

Learning and Knowing in Small Firms

Michael Zhang^a,
Allan Macpherson^a, and
Oswald Jones^a

^a Manchester Metropolitan University Business School
Manchester Metropolitan University, UK
m.zhang@mmu.ac.uk
a.macpherson@mmu.ac.uk
o.jones@mmu.ac.uk

Abstract

Based on an empirical study of twenty-six small and medium-sized enterprises we examined the ways in which owner managers of small firms manage organizational knowledge and learning process. The authors are particularly interested in practice-based perspectives on knowing and learning. In this paper we focus primarily on one aspect of learning: learning scope, which covers individual learning, group learning, intra-organizational learning and inter-organizational learning. Two major empirical findings are interpreted theoretically. Firstly, the effectiveness of 'individual learning' has great impact on 'organizational learning' in a small firm given the dominant influence of the owner manager upon the process of decision making. Secondly, socialization in general and that between organizations—networking—in particular, is another key factor determining the success and innovativeness of a small firm. In conclusion we discuss the research and policy implications of practice-based knowing and learning in small firms.

Keywords: organizational knowledge, knowing, learning, reflecting, practice, innovation.

Suggested track:

- A. The relationship between individual, team and organizational learning

1. Introduction

The study of knowledge and learning in the domain of organization research has become multidisciplinary. The prime driver of the current popularity of knowledge management and organizational learning is business and economic. The acquisition and integration of knowledge is increasingly seen as integral to the development of firm-based resources and capabilities (Grant, 1996). Learning, 'the acquisition of knowledge' (Brown and Duguid, 2002: 124), is studied to improve management skills and organizational performance. Various scholars have done comprehensive reviews of the literature on organizational learning (Cohen and Sproull, 1996; Dierkes et al.,

2003; Easterby-Smith et al., 2000; Foil and Lyles, 1985) and knowledge (Blackler, 1995; Dierkes et al., 2003; Nonaka, 1994; Tsoukas and Vladimirou, 2001). Social learning theories, in terms of both epistemology and methodology, will enhance our understanding of innovation and performance in organization and lend us invaluable support for conducting empirical research. Theories of communities of practice (Lave and Wenger, 1991), the 'spiral of knowledge' (Nonaka, 1994) and activity systems (Engeström, 1987, 2000), albeit independently developed, all share a critical concern with regard to knowledge and learning in organizations. They articulate the limitations and constraints of rationalist approach to the understanding of knowledge and learning. Instead of viewing knowledge as an abstract entity dwelling in one's head and learning as passing on knowledge from the knower to the learner, they draw our attention to practice-based, action-oriented knowledge and socially mediated, culturally situated learning. The debate on social practices and business activities redirects our research focus from knowledge to knowing (Blackler, 1995; Gherardi, 2000; Orlikowski, 2002; Schön, 1983). The change from knowledge the noun to knowing the verb engenders fundamental modification of our epistemological view of knowledge and learning. Learning is no longer simply accomplished through individual cognition or formal education but takes place in everyday practices (Gherardi, 2000, p.214). Nor is knowledge merely an explicit entity transferred from the knower to the learner but also tacit knowing reflected by the doer *on* and *in* action (Schön, 1983, p.55, italics in the original). Viewed from such a perspective, there is a need to re-examine the relationship between personal knowledge and collective knowledge (Tsoukas and Vladimirou, 2001), and that between individual learning and organizational learning (Crossan et al., 1999).

The rest of this paper is structured in four sections. Section Two elaborates the theoretical concepts and arguments introduced above. Section Three addresses research methods and analytical procedures. In Section Four research findings are presented in support of our arguments. The final section discusses empirical findings with underlying theories followed by conclusion and implication for further research.

2. Learning and knowing

2.1 Knowledge, learning and knowing

The study of learning in organizations or organizational learning has been ongoing since the 1960s (Argyris, and Schön, 1978; Blackler et al., 2000; Brown and Duguid,

1991; Crossan et al., 1999; Cyert and March, 1963; Foil and Lyles, 1985; Lave and Wenger, 1991; March and Simon, 1958; Schön, 1983; Senge, 1990; Spender, 1996). The accumulation of different approaches to the literature of organizational learning results in a fertile ground for intellectual debate on the one hand, yet a lack of consistency in theory development on the other. The theoretical discussion of organizational learning culminated in the 1990s in light of the debate of the contribution of knowledge to wealth creation (Davenport and Prusak, 1998; Nonaka and Takeuchi, 1995; Venzin et al., 1998). In retrospect, early studies of organisational learning were concerned mainly with organisational behaviour derived from the research on individual cognition. Lave (1993, p.12) criticizes the flaws of cognitive approach in assuming a universal process of learning and the homogeneity of knowledge. She notes that the static view of knowledge as an explicit entity does not account for the dynamic properties of tacit knowing enacted in emergent processes. In a similar vein, internalization of codified knowledge, without knowing in individual action and social practices through interaction, forms only a part of the process of learning. At the practical and operational level, Lave (1993) aptly points out the difficulties associated with research on knowledge and learning. From behavioural and cognitive point of view, knowledge is a simple concept while learning is a problematic process to unravel. On the contrary, from the standpoint of practice-based theorizing, learning is a relatively straightforward concept, whereas knowledge 'becomes a complex and problematic concept' (ibid. p.12).

Kolb (1984) proposes an experience-based theory of learning. He challenges the rational and idealist epistemology adopted by the behavioural theorists. Kolb's work on experiential learning has great impact on education and lifelong learning. However, for Kolb, learning and knowledge is still fundamentally an individual experience: 'individual learning styles are shaped by the structure of social knowledge and through individual creative acts; knowledge is formed by individuals' (ibid. p.99). Tsoukas and Vladimirou (2001) combine Polanyi's (1962) personal knowledge and Wittgenstein's (1958) collective knowledge to form the basis of organizational knowledge. They define knowledge as '*the individual ability to draw distinctions within a collective domain of action, based on an appreciation of context or theory, or both*' (Tsoukas and Vladimirou, 2001, p.979, italics in the original). It is clear that their definition of knowledge puts individuals in a collective context of action. In a similar attempt to Schön's (1983) but with more specific an aim at building a model, Nonaka (1994)

compares Ryle's (1949) classic categorization of 'knowing that' and 'knowing how' with Polanyi's (1962) differentiation of explicit and tacit knowledge, which paved the way for the development of model of the spiral of knowledge. Nonaka and Takeuchi (1995) delineate the conversion of tacit and explicit knowledge in four interconnected modes: socialization, externalization, combination and internalization.

The conversion approach is problematic not least because of the tension existed between the conversion modes. There is still separation between tacit knowledge as a form of knowledge and knowing as an action enacted in practice during the process of learning and innovation. In comparison, Engeström's (1987, 2000) triangular model of activity systems not only consider individuals' (subject) action-oriented object in the collective context of communities, but also attend to the potential tensions emerging from the interaction between elements of the system. Lave and Wenger (1991) conceptualized learning through legitimate peripheral participation. Key to the concept is practice and individuals' participation in actual practices within the context of social communities. Brown and Duguid (1991) argue that practice is intricate and emergent and any attempt to apply abstract knowledge to practice may be in danger of distorting it. The essence of their argument is to learn through practice, which can be phrased as 'learning-in-working' (1991, p.41).

These models draw our attention to the notion of knowing and practice. Schön (1983) was arguably one of the early writers who attacked technical rationality and the resultant ignorance of practical knowledge. Citing Ryle (1949) and Polanyi (1962) he introduced the concepts of knowing-in-action and reflecting-in-practice. The underlying epistemology of the interplay between knowing and practice has far-reaching implications for the understanding of practical knowledge created through action and activities and organizational learning enacted in the work process. In a similar vein, Orlikowski (2002) further develops the concept of knowing-in-practice through the study of a large and complex organization with globally distributed product development capabilities. She proposes a repertoire of five interconnected practices, namely, sharing identity, interacting face to face, aligning effort, learning by doing, and supporting participation. Using qualitative data collected from the fieldwork, Orlikowski clearly shows how product development projects in a complex and distributed organization can be successfully achieved through knowing in practice. At both

theoretical and practical levels, her insightful analysis and empirical findings will have direct implications for future research in the area and related fields.

The concept of knowing-in-practice discussed above is closely related to the issue of learning level or learning scope, which forms an important part of the literature of organizational learning. Our empirical work is concerned with small organizations with their own characteristics. Research on learning scope, which includes individual, group, intra-organizational and inter-organizational learning, within such a context will undoubtedly contribute to the study of knowing in practice.

2.2 Learning scope and knowing-in-practice in small firms

There is a debate over whether organizational learning constitutes the distribution and transfer of individual learning (Kolb, 1984) or whether individual learning is always influenced by the context in which day-to-day activities take place (Cook and Yanow, 1996; Lave and Wenger, 1991). Crossan et al. (1999) posit that organizational learning occurs through four interrelated processes: intuiting, interpreting, integrating and institutionalizing. And the four processes unfold at three different organizational levels: individual, group and organization. These processes include intuiting (subconscious recognition of patterns or possibilities available through an individual's experience), interpreting (explanation of an insight to one's self or others), integrating (developing shared understanding through mutual adjustment) and institutionalizing (where new understanding embeds learning into specific actions, processes, procedures and systems). This has similarities to the knowledge creation cycle which relies on the conversion between explicit and tacit knowledge (Nonaka and Takeuchi, 1995). Another feature of their framework is the loop of feed-forward process and feedback process of learning. They liken the process of feed-forward as exploration, whereas feedback as exploitation (March, 1991).

Pawlowsky (2001, p.75) reviews the literature of learning and notes that 'the basic building blocks for an integrative model are beginning to emerge'. He argues that four integrated dimensions can be incorporated into a conceptual framework, which includes system levels, learning mode, learning type, and phases of a collective learning process. He draws directly on the cognitive, experiential and social schools of learning. The term system levels indicate the levels of learning. Identifiable network

communities based on direct social interaction are the main means of learning diffusion. In particular, Pawlowsky identifies inter- and intra-organizational groups which link the individual and organization and through the 'intervening social system' contribute to learning. The transition from individual learning to collective learning is only evident in changes to collective actions and behaviours. The concept of mode refers directly to the theoretical understanding of how individuals learn and how that learning is conditioned by social contexts. Understanding modes of learning in organization requires that attention is directed to existing systems of information processing (Huber, 1991), systems that structure work activity (Argyris and Schön, 1978; Gherardi, 2000), and systems that support organizational interactions and dialogue (Brown and Duguid, 1991; Coopey and Burgoyne, 2000). The concept of learning type demonstrates that, since experience is influential in the sensemaking process, learning may occur in small, adaptive changes. More fundamental change requires challenges to the underpinning assumptions that guide action. There are four phases in a learning process. They describe the identification or creation of new knowledge, the diffusion of knowledge, the integration of knowledge into processes and systems, and the application of that knowledge.

There seems to be some confusion over the use of learning levels in the literature of organizational learning. Pawlowsky (2001) uses system levels to analyze individual learning, group learning, organization learning, and inter-organizational learning. Foil and Lyles (1985) discuss levels of learning in a hierarchy of lower- and higher- levels akin to Argyris and Schön's (1978) single-loop and double-loop learning respectively. We chose in this paper to use learning scope instead of learning level to address individual, group, intra-organizational and inter-organizational learning. Holmqvist (2003) notes that most literature examining intra-organizational and inter-organizational learning focuses on formal relationships such as strategic alliances at the expense of informal interactions. Brown and Duguid (1991) argue that communities of practice form wherever social groups engage in mutual activity. Participating in constellations of communities of practice requires an understanding not only of discourse within one's own community but also the discourses and practices of other communities (Gherardi and Nicolini, 2002). Understanding the scope of learning requires paying attention to the communities that form both across and within organizational boundaries.

In theory individuals have little difficulty in understanding tacit knowing and personal experience. Nonetheless, when individuals come together for the purpose of social practices, sharing of personal knowledge and tacit knowing becomes a major challenge. It is argued that top-management's perception of market environment has a significant impact on the exploitation of business opportunities (Child, 1972). This is particularly important in small firms where the influence of the owner-manager or senior management team is dominant (Stanworth and Curran, 1976). Organization practitioners attempt and manage to find ways of solving business problems through goal-oriented action and practice-based social activities. Some of them are able to reflect both on and in their action and therefore accomplish knowing-in-action and learning-in-working. As a result, business targets are met and objects achieved. Others, however, fail to understand the importance of knowing in practice. They rely heavily on the explicit and codified knowledge acquired through education and training. Furthermore, those managers who have accumulated experience from their previous work and practice find themselves in a position where they can no longer exercise the kind of knowing-in-action in a changed context of social practice. Such a result illustrates the limitations of experiential learning. Because business practices are complex and emergent, competence and capabilities of improvisation are needed (Weick, 1998), especially in small firms that lack resources and structure.

3. Samples and Methods

This study was originally sponsored by the European Social Funds and has now developed into a larger project with funds from the UK Economic and Social Research Council. The project is concerned with the evolution of business knowledge with special reference to small firms based in the North West of England. There are advantages as well as disadvantages in studying knowing and learning in small firms. On the one hand, small firms, with their flat structure and informal relationship between management and employees, provide appropriate research settings. On the other hand, lack of resources, in terms of both time and space, entails difficulties for the managers of small firms to be engaged in academic research (Curran and Blackburn, 2001), especially if and when the nature of research requires extensive period of time. In research design, we chose to use in-depth interviews with owner-managers or line managers as the main methods of data collection. To effectively use our time in the field, critical incident technique (Flanagan, 1954) was used to capture key learning events and managers were encouraged to *reflect on* their experiences in those

changes under concern. Critical incidents include such factors as founding of the firm, financial crisis, process or product development, and relationship with customers and suppliers.

Table 1 Summary of the Sample Companies

| <i>Case</i> | <i>Business</i> | <i>Technology Level</i> | <i>Size</i> | <i>Age</i> | <i>Interviewee</i> |
|-------------|-----------------------|-------------------------|-------------|------------|--------------------------|
| A | Materials Process | Mid | 30 | 17 | Quality Control Manager |
| B | Materials Engineering | Mid | 38 | 135 | Financial Director |
| C | Precision Engineering | Hi | 35 | 22 | Owner/Manager |
| D | Printings | Low | 18 | 17 | Production Director |
| E | Food Process | Mid | 25 | 13 | Production Administrator |
| F | Hygiene Products | Mid | 247 | 13 | Managing Director |
| G | Packaging | Mid | 17 | 10 | Owner/Manager |
| H | Dispensing Machine | Mid | 10 | 23 | Owner/Manager |
| J | Deco & Lighting | Low | 4 | 10 | Owner/Manager |
| K | Food Process | Mid | 50 | 12 | Operations Director |
| L | Software Development | Hi | 24 | 3 | Financial Director |
| M | Printings | Mid | 90 | 149 | Financial Director |
| N | Marble Ware Producer | Low | 15 | 6 | Owner/Manager |
| P | Electronics | Hi | 15 | 15 | Owner/Manager |
| Q | Painting | Low | 12 | 6 | Owner/Manager |
| R | Tickets Machine | Mid | 16 | 40 | Owner/Manager |
| S | Clothing | Low | 4 | 15 | Owner/Manager |
| T | Coach Engineering | Mid | 13 | 10 | Owner/Manager |
| U | Medical Equipment | Mid | 3 | 25 | Owner/Manager |
| V | Cupboards | Low | 48 | 9 | Managing Director |
| W | Chemical | Mid | 46 | 19 | Financial Director |
| X | Deep-sea Equipment | Hi | 3 | 2 | Owner/Manager |
| Y | Protection Work Wear | Hi | 35 | 14 | Owner/Manager |
| Z | Science Instrument | Hi | 25 | 13 | The Works Director |
| A1 | Printings | Mid | 73 | 22 | Managing Director |
| B1 | Metal Fabrications | Mid | 150 | 24 | General Manager |
| Mean | * | * | 40.2 | 24.2 | * |

Through managers' narratives of their business encounters and challenges in their activities we can demonstrate to a certain degree how they *reflect in* their actions. To a lesser extent, we can also discern how they achieve *knowing in practice*. As a result, we are able to differentiate between innovative and stable firms. Furthermore, by identifying the scope of learning we can find certain correlation between innovativeness and learning scope. We managed to recruit 32 owner managers or line managers of 26 companies in the manufacturing and services sectors. The sample includes small firms operating in the following businesses: chemical processes, clothing, food processing, health services, materials manufacturing, mechanical engineering, painting and cleaning, and printing as shown in Table 1.

Prior to interviews, we had informed the participating managers of the nature of our research either through telephone conversation or via our research flyer sent by postal or electronic mails. While in the field we were using semi-structured interview questions to provoke interviewees to explain how critical incidents led to their knowing and learning in business activities and social practices. Interview questions covered managers' background in terms of education and experience, their business communities, divisions of labour, and rules and routines that influenced and structured their practices. Interviews lasted approximately between one and a half and two hours with tape recording time varying from 45 minutes to two hours. In most occasions, interviews were followed by a brief tour of their business premises. With permission we would take some photographs of their offices, workshops, and business activities. Interviews then were transcribed verbatim. In addition, we asked the managers for copies of their corporate documents where appropriate. We also visited their websites, if constructed, to search for information regarding their manufacturing and commercial activities as well as external relationships with the key links of their immediate business community. These raw data were first given a preliminary reading and analysis. Relevant passages and sentences were highlighted and summarized in synopsis. This was followed by several times of iteration of the original transcripts between the authors depending on the complexity of the stories. To add clarity and validity to the results the researchers' interpretations of events are checked with participants themselves. Research findings are presented in the following way. An overall summary of sample data is given in a table. Generalized results are provided in a tabulated exhibit as an appendix. Detailed analysis and research findings are exemplified by a number of cases with excerpts from the original transcripts.

4. Data analysis and findings

We started the procedure of data analysis by looking into the quality of narration and stories told by the participating managers. A scale of three scores representing good, moderate and poor is applied. The interview transcripts were visited the second time to examine how the managers reflected in their action. Again, scores are given against the nature of their reflecting-in-action. This is followed by the third time reading of the transcripts and supporting documents gathered from various sources. The purpose of the third reading of the collected data was to discover how knowing-in-practice was accomplished. Similarly, scores were given. At the same time, we also investigated the aspect of learning scope to examine the impact of knowing and learning in practice, i.e. whether it was individual, group, intra-organization, or inter-organization. Using the overall score of each sample firm we divided the sample into two distinct groups: innovative and stable. In total there are 14 innovative and 12 stable firms.

Table 2 shows that the majority of 14 firms have good reflection-on-action in the course of critical events, of which 12 are innovative. Eleven firms have moderate and one poor reflection-on-action. Of the 11 moderate reflections two are from innovative firms. This result indicates that innovative firms may not necessarily reflect well on their action. In other words, some of them cannot tell a good story in spite of either reflecting well in action or knowing well in practice.

In contrast, all the 14 innovative firms have good reflection-in-action. Four poor reflection-in-actions and 8 moderate are found in the group of 12 stable firms. Similarly, 13 innovative firms are found to be good at knowing-in-practice, except one moderate. Again, the same 4 stable firms that reflected poorly in action are also poor at knowing-in-practice. Among the 9 firms with moderate knowing-in-practice 8 are stable and one innovative. This innovative firm scored moderate knowing-in-practice could be understood as a special case which can be further explained by detailed stories.

The result of learning scope is summarized in Table 3. Individual learning took place in 8 out of 12 stable firms, whereas it did in only one out of 14 innovative firms. In stark contrast, 7 innovative firms had the impact of intra-organization learning, as against only one stable firm. None of the stable firms experienced inter-organization learning while one innovative firm did. The lack of inter-organization learning even within the innovative group demonstrates the degree of difficulty associated with participating in inter-organizational activities and networking. Group learning took place 'normally' in

both stable and innovative firms, albeit the impact is greater in innovative than in stable firms.

Table 2 Knowing, Learning and Innovativeness in Small Firms

| <i>Case</i> | <i>Reflecting-on-Action</i> | <i>Reflecting-In-Action</i> | <i>Knowing-in-Practice</i> | <i>Innovativeness</i> | <i>Learning Scope</i> |
|-------------|-----------------------------|-----------------------------|----------------------------|-----------------------|-----------------------|
| A | Good | Good | Good | Innovative | Group |
| B | Good | Good | Good | Innovative | Intra-organization |
| C | Good | Good | Good | Innovative | Group |
| D | Poor | Poor | Poor | Stable | Individual |
| E | Moderate | Moderate | Moderate | Stable | Group |
| F | Moderate | Moderate | Moderate | Stable | Group |
| G | Moderate | Moderate | Moderate | Stable | Group |
| H | Moderate | Moderate | Moderate | Stable | Individual |
| J | Moderate | Poor | Poor | Stable | Individual |
| K | Good | Good | Good | Innovative | Intra-organization |
| L | Good | Good | Good | Innovative | Group |
| M | Good | Good | Good | Innovative | Intra-organization |
| N | Moderate | Moderate | Moderate | Stable | Individual |
| P | Moderate | Poor | Poor | Stable | Individual |
| Q | Good | Good | Good | Innovative | Group |
| R | Moderate | Good | Good | Innovative | Group |
| S | Moderate | Poor | Poor | Stable | Individual |
| T | Moderate | Moderate | Moderate | Stable | Individual |
| U | Good | Moderate | Moderate | Stable | Individual |
| V | Good | Good | Good | Innovative | Intra-organization |
| W | Moderate | Good | Good | Innovative | Intra-organization |
| X | Good | Good | Moderate | Innovative | Individual |
| Y | Good | Good | Good | Innovative | Inter-organization |
| Z | Good | Good | Good | Innovative | Intra-organization |
| A1 | Good | Moderate | Moderate | Stable | Intra-organization |
| B1 | Good | Good | Good | Innovative | Intra-organization |

Source: Authors' own compilation

Table 3 Learning Scope in Sample SMEs

| <i>Learning Scope</i> | <i>SMEs</i> | | <i>Total</i> |
|-----------------------|-------------|------------|--------------|
| | Stable | Innovative | |
| Individual | 8 | 1 | 9 |
| Group | 3 | 5 | 8 |
| Intra-organization | 1 | 7 | 8 |
| Inter-organization | 0 | 1 | 1 |
| Total | 12 | 14 | 26 |

Source: Authors' own compilation

The overall profile or distribution of learning scope illustrates that learning in stable firms consists disproportionately of individual and group learning and is highly skewed to individual learning. In comparison, group and intra-organizational learning frequently take place in innovative firms.

5. Discussion and Conclusion

As demonstrated in the previous section, in this paper we have attempted to use a three-level analysis to examine knowing and learning in small firms. *Reflection-on-action* is the first level and is concerned with managers' reflection on action. The main method used in this study is semi-structured interviews of participating managers. Analysis at this level is largely cognitive because the nature of the interviews is to follow managers' minds through the course of critical incidents in certain environment and circumstances. The ways in which managers tell their stories determine the quality of reflection-on-action. One could argue that the judgement of quality is subjective. Nonetheless, we find the results from the sample are relatively objective and satisfactory. On the one hand, an ostensibly good story without underlying actual activity and practice can not be a good reflection-on-action. On the other hand, poorly recalled stories do not show the flow of actions. *Reflection-in-action* is the second level and focused on the actual decision made and action taken by the managers in the light of critical events. *Knowing-in-practice* is the third level where social practices are observed and collective learning take place.

Data in Table 2 indicate that the combination of this three-level analysis enables us to distinguish innovative firms from stable firms. Equally important is the analysis of learning scope. As one of the key constructs of a learning process, learning scope is intrinsically linked to reflecting-in-action and knowing-in-practice.

The effectiveness of individual learning has great impact on organizational learning in a small firm given the dominant influence of the owner manager upon the process of

decision making. Learning scope in stable firms is limited to individuals, often the owner managers or senior managers. The study reveals that innovative firms are much more effective in utilizing internal human resources as well as external relationship to develop new products and processes. This is linked to more effective environmental scanning and to a greater willingness of owner-managers to reflect on and in action. When a wider scope of learning such as group, intra-organization and inter-organization learning, is identified it can be reasonably assumed that individual learning also takes place. But there is no reason to believe that a wider scope of learning should be automatically taking place when individual learning occurs. As Fiol and Lyles (1985, p.804) forcefully argue: "Though individual learning is important to organizations, organizational learning is not simply the sum of each member's learning". For individual learning, the managers' in our case, to be effective it requires that not only managers themselves be reflecting-in-action but also participate in knowing-in-practice with employees. The story from a printing company manifests the point.

We were aware what our competitors were doing and some of them had been far more active in pre-press than we had been, so they had systems in which were doing this for them but we believed that the technology that we were invested in, that we were the first people to have that in our sector and we believed it represented the best available option for printing.....these technological changes meant that instead of using digital film and we used to have a large area where my new offices are, that whole area up stairs which was a huge area used to be full of film and now there isn't one single piece of film. So in the space of maybe five years, the industry has gone from being reasonably dependent on film to it not existing... But we knew that we couldn't just train our existing people, we needed to recruit in order to get through the work and also to bring in the skills that we required, so we bought in a manager and we bought in an operator to make a department of four people. [Case M, FD]

The participant manager and the management team first felt the competitive pressure by reflecting on their business within the industry and making investment decisions. The reflecting-on-action was followed by reflecting-in-action that involved individual actions by allocating physical resources for process innovation. Yet they did not stop there but started knowing-in-practice through recruiting and training staff. Such a finding confirms early studies on the importance of organization-wide (intra-organization) learning in innovative firms (Shrivastava, 1985).

Another example, a materials processing business, shows how group learning emerged. The company purchased a decommissioned machine in order to expand products scope. Like most small manufacturing firms, they are constantly faced with financial constraints and could not afford a new production line. Due to the lack of

instruction and training, they have to try learning-by-doing with reflecting-in-action and later master knowing-in-practice with improvisation.

I would then basically be running it myself, myself and that chap Kenny... I was assisted by another chap called Terry, who runs another plant on another floor of this premise... Again now with trials, you know, a high percentage don't actually materialise into winner products. But a great deal of hours have been put on this new machine...[Case A, QC Manager]

Managers of stable firms are confined in a narrow scope of learning which leads to ineffective individual learning. The owner manager of an electronics components company failed to complete a new product development on time, which damaged customer relationship. The underlying reasons are three-fold. First, the manager did not properly reflect on the critical incident. Second, the story tells us that while developing new product for the customer reflecting-in-action failed to occur. Third, without the second it is highly unlikely for knowing-in-practice to take place.

We developed a mechanical look-alike but the actual performance we haven't developed yet...Delayed...the customer is not very happy, it causes a lot of grief...okay taking that as the problem, who would I talk to help me? ...I've got somebody to make the technical decisions but in the end it's down to me. [Case P, MD]

Socialization in general and that between organizations, inter-organization, in particular is another key factor determining the success and innovativeness of a small firm. This is clearly indicated by the story of a personal protection work-wear company where inter-organizational learning occurred when the design teams of the partner firms met regularly to discuss the development of a new product.

We were involved in the trialling and the testing and the feedback to Finland and going to Finland and working with the design people to evolve a mask that was suitable for their environment which is very, very harsh.....we're all going to be an awful lot more conversant with each other and give each other secrets because we're getting business off each other. [Case Y, CD]

However, we recognize that building external contacts and relationships is difficult because owner-managers have limited opportunity for environmental scanning. That only one innovative firm is identified in this category in the sample strongly supports the argument.

A closer look at the education background and personal experiences of three owner managers will shed further light on our discussion on reflecting in action and knowing in practice.

The three owner managers are all in their mid-40s and running completely different businesses. Manager P runs a technology-intensive electronics component company and has been in the business for fifteen years. He is a university graduate and worked a number of years in the same industry before starting his own business. Therefore, in terms of both education and experience he is in a better position than the other two managers to operate innovatively and profitably. Nonetheless, data from the field tells a contrary story. He focuses almost entirely on the technological aspect of his business and feels isolated. He tries to be approachable to staff and lacks the communication skills in so doing. As a result, he relies on directives to organize business. When developing a new product, he is devotedly involved in the project at the expense of neglecting other aspects of the business such as marketing and team working. Given the ever increasing competition and volatile market environment of the business sector, his acquired explicit knowledge and accumulated tacit knowledge cannot solve the problem at hand. Although he can reasonably reflect on his action, his story shows that he is poor at both reflecting-in-action due to his narrow focus and knowing-in-practice because of his inability to participate in social practice.

Manager Q runs a low technology labour-intensive painting and cleaning business. He has been in the business for six years. He is a high school leaver without formal higher education qualification. Before starting his own business with a shed in his rear garden, he worked as a cleaner for a larger company, where he learned his business skills. He now manages his business in a well furnished premise with twelve employees. The way he grows his business is experience-based. But he did not simply rely on his work experience. He realized the need to learn basic business accounting skills and certain knowledge of health and safety regulation should he wish to expand the business or just for survival. He went to the local authorities and was advised where he could get help and funding for his vocational education. Not only does he realize his personal need of education and learning, but he also allocates limited resources to have his staff trained in a purpose-built workshop within the premise. Eventually he acquired explicit knowledge through reflecting-in-action. Moreover, he and his staff gained knowing-in-practice via social practice.

Manager X runs a high technology knowledge-intensive deep-sea equipment business. He has a doctorate with many years of research and work experience. He started his business largely due to his dissatisfaction with his research work, which he regards not so challenging as running his own business. At the time of interviewing he has just

been in the business for two years. He is a good speaker and storyteller. His reflection on action is well communicated and received. He has excellent skills of experimenting with his equipment in a way of doing research and development. Therefore, he is good at reflecting-in-action. However, running through his story one feels that he lacks the business knowledge such as maintaining a good relationship with his partner and marketing his products. The current business circumstance as it was as a start up company did not allow him to follow a business course. The only option available was for him to learn the necessary skills and knowing-in-practice, not the kind of explicit knowledge as he would like to perceive.

The comparative story of the three owner managers indicates a number of points regarding the nature of learning and knowing in action and practice. The first point is that we have to realize and accept the fact that business life is complex and full of dilemmas. To run business well requires not only certain explicit business knowledge as written in textbooks, but also, and perhaps more importantly, demands commitment on the part of the practitioners to reflect in action and learn and know in practice. Knowing in practice helps practitioner the learner learn a unique kind of tacit knowing that cannot be acquired through other ways because practice is emergent and situated. The second point addresses the potential and limit of experiential learning. Accumulated experience is undoubtedly important for any social practices. Knowledge gained through experience and experiential learning is fundamentally personal (Kolb, 1984) and static that cannot be adequately applied in the face of emergent practice. The third point is about the relationship between reflecting-in-action, knowing-in-practice and learning scope. There is little research directly focusing on this issue and we believe it demands a proper investigation. Some scholars have done research in related areas which can act as a starting point for future research (Brown and Duguid, 1991; Schön, 1983; Orlikowski, 2002).

In this paper we have attempted to demonstrate the importance and possibility of analyzing knowing and learning in small firms by using the three-level analytical framework. The limitation of the present research is the lack of longitudinal data. Research in other sectors following similar approaches is desirable.

We are indebted to many owner-managers and managing directors of regional small firms who allowed us to visit their business premises and collect data in the midst of busy business activities. For the reason of confidentiality we have not included the

names of the managers and their companies. Apart from direct quotations all the views in this report are our interpretations of small business activities and therefore any errors remain our own.

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