvre and Lefebvre, 1992; Hegarty and Hoffman, 1990) and change. They try to resolve the innovator's dilemma (Christensen, 1997): how to cope with the necessity of development around a core of technologies and at the same time always renew the firm's activities.

Authors have a tendency to consider that the CEO's attitude will have a significant influence on innovation and business activity, specifically in small firms (Miller and Toulouse, 1986). The innovative strategy is "often determined by executives on the basis of their goals and temperaments" (Miller and Friesen, 1982). Following Miles and Snow (1978), the strategic posture given to the firm influences the firm. Also, the need for an executive champion, or champions was emphasized (Rothwell et al., 1974, Kotter 1996).

Politis (2001) has found that leadership styles like participative behaviour and mutual trust and respect for subordinates are positively related to knowledge acquisition attributes.

Bierly et al. (2000) argue that transformational leadership defined as including charisma, inspiration, intellectual stimulation, and individualised consideration will improve the impact of organisational learning on competitive advantage.

Sinkula et al. (1997) identify the core components of a learning orientation as:

- Commitment to learning: simply stated, if an organization does not believe in learning, learning may not occur.
- Open-mindedness: related to the idea of competency trap or core rigidities, an organization must be able to challenge the existing situations, or unlearn (Nystrom and Starbuck, 1984).
- Shared vision: shared vision influence the direction, or focus of learning.

The concept of a shared vision together with the focus on effective communication of both direction and values appear to be particularly significant to effective leadership.

“...it (leadership) produces movement. Throughout the ages, individuals who have been seen as leaders have created change, sometimes for the better and sometimes not. They have done so in a variety of ways, though their actions often seem to boil down to

establishing where a group of people should go, getting them lined up in that direction and committed to movement, and then energizing them to overcome the inevitable obstacles they will encounter along the way” (Kotter 1990)

Whilst the discussion of leadership characteristics continues in many hundreds of texts, there is emerging a view of what leaders do, the function they fulfil in any organisation or community, as opposed to personal characteristics and leadership style. Bennis (1989) has been a key writer in this area, but whilst the words may be different, many writers have identified the critical roles or functions of a leader.

These roles or functions include:

Creating a vision, direction, goals (Gardner, 1990; Bennis, 1989; Kotter, 1990; Conger, 1992; Gardner, 1997; Mariotti, 1999), Communicating with followers (Gardner, 1990; Bennis, 1989; Mariotti, 1999), Motivating and empowering (Gardner, 1990; Kotter, 1990), Affirming/ reaffirming values (Gardner, 1990; Freiberg 1998), Aligning people - management of meaning - achieving workable unity (Gardner, 1990; Bennis, 1989; Kotter, 1990; Conger, 1992; Gardner, 1997), and the Management of Trust (Bennis, 1989; Gardner, 1997).

The question then is - are these roles of creating a vision, aligning relevant stakeholders, motivating and empowering followers, and engendering trust, relevant to organisational learning and performance in small and medium firms? Are they in fact critical to

success? Does leadership, as suggested by Moore & Buttner (1997), play a key role in the survival and success (performance) of small and medium ventures?

4. An integrative model

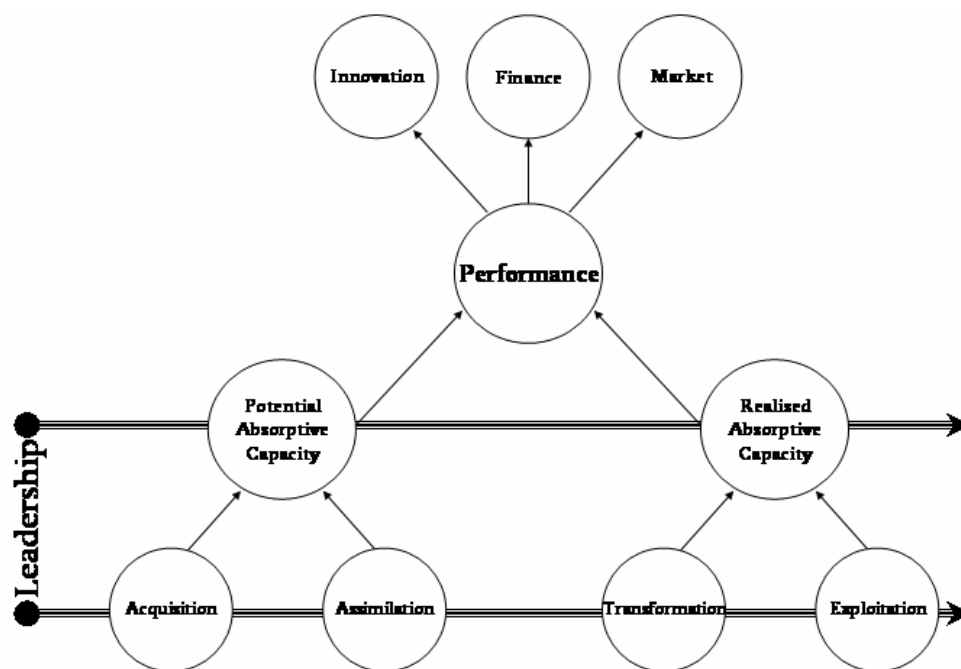


Figure 1: General model for absorptive capacity, leadership and performance

The model presented above builds on the existing literature and delimits the scope of the research question raised in this paper. Of course, several other internal and external factors could interfere with the building of learning capabilities, such as age (Sorensen and Stuart, 2000), strategic orientation (Senge, 1990; Zack, 1999) or the use of technology alliances (Jolly & Therin, 2003).

4.1 Associated hypotheses

In line with the preceding studies, hypotheses can be drawn between the processes of managing knowledge and the performance of the firm. Differential absorption capacities induce different learning rates (Kumar & Nti, 1998). A learning organization will obtain accurate internal and external information and be able to reorganize itself to use it in an effective way and thus perform better than the others (Senge, 1990; Nevis et al., 1995; Leonard-Barton, 1997; Mone et al., 1998; Sorensen & Stuart, 2000). Of course, we make also the hypothesis that the different constructs will be pass the different validities tests.

Hypothesis 1: PACAP is positively associated with the performance of the firm.

Hypothesis 2: RACAP is positively associated with the performance of the firm.

Furthermore, as it is viewed as a continuum, we can hypothesis that the more PACAP, the easier it will to transform it into RACAP:

Hypothesis 3: PACAP has a positive influence on RACAP.

Zhara and George (2002) insist on the necessity of having formal processes inside the firm associated with the four capabilities of absorptive capacity. As such, at the same

level of capabilities, companies having formal processes should surpass companies having informal processes.

Hypothesis 4: At the same level of capabilities, companies with formal processes should outperform companies with more informal processes.

Following our discussion about leadership, we could hypothesise that certain leadership characteristics, such as vision and communication of meaning, will create surrounding atmosphere conducive to learning. As the processes put in place are as important as the behaviours created (Zhara and George, 2002), leadership dimensions may influence behaviours, processes or both of them. As this research is strongly exploratory and can not be grounded on several preceding studies, those hypotheses must remain very broad. Regarding vision, it will act either as a facilitator or an inhibitor of absorptive capacity. If the CEO is learning oriented and shares his/her vision with all the employees, absorptive capacity should be higher. The same applies for communicating meaning.

Hypothesis 5: The positive link between the four absorptive capacity constructs will be stronger for firms whose CEO has stronger leadership attributes in term of vision and communicating meaning.

These leadership characteristics should also influence the implementation of processes. Here, the link may be different. If the values of the firm are communicated and

understood by all the employees, the necessity to develop formal processes to sustain the absorptive capacity may be less important.

Hypothesis 6: The influence of formal processes on the link between ACAP and performance will be lower for firms whose CEO has stronger leadership attributes in term of vision and communicating meaning.

4.2 Operationalisation

Absorptive capacity can be understood as a third-order construct made of two second-order constructs, potential and realised absorptive capacities, each made of two first-order constructs, respectively acquisition and assimilation for the potential absorptive capacity and transformation and exploitation for realised absorptive capacity.

Following Zahra and George (2002), the emphasis is put on the measure of specific behaviours/capabilities but also on the degree of formality of the processes used to sustain those behaviours/capabilities. The set of questions used to measure assimilation is presented in appendix 1 as an example.

Leadership is measured through 2 main constructs, vision and the communication of meaning.

Vision is defined as the ability to imagine different and better conditions and the ways to achieve them (Dubrin and Dalglis, 2003:70). The capacity to create a compelling vision

provides not only a direction for the organisation and the staff, but also a set of values to which the staff can align their activities.

Communication is defined as the ability to transfer meaning accurately to another person or persons. A vision by itself may not be enough to motivate and enthuse staff or encourage learning. It is vital that the vision, and the values it embodies are communicated in a way that adds meaning to staff activities. The communication needs to be continuous, reframing all activities to coincide with the vision and the values for staff.

Perceptual measures are also used instead of factual measures because of the small firm CEOs' reluctance to disclose financial data (Lefebvre et al., 1996). Furthermore, they are highly correlated to the factual measures (Sapienza et al., 1988). Those measures have demonstrated reliability in previous studies (Therin, 2002).

The questionnaire was pre-tested on a group of 20 middle managers to ensure the understanding of the questions and the reliability of the dimensions.

4.3 Further research

As stated previously, this paper presents the theoretical framework of an on-going study. The next step is to test our different hypotheses on a large sample of small businesses.

Meanwhile, we would encourage researchers to explore several areas of research. First of all, as attempts to operationalise learning are still scarce, other conceptual and empirical

studies are needed to better understand this phenomenon and its different implications for the development, sustainment and renewal of the competitive advantage of the firm. Second, as formal processes are associated with the four capabilities of absorptive capacity, and as they are hypothesized to have positive effects, researchers could explore what processes allow for better absorptive capacity, particularly the use of information systems to identify, store and use new knowledge. Tools like Customer Relationship Management software or EDI with the suppliers should enhance the absorptive capacity, *ceteris paribus*. As a complex phenomenon, both qualitative and quantitative studies should be useful.

5. Conclusion

Organisational learning is still today a largely misunderstood concept, both for researchers and practitioners, especially in terms of implementation within small and medium enterprises. As such, every attempt to open the black box, by deepening and refining the concept and confronting it to the real life of companies is helpful for both academics and practitioners. If ontological or epistemological developments on learning are numerous, there is definitely a need for more qualitative and quantitative studies on this topic.

This ongoing research tries to fill partially this need in several ways.

First, by confronting one of the latest conceptual developments on learning to empirical validation, we hope to strengthen the thinking and hypotheses of these last years on absorptive capacity. A number of challenging hypothesis has been formulated, which should be helpful in better understanding the learning processes.

Second, we introduce into the framework the concept of leadership, which has been scarcely associated with learning, even though the role of the CEO and the associated climate in the learning processes has been long acknowledged, particularly for small firms.

Finally, by focusing on small and medium sized companies, which constitute the largest contingent of companies both in industrialised countries and in high-tech industries, we hope also to help managers of those companies develop adapted tools to manage their knowledge valuation processes.

As an ongoing research, this paper does not attempt to provide definite answers in the understanding of learning processes in companies but at least to raise challenging discussions between its authors and its readers.

References

- Bennis, Warren, *On Becoming a Leader*, Addison Wesley Publishing company, 1989.
- Bierly, P.E, E.H. Kessler and E.W. Christensen, "Organizational learning, knowledge and wisdom", *Journal of Organizational Change Management*, 2000, 13(6), pp.595-618.
- Calantone, R.J., S.T. Cavusgil, and Y. Zhao, "Learning orientation, firm innovation capability, and firm performance", *Industrial Marketing Management*, 2002, 31, pp. 515-524.
- Christensen, C.M., *The innovator's dilemma. When new technologies cause great firms to fail*, Harvard Business School Press, Boston, 1997.
- Cohen, W. and D. Levinthal, "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, 1990, 35(1), pp.128-152.
- Cohen, W. and D. Levinthal, "Innovation and Learning: the two faces of R&D", *The Economic Journal*, 1989, 99(Sept.), pp.569-596.
- Cohen, W. and D. Levinthal, "Fortune Favors the Prepared Firm", *Management Science*, 1994, 40(2), pp.227-251.
- Conger, Jay A., *Learning to Lead*, Jossey Bass Inc. San Francisco, 1992.
- Damanpour, F., "Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators", *Academy of Management Journal*, 1991, 34(3), pp.555-590.
- Dubrin, A. and Dalglish, C., *Leadership, An Australasian Focus*. John Wiley & Sons: Brisbane, 2003.
- Easterby-Smith, M., R. Snell, and S. Gherardi, "Organizational Learning: Diverging communities of practice?", *Management Learning*, 1998, 29(3), pp. 259-272.
- Freiberg, K., "Leaders as value shapers", *Executive Excellence*; Provo Nov. 1998.
- Gardner, H., *Leading Minds*, Harper Collins, 1997.
- Gardner, J., *On Leadership*, The Free Press Macmillan Inc New York, 1990.
- Garud, R., and P.R. Nayyar, "Transformative capacity: continual structuring by intertemporal technology transfer", *Strategic Management Journal*, 1994, 15(5), pp. 365-385.
- Gilbert, M., and M. Cordey-Hayes, "Understanding the process of knowledge transfer to achieve successful technological innovation", *Technovation*, 1996, 16(6), pp.301-312.
- Grant, R.M., "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, 1996, 17(4), pp.109-122.
- Hakam, A.N. and Chang, Z.Y., "Patterns of Technology Transfer in Singapore: the Case of the Electronics and Computer Industry", *International Journal of Technology Management*, 1988, 3(1-2), pp.181-189.
- Hegarty, W.H. and Hoffman, R.C., "Product/market innovations: a study of top management involvement among four culture", *Journal of Product Innovation Management*, 1990, 7, pp.186-199.
- Huber, G., "Organizational learning: the contributing processes and the literature", *Organizational Science*, 1991, 2(1), pp.88-115.
- Jolly, D. and Therin, F., "New Ventures' Technology Sourcing: Exploring the Effect of Absorptive Capacity, Learning Attitude and Past Performance", *Babson Conference on Entrepreneurship*, 2003, Babson, June.
- Kedia, B.L. and Bhagat, R.S., "Cultural Constraints on Transfer of Technology across Nations", *Academy of Management Review*, 1988, 13(4), pp.559-572.

Kim, L., "The dynamics of Samsung's technological learning in semiconductors", *California Management Review*, 1997, 39(3), pp.86-100.

Kogut, B., and U. Zander, "Knowledge of the firm, combinative capabilities, and the replication of technology", *Organization Science*, 1992, 3(2), pp.383-397.

Kotter J.P., *Leading Change* Harvard Business School Press, Boston, MA: 1996

Kotter J.P., *A Force for Change*, The Free Press, New York, 1990.

Kumar, R., and Nti, K.O., "Differential Learning and Interaction in Alliance Dynamics: A Process and Outcome Discrepancy Model", *Organization Science*, 1998, 9(3), pp.356-367.

Lefebvre, E., and Lefebvre, L.A., "Firm Innovativeness and CEO Characteristics in Small Manufacturing Firms", *Journal of Engineering and Technology Management*, 1992, 9(3/4), pp.243-277.

Lefebvre, E., L.A. Lefebvre, and L. Prefontaine, "Technological Learning and Organizational Context: Fit and performance in SMEs.", *University of Montreal, CIRANO*, Working Paper 96-32, 1996

Leonard-Barton, D., *Wellsprings of Knowledge*, Harvard Business School Press, Boston, MA, 1997.

Liu, X. and White, R.S. (1997), "The relative contributions of foreign technology and domestic inputs to innovation in Chinese manufacturing industries", *Technovation*, 1997, 17, pp.119-125.

Mariotti, J., "The role of a leader", *Industry Week*, Cleveland Feb1, 1999.

McKee, D., "An Organizational Learning Approach to Product Innovation", *Journal of Product Innovation Management*, 1992, 9(3), pp.232-245.

Miller, D. and Friesen, P.H., "Innovation in conservative and entrepreneurial firms: two models of strategic momentum", *Strategic Management Journal*, 1982, 3, pp.1-25.

Miller, D. and Toulouse, J.M., "Chief Executive Personality and Corporate Strategy and Structure in Small Firms", *Management Science*, 1986, 32(11), pp.1389-1410.

Mone, M.A., McKinley, W., Barker, V.L., "Organizational Decline and innovation: a contingency framework", *Academy of Management Review*, 1998, 23(1), pp.115-132.

Moore D.P. and Buttner E. H., *Women Entrepreneurs*, Sage Publications, 1997.

Mowery, D.C. and Oxley, J.E., "Inward technology transfer and competitiveness: the role of national innovation systems", *Cambridge Journal of Economics*, 1995, 19, pp.67-93.

Nevis, E.C., A.J. DiBella, and J.M. Gould, "Understanding Organizations as Learning Systems", *Sloan Management Review*, 1995, 36(2), pp.73-85.

Nonaka, I., "A Dynamic Theory of Organizational Knowledge Creation", *Organization Science*, 1994, 5(1), pp.14-37.

Nystrom, P.C. and Starbuck, W., "To avoid organizational crises, unlearn", *Organizational Dynamics*, 1984, 13, Spring, pp.53-65.

Papadakis, V. and Bourantas, D., "The Chief Executive Officer as Corporate Champion of Technological Innovation: An empirical investigation", *Technology Analysis and Strategic Management*, 1998, 10(1), pp.89-109.

Politis, J.D., "The relationship or various leadership styles to knowledge management", *Leadership and Organisation Development Journal*, 2001, 22(8), pp.354-364.

Prahalad C.K., and G. Hamel, "The Core Competence of the Corporation", *Harvard Business Review*, 1990, 68(3), pp.79-91.

- Rothwell, R., Freeman, C., Horley, A., Jervis, V., Robertson, A.B. and Townsend, J., "SAPPHO Updated- Project SAPPHO, Phase II", *Research Policy*, 1974, 3, pp.258-291.
- Sapienza, H.J., K.G. Smith, and M.J. Gannon, "Using Subjective Evaluations of Organizational Performance in Small Business Research", *American Journal of Small Business*, 1988, 12(3), pp.43-53.
- Senge, P.M., *The Fifth Discipline: the Art of Organizational Learning Systems*, Doubleday, N.Y., 1990.
- Sinkula, J.M., Baker, W.E. and Noordewier, T., "A Framework for Market-based Organizational Learning: Linking Values, Knowledge, and Behavior", *Journal of the Academy of Marketing Science*, 1997, 25(4), pp.305-318.
- Sorensen, J.B., and T.E. Stuart, "Aging, Obsolescence, and Organizational Innovation". *Administrative Science Quarterly*, 2000, 45(1), pp.81-112.
- Stock, G.N., Greis, N.P. and Fischer, W.A., "Absorptive capacity and new product development", *Journal of High Technology Management Research*, 2001, 12(1), pp.77-91.
- Teece, D.J., Pisano, G. and Shuen, A., "Dynamic capabilities and strategic management", *Strategic Management Journal*, 1997, 18(7), pp.509-533.
- Therin F., "Learning Organization and Innovation Performance in High-Tech Small Firms", *Proceedings of International Council for Small Business Conference*, Puerto Rico, 2002.
- Veugelers, R., "Internal R&D expenditures and external technology sourcing", *Research Policy*, 1997, 26 (3), pp.303-315.
- Winter, S., "Knowledge and competence as strategic assets", in Teece, D.J. (ed.). *The competitive challenge: strategies for industrial innovation and renewal*. Ballinger, Cambridge, MA, 1997, pp.159-184.
- Zack, M.H., "Developing a Knowledge Strategy", *California Management Review*, 1999, 41(3), pp.125-145.
- Zhara, S.A and George, G., "Absorptive capacity: a review, reconceptualization, and Extension", *Academy of Management Review*, 2002, 27(2), pp.185-203.

Appendix 1: Operationalisation of the assimilation construct

Assimilation

What is your company ability to ?:

How would you characterize the associated processes ?

| | Very difficult | | | | | | | Very easy | | | | | | | Unformal | | | | | | | Formal | | | | | | |
|--|----------------|---|---|---|---|---|---|-----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|--------|---|---|---|---|---|---|
| • Analyse innovations developed by others | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| • Comprehend innovations developed by others | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| • Adopt innovations developed by others | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| • Assimilate knowledge coming from outside | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| • Have employees use the information they get from outside | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| • Implement technologies developed by others | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |