

12 RESILIENCE AS A SOURCE OF COMPETITIVE ADVANTAGE FOR SMALL INFORMATION TECHNOLOGY COMPANIES

Brian Webb
Frank Schlemmer
Queen's University of Belfast
Belfast, N. Ireland

Abstract

Resilience, defined as the capacity for continuous reconstruction, is based on Hamel's earlier work on core competencies. We deploy the resilience concept to explain the performance differentials of small information technology companies. Our interviews with owner-managers suggest that the resilience concept is insufficient to account for competitive advantage and suggest that a sole focus on core competencies can even create competitive disadvantage. In particular, those managers that focused too much on their own core competencies and ignored market developments and other stakeholders created competitive disadvantages. We therefore suggest that resilience can only be a source of competitive advantage if it is extended with the option of replacing core competencies. In addition, core competencies frequently have to be supplemented by competencies of partners or customers in order to achieve competitive advantage.

Keywords Core competence, core rigidity, resilience, SMEs, IT

1 INTRODUCTION

Resilience, defined as “the capacity for continuous reconstruction” (Hamel and Valikangas 2003, p. 55), is based on Hamel's earlier work on core competencies (Prahalad and Hamel 1990). However, it has been suggested that core competencies also have a dysfunctional flipside—the core rigidities that impede change (Leonard-Barton 1992). We argue that this critique also applies to Hamel and Valikangas' understanding of resilience and that their concept can be enhanced by going beyond the core competencies. Furthermore, the original concept of resilience was designed for

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large multi-business companies and focuses, for example, on the allocation of resources to different strategic business units, political conflicts in large companies, and bureaucracy. Yet, small companies also face the challenge of continuous reconstruction or resilience. Dean et al. (1998) even suggested that flexibility and change is more important for small companies than for their larger competitors. But small companies differ in many ways from large ones, for example, in their structure (Hannan and Freeman 1984), management (Feindt et al. 2002; Schlenker and Crocker 2003), and behavior (Hitt et al. 1991; Woo 1987).

We conducted interviews with owner-managers in order to explore how resilience can be a source of competitive advantage for small IT companies. We grounded our work in the dynamic capabilities concept (Eisenhardt and Martin 1997; Teece et al. 1997) and found that continuous reconstruction of human resources, customer relationships, and IT resources is a source of competitive advantage in high velocity markets. This paper contributes to the literature in three ways. First, it suggests that including external resources and stakeholders in the resilience concept increases its explanatory power. Second, it empirically demonstrates that continuous reconstruction is a source of competitive advantage. Third, the resilience concept is applied to small instead of large companies.

The remainder of the paper is structured as follows. In the next section, the literature on core competencies, core rigidities, and resilience is briefly reviewed. Furthermore, some differences between small and large companies are highlighted. Our focus on small IT companies is then discussed. In the research method section, the data collection and sampling process are explained. Then the results are presented; the discussion and conclusions follow.

2 LITERATURE REVIEW

In their quest for resilience, Hamel and Valikangas (2003) develop the core competencies concept (Prahalad and Hamel 1990) which suggests that companies should aim at developing leadership in selected areas—the so called core competencies. The core competencies can be a source of competitive advantage if they fulfil the following three criteria. First, they have to provide potential access to a wide variety of markets. Second, they should make a significant contribution to the perceived customer benefits of the end product. Third, they should be difficult for competitors to imitate. Prahalad and Hamel further argue that companies should focus only on a few (maximum of 5 or 6) core competencies, and then transfer the core competencies to core products. They describe Honda as an example that had the core competence to build high-revving, smooth-running, lightweight engines for motorcycles and then exploited this core competence for other markets, for example cars, four-wheel off-road buggies, and boat motors.

Prahalad and Hamel (1990), among others, laid the fundament for the resource-based view of the firm (RBV), which is based on the assumption that a firm can be seen as a bundle of resources and capabilities (Penrose 1959) that can lead to competitive advantage and superior rents. It has been argued that the traditional resource-based view has not adequately explained how and why certain firms have competitive advantage in

situations of rapid and unpredictable changing markets. The dynamic capabilities framework (Teece et al. 1997) analyzed the sources and methods of wealth creation and capture by firms operating in environments of rapid and unpredictable market change. In such conditions, the mere existence of appropriate bundles of specific resources and capabilities is not sufficient to sustain competitive advantage. Instead, a firm must constantly reconfigure, gain and dispose of their resources and capabilities to meet the demands of a shifting market.

Whereas the resource-based view was developed in strategic management research it has also been deployed in information technology and information systems research. For example, Wade and Hulland (2004) suggested that the RBV can be used as a framework to evaluate the value of strategic IS assets and for comparing IS resources with non-IS resources.

Many of the early studies deploying the resource-based view to IS research identified and defined IS resources. Ross et al. (1996) identified the following three IT assets: human assets (for example, problem solving orientation, business understanding, and technical skills), technology assets (for example, physical IT assets, technical platforms, and databases), and relationship assets (for example, partnerships with other divisions, client relationships, and shared risks and responsibility). Feeny and Willcocks (1998) identified nine IS core capabilities: IS leadership, business systems thinking, relationship building, architecture planning, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development. Bharadwaj (2000) defined IT infrastructure, human-IT resources, and IT-enabled intangibles as IT resources. She argues that the capability to deploy these IT resources synergistic with other organizational resources and capabilities can lead to competitive advantage. She found that firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures. Santhanam and Hartono (2003) extended this study with a more sophisticated methodology and came to very similar results. Zhang and Lado (2001) argue that the potential contributions of information systems to competitive advantage can be understood in terms of their impact on the development and utilization of distinctive organizational competencies (input-based competencies, transformation-based competencies, and output-based competencies). Tippins and Sohi (2003) divide IT competency into IT knowledge, IT operations, and IT objects and show that it affects organizational learning, which then affects firm performance.

Definitions for resources, dynamic capabilities, core competencies and rigidities are provided in Table 1.

A combination of the core competencies concept and the dynamic capabilities framework was developed by Hamel and Valinkangas (2003) and labeled resilience. Resilience is the ability to dynamically invent business models and strategies as circumstances change, and defined as “the capacity for continuous reconstruction” (p. 55). Hamel and Valinkangas’ main argument is that companies should focus on their existing resources, but that the continuously changing environment, customer preferences, markets, and competition force them to continuously reconstruct them.

Whereas the resource-based view in general, and the core competencies and resilience concepts in particular, have been extensively discussed in the literature, they

Table 1. Definitions

	Authors	Definition
Resources	Amit and Schoemaker (1993)	Stocks of available factors that are owned or controlled by the firm.
Dynamic capabilities	Teece et al. (1997)	The firm's ability to integrate, build, and reconfigure internal and external resources.
Core competencies	Leonard-Barton (1992)	A knowledge set that distinguishes and provides a competitive advantage.
Core rigidities	Leonard-Barton (1992)	Inappropriate sets of knowledge that actively create problems.

were mainly developed for large companies. The articles on core competencies (Prahalad and Hamel 1990) and resilience (Hamel and Valikangas 2003) are illustrated with many examples of companies like NEC, Honda, Sony, IBM, Toyota, and Motorola, all of them large companies. However, we believe that the basic resilience concept also applies to small companies because they also face the challenge of continuous reconstruction or resilience. It has even been argued that flexibility and change is more important for small companies than for large ones (Dean et al. 1998).

Small companies differ in their structures from their larger competitors. For example, SMEs tend to be structured more simply than larger enterprises and they lack structural inertia (Hannan and Freeman 1984). They are often governed by owner-managers, and the vast majority of strategic decisions are usually made by one person (Feindt et al. 2002; Schlenker and Crocker 2003), who often has an entrepreneurial oriented and risk seeking leadership style (Hitt et al. 1991; Woo 1987). In addition, small companies challenge competitors more actively and are faster than large companies in reacting to challenges and they are often very effective by focusing their strategic moves (Chen and Hambrick 1995) and innovation (Hameresh et al. 1978) in a narrow domain.

This suggests that many issues that were raised about core competencies (Prahalad and Hamel 1990) and resilience (Hamel and Valikangas 2003) do not apply to small companies, for example, bureaucracy and political conflicts within large organizations or the allocation of resource to different strategic business units. We believe that the simple structures and the focused strategies of small companies are a promising research setting because this simplifies the analysis and enables us to better explore the concept of resilience.

Another difference between small and large companies is that they control different resources and capabilities. For example, small companies frequently suffer from resource poverty (Welsh and White 1981), which often affects business strategy development and the perceptual and physical barriers to growth (Fillis et al. 2004). They usually have fewer financial and human resources (Caldeira and Ward 2003; Chow et al. 1997; Gribbins and King 2004; Ihlstrom and Nilsson 2003). Thus the process of allocating and managing resources differs between small and large companies mainly because small ones have fewer resources and simpler structures.

Hamel and his colleagues (Hamel and Valikangas 2003; Prahalad and Hamel 1990) believe that large companies take unnecessary risks by diversification and by approaching markets in which they can't exploit their core competencies, which often undermines their competitive advantage. The reverse conclusion would be that small companies, which tend to focus their strategy in a narrow domain (Chen and Hambrick 1995) or niche (Porter 1980) can create competitive advantage by focusing on their core competencies, which then leads to resilience.

The focus of this paper is small IT companies but our larger study is of e-SMEs. Research on e-SMEs is still very rare and is often limited to small firm's adoption and usage of the Internet (see Kula and Tatoglu 2003; Tiessen et al. 2001) and frequently lacks grounding in academic theory (Griffin 2000). However, there are more rigorous SME studies in the IS area. For example, Thong (2001) developed a resource-based model to analyze resource constraints and information systems implementation in Singaporean small businesses and found that external technical expertise is a very important factor of IS implementation success. Duhan et al. (2001) analyze the role of property-based and knowledge-based resources for IS strategies of a not-for-profit organization. Caldeira and Ward (2003) found that management perspectives and attitudes toward IT adoption and use, and the development of internal IT competence, are success factors for the adoption of IT.

Some researchers have examined how small e-businesses differ from large ones. For example, Duhan et al. (2001) suggested that small firms could create competitive advantage online because they are more flexible, they can conduct changes more quickly, and they work more closely with customers. In addition, SMEs are usually more entrepreneurial and willing to experiment and innovate in business models than their larger competitors with established hierarchies (Jutla et al. 2002). On the other hand small companies are restricted by their limited resources (Jutla et al. 2002), which can have more restraint on marketing options compared to larger companies (Jones 2004). Saban and Rau (2005) found that resource and knowledge limitations hamper the usage of websites of SMEs. Furthermore, SMEs use the Internet less strategically (Webb and Sayer 1998) and less for marketing purposes (BarNir et al. 2003) than their larger competitors.

3 RESEARCH METHOD

Resilience, defined as continuous reconstruction, will be evaluated in terms of reconstructing resources (Hamel and Valikangas 2003). According to the dynamic capabilities framework (Teece et al. 1997), firms have to build, integrate, and reconfigure resources in order to match them to the changing environment. For this research, the Powell and Dent-Micallef (1997) framework, which consists of human resources, business resources, and IT resources, was combined with the dynamic capabilities framework, which consists of building, integrating, and reconfiguring resources (Teece et al. 1997). The research framework is shown in Figure 1. (Examples of dynamic capabilities and their enablers are shown in Appendix A.)

Given their importance to the success of the firm (Gans and Quiggin 2003; Lins 1998), the primary sources of data were semi-structured interviews with the owner-

Resources			
Dynamic Capabilities	Human Resources	Customers*	IT Resources
Building			
Integration			
Reconfiguration			

*In our research, we focused specifically on customers as a business resource because all managers highlighted the importance of customers in the interviews.

Figure 1. Framework

managers. The interviews were conducted at the work place of the managers. This enabled the researcher to develop a level of detail about the individual and place and to be highly involved in actual experiences of the participants (Rossman and Rallis 1998). A literature search was conducted in tandem with data collection and analysis in order to ground the analysis theoretically. Interview data were triangulated through a qualitative content analysis of the companies’ websites. These data were primarily used to verify company interview data, and thus increase the validity of the findings (Silverman 1993). The interview transcripts were analyzed through the categorization and analysis of emergent concepts and ideas and constant comparison of these concepts to identify common themes (Miles and Huberman 1984).

As suggested by Miles and Huberman (1984), codes were created before the fieldwork. As shown in Table 2, dynamic capabilities were divided in the three subcategories—building (bui), integrating (int), and reconfiguration (rec) of resources—and the examined resources were human resources (hr), customers (cu), and IT resource (it). The coded transcripts of the high, average, and low-performers were analyzed by searching these codes and then directly contrasting them in order to find out how they differ (Strauss and Corbin 1990). (An example of a coded interview is given in Appendix B.)

Table 2. The Codes

Dynamic Capability		Resources	Codes
Building	of	human resources.	bui-hr
		customer relationships.	bui-cu
		IT resources.	bui-it
Integration		human resources.	int-hr
		customers relationships.	int-cu
		IT resources.	int-it
Reconfiguration		human resources.	rec-hr
		customer relationships.	rec-cu
		IT resources.	rec-it

Since this paper is part of a larger research project, we used data from a postal survey measuring resources and capabilities as performance drivers of e-business SMEs (we defined e-business SMEs as companies with less than 250 employees that are selling online). The 106 companies surveyed were ranked according to their financial performance. In this paper, we only focus on the 13 IT companies that replied to our survey. However, three of the companies went out of business; therefore, the sample size was 10. Two were used for a pilot study and thus eight IT companies remained. Two managers didn't want to participate and therefore six interviews (two high performers, one low performer, and three average performers) were conducted. Table 3 provides an overview of the six companies.

According to Hamel and Valikangas (2003, p. 63), resilience is "the ultimate advantage." Competitive advantage is typically measured in terms of financial performance (Hawawini et al. 2003). Managers were asked if their performance over the last 3 years was outstanding and if they had exceeded their competitors. We used the financial performance data of the postal survey for identifying high, average, and low performers (Rouse and Daellenbach 2002). Financial performance was measured in terms of revenues, sales growth, and return on assets, by six questions, each of them with a five-point Likert scale (Powell and Dent-Micallef 1997). Therefore, the theoretical minimum performance was 6 (6 questions \times 1 point) and the maximum performance was 30 (6 questions \times 5 points). The company with the lowest financial performance had 6 points and the best performing company had 29 points; the mean was 17.47 (standard deviation = 4.99). The companies were divided into the following three groups: low performers (6 to 13 points), medium performers (14 to 21 points), and high performers (22 to 29 points).

- **High IT 1** was an Internet solutions provider with eight employees. They had the exclusive rights to distribute Internet connectivity of the international Internet backbone provider MCI for Northern Ireland. The relationship with MCI enabled the company to offer customers a fast and reliable Internet connection. Furthermore High IT 1 offered a range of additional products and services such as hosting, virtual private networks, connectivity, network support and maintenance, and specialized software products. High IT 1 won an innovation award for the development of networked services for combining voice and data services without the necessity of managing procurement and provisioning of the facilities. High IT 1 purchased 70 percent of their products and services online.

Table 3. The Companies

	Financial Performance	Difference to Mean	Number of Employees	Turnover
High-IT 1	23	+5.5	8	£ 600,000
High-IT 2	24	+6.5	6	£ 350,000
Average IT 1	21	+3.5	13	unknown
Average IT 2	14	-3.5	9	£500.000
Average IT 3	14	-3.5	3	unknown
Low-IT	11	-6.5	10	unknown

- **High IT 2** specialized in local government and compliance consultancy and software solutions. They were the market leader in the provision of browser-based applications for the public sector in Northern Ireland. They purchased 80 percent of their products and services online and because, all of their products are online, 100 percent of their sales are in e-business.
- **Average IT 1** specialized in video streaming and the design and development of highly interactive web applications. They had 13 employees, offering a wide variety of services including video streaming, software development, and the design of web applications, consulting (for example, in content management, broadband applications, and video on the web), and video archiving. In addition, they offered software products such as security and surveillance, content management, and video archiving and presentation software. Average IT 1 purchased 80 percent of their products and services online and created all their revenues online.
- **Average IT 2** specialized in new media and advertising design. In the new media area, they designed websites and online games; in the advertising area, they designed billboards, annual reports, brochures, etc. They had nine employees and they were the first design agency to acclaim Investors in People.¹ Average IT 2 purchased only 1 percent of their products and services and created only 5 percent of their turnover online.
- **Average IT 3** was a web and multimedia design company that targeted small businesses as customers. They offered a large variety of services including web design, hosting, maintenance, and training. They had three employees, supplied 75 percent online, and created 50 percent of their turnover online.
- **Low IT**, the low performer in the IT industry, had 10 employees and supplied IT-solutions for membership management and accounting, access, and stock control to sports clubs. With the integrated system, the members' smartcard allowed them to gain access to the clubhouse and make purchases at the bar, restaurant, or shop. Low IT created 5 percent of their revenues online and purchased 70 percent of their products and services online.

4 RESULTS

This research aimed at examining resilience, defined as the continuous reconstruction of resources. The results are summarized in Table 4. The matrix includes human resources, customers, and IT resources, and how they were reconstructed. It shows a set of characteristics (bullet points) of resilience. Each characteristic represents a difference that was identified. These differences include the managers' commitment

¹Investors in People is an initiative founded by the UK government to develop companies through building training and development activity in their business strategy.

Table 4. Results

Resources DC	Human Resources	Customers	IT Resources
Building	<ul style="list-style-type: none"> • Training programs for managers • Training programs for employees 	<ul style="list-style-type: none"> • Experimentation • Employees understand markets 	<ul style="list-style-type: none"> • Cooperation with other companies
Integration	<ul style="list-style-type: none"> • Team building • New employees 	Integrate customer feedback	<ul style="list-style-type: none"> • Integrate external IT
Reconfiguration	<ul style="list-style-type: none"> • Structure • Processes 	<ul style="list-style-type: none"> • Tailor offers to customer needs • Additional services 	<ul style="list-style-type: none"> • Matching of IT and business processes

to resilience, their activity in developing resilience, and their beliefs as to whether their companies created competitive advantage in that area. If the managers’ answers indicate positive resilience and competitive advantage, the characteristic is categorized as positive resilience (+1), and if it indicates negative resilience and competitive disadvantage, it is categorized as negative resilience (-1). If the managers’ answers are inconclusive or if that specific characteristic doesn’t apply to a specific company, it is categorized as inconclusive (0).

Table 4 was developed by directly contrasting high with low performers as suggested by Rouse and Daellenbach (1999). Each of the bullet points is a characteristic in which they differed. For example, managers of both high performers were involved in training programs and offered training programs for their employees, and the low performer did not. The manager of High IT 1 said, “We do believe in ongoing training [and] updating our skill sets....we acquire the skills that are necessary to serve the clients.” Furthermore, the high performers regularly engaged in team building activities and took a more active role in integrating new employees in the team than the low performer. The high performers also constantly reconfigured the firm’s structure and processes and the low performers did not. For example, the managers of both high performing IT companies continuously asked questions such as “How can we mold things to actually make them operate better” (High IT 1). The manager of High IT 1 also believed that “if you cannot accept change and you cannot work with change then there is no point in being in this business and you can go home and close the door immediately.”

Similarly, the manager of High IT 2 was committed to find out “how we can improve the process” and they continuously asked themselves the questions: “Is the process that we are following for this project successful? Are we failing anywhere? Is it going more slowly or quickly than expected?” In contrast, the manager of Low IT showed a high resistance to change. Not only did he avoid any changes at the organizational level, he even resisted any changes at the product level. He said, “We try to

avoid changes to the product.” In contrast, High IT 1 offered a variety of standardized product packages, and also tailored the products especially to the customer needs. The manager said, “Nothing is set in stone...we are able to take each customer’s requirements and individualize.” Similarly, the manager of High IT 2 stated that rather than expecting the customers to adapt to their product, they would modify their products and services to the customer requirements.

In terms of customer relationships, the high performers engaged heavily in experimenting and they made sure that their employees had a solid knowledge of the markets for better understanding customer needs. That helped them to acquire new customers and to enhance existing relationships. In contrast, the low performer was not active in that area and said, “We don’t want to put too many resources in it.” The high performers also had an open ear and integrated customer feedback in the company. The low performing manager tried to “avoid changes to the product [because] we like selling our product as it is.” In contrast, the high performers tailored services to customer needs and offered a wider range of services than the low performer.

The main difference in managing IT was that the high performers worked much closer with their customers. They integrated their own IT systems better with those of their customers, and tailored IT according to the customers’ business processes. For example, the manager of High IT 1 said, “We are able to take each customer’s requirements and individualize them and bring together all the necessary parts that they are looking for and then put it together as a package for what they are looking for.” In contrast, the manager of Low IT said, “We try to avoid if they want a particular system for themselves.”

As suggested by Levitas and Chi (2002), we also compared average performing companies to the high and low performers. In contrast to the high and low performers, the average performers had a mixed bag. They created competitive advantages on some characteristics (bullet points) and disadvantages on others. The net effect of the advantages and disadvantages caused average financial performance.

5 DISCUSSION AND CONCLUSIONS

This paper applied the resilience concept (Hamel and Valikangas 2003) to small IT companies. We focused on the technology sector because it is typically characterized by rapid market changes which are the actual cause for continuously reconstructing a firm’s resources (Teece et al. 1997). The results suggest that even though the concept has been developed for large companies, it can also be applied to small ones. We believe that the simple structures and the focused strategies of small companies are an adequate research setting for exploring the resilience concept.

Resilience was defined as continuous reconstruction of resources (Hamel and Valikangas 2003). The reconstruction process was divided in the subcategories of building, integrating, and reconfiguring resources. Interviews with owner-managers indicate that high performing companies create competitive advantage by resilience, average performing companies create a combination of advantages and disadvantages, and low performers create competitive disadvantages.

However, our data suggests that Hamel and Valikangas resilience concept, which is based on the Hamel’s earlier work on core competencies and existing resources, may

be too narrow. Whereas the concept of core competencies has attracted huge interest by practitioners, it has also been heavily criticized by researchers because core competencies can also become competency traps (Levitt and March 1988) or core rigidities (Leonard-Barton 1992). Leonard-Barton discovered a paradox by showing that core competencies facilitated the development of projects closely aligned with the core business, but that they also inhibit innovation, lacking alignment with the core business. She called these core rigidities, the dysfunctional flip-side of core competencies. Thus managers face the dilemma of both utilizing and maintaining their core competencies, and yet avoiding their dysfunctional flip side by renewing and replacing them.

This paradox is supported by further research. For example, Dougherty (1995) discovered that core incompetencies grow around a firm's core competencies. This was supported by Henderson's (1993) research, which suggested that organizational skills were hampered by incumbents' previous experience. Similarly, Sorenson and Stuart (2000) suggested that greater reliance on prior developments is associated with more innovation (at semiconductor and biotechnology companies) but that this innovation (which relies on own developments) is less relevant, and is therefore a hallmark of obsolescence. In the same vein, Rosenkopf and Nerkar (2001, p. 303) found that "firms that focus inward on their core competencies run the risk of developing innovations that wind up being peripheral to the aggregate path of technological development." Furthermore, they discovered a trade-off between the impact of innovation on the domain of the core business and the overall impact beyond that domain. They argued that innovations based on core competencies tend to create domain impacts and subsequently short term gains; innovations beyond the core competencies tend to create overall impacts and subsequently long term gains. They believed that the reason for the higher impact of innovations outside their core competencies could be the usage of external expertise. In particular, including external expertise increases the number of choices between different technologies and thus the likelihood of choosing well-regarded technology. In contrast, building on internal expertise restricts that choice.

In conclusion, the literature supports Leonard-Barton's suggestion that core competencies have to be renewed *and replaced*. But the resilience concept as suggested by Hamel and Valikangas only focuses on renewing and not on replacing. Our data suggests that a too-strong internal focus and ignoring stakeholders such as customers and partners can be a source of competitive disadvantage. For example, the low performer continuously ignored customer feedback, was not capable of integrating his own IT with the customers' systems, focused only on a single core product without offering modifications or additional services, and subsequently created competitive disadvantages. In contrast, the integration of customer feedback, cooperation with other companies, integrating new employees in the company, and training courses with external trainers helped the high and average performers to create competitive advantages.

The paper contributes to the literature in three ways. First, the resilience concept is relatively new and has attracted little attention by researchers. Our results suggest that the resilience concept (Hamel and Valikangas' 2003) is incomplete, mainly because it doesn't address Leonard-Barton's suggestion that core competencies may have to be replaced as well, otherwise they could become core rigidities. Second, it empirically demonstrates that continuous reconstruction is a source of competitive advantage. Third, the resilience concept is applied to small instead of large companies.

The main implication for managers is that they should not exclusively focus on core competencies. Our results suggest that it is a very thin line between a core competence and a core rigidity. Obviously, continuous reconstruction of human resources, customer relationships, and IT resources is a source of competitive advantage. But managers should also seek to strengthen the resources they control by including external expertise, as Leonard-Barton suggested. They have to renew *and* replace them, if necessary.

The key limitation of this study is that it followed a middle road between rich insights and number of organizations from which the data was collected. In particular, the main data sources were the interviews with owner-managers. However, this bears the risks of interviewee bias and memory failure, but the analysis was supplemented by contrasting the findings to the information that was offered on the company website and this information confirmed the results. Furthermore, the findings in this study are based on the examination of six firms. However, the findings presented above have a strong intuitive and conceptual appeal, and are amenable to quantitative verification. Another limitation of the study is the focus on the IT industry and generalizability to other industries is questionable. Furthermore, this paper examined small companies that were managed by a single person. Therefore, the findings can probably not be applied to manager teams or boards of directors.

This study is explorative and can thus only be a first step in analyzing the relationship between resilience and competitive advantage at small companies, which can be supplemented by further empirical verification. Furthermore, as little is known about the effective management of the trade-off between core competencies and core rigidities, this could be addressed either by long-term in-depth qualitative studies or by large scale quantitative work.

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About the Authors

Brian Webb is a senior lecturer in Information Systems, School of Management and Economics, Queen’s University of Belfast, N. Ireland. He is a former Distinguished Erskine Fellow in the Department of Accounting, Finance, and Information Systems, Faculty of Commerce, University of Canterbury, New Zealand. He holds a Bachelor’s degree from Queen’s, an MBA from the University of Ulster and a Ph.D. from University College London. In 1999 he was visiting scholar in the Department of Computer Science, University of British Columbia, Canada. Prior to becoming an academic, Brian worked as a systems analyst in both the UK and the United States. He is currently on secondment as a Senior Researcher at the Centre for Competitiveness, Belfast. He may be contacted at b.webb@qub.ac.uk.

Frank Schlemmer is the owner-manager of a small independent retailer based in Nuernberg, Germany. He is also currently in the final stages of completing his doctoral studies at the Queen’s University of Belfast. He has written a number of papers on the impact of IT and small firms and has previously published a book on performance management. He may be contacted at frank.schlemmer@gmx.de.

Appendix A. Examples of Dynamic Capabilities and Their Enablers

Dynamic Capability (Teece et al., 1997)	Of (= Examples)	By (= Enablers)
<p>Learning is a process by which repetition and experimentation enable tasks to be performed better or quicker. It also enables new production opportunities to be identified. The organizational knowledge generated by such activity resides in new patterns of activity, in “routines” or a new logic of organization.</p>	<p>Zollo and Winter (2002):</p> <ul style="list-style-type: none"> • Operating routines 	<p>Teece et al. (1997) and Eisenhardt and Martin (2000):</p> <ul style="list-style-type: none"> • Experimentation • Collaborations and partnerships • Developing individual and organizational skills • Joint contributions of employees

Dynamic Capability (Teece et al., 1997)	Of (= Examples)	By (= Enablers)
Integration is the coordination of internal and external activities and technologies.	Teece et al. (1997) and Eisenhardt and Martin (2000): <ul style="list-style-type: none"> • Customer feedback on different stages of the value chain • New technologies in organizational processes • Stakeholders (for example alliancing and partnering with suppliers or other companies) • New knowledge in the organization 	Ravasi and Verona (2001): <ul style="list-style-type: none"> • Fluid project-based organization • Interaction between experts of different professional areas • Cross-functional teams • Reduction of physical and structural barriers
Reconfiguration of the firm’s asset structure and the accomplishment of the necessary internal and external transformation.	Teece et al. (1997) and Eisenhardt and Martin (2000): <ul style="list-style-type: none"> • Resources • Capabilities 	Ravasi and Verona (2001): <ul style="list-style-type: none"> • Open and informal culture • Openness to individual proposals and creativity • Broad involvement in strategic process Teece et al. (1997) and Eisenhardt and Martin (2000): <ul style="list-style-type: none"> • Reduction of costs for change • Exit routines

Appendix B: Extract of Coded Interview

This section of the interview was mainly about learning and building strategic assets and about reconfiguration. I stands for interviewer (the researcher) and R for the respondent (the managing director). The left column shows the codes that emerged during data collection and the right column the codes that were created before data collection.

Manager’s Activity and Commitment	Question and Answer	Dynamic Capabilities
^A Com-bui: The manager appears to be committed toward learning. ^B Act-buy: Saying that she couldn’t stop learning indicates that she already learns.	I: Does your company learn easy? R: Yes, but I think in this competitive market, you have to keep learning all of the time ^A I mean if you stop learning then you become complacent and someone else tips you to the post and I think it’s what makes us hungry for the industry. ^B You must always be a step ahead and try and find out what is next to come aboard and learn that if need be so yes, I do think so. ¹	¹ Bui-hr: The manager believed that she created competitive advantage by learning and developing human resources.

Manager's Activity and Commitment	Question and Answer	Dynamic Capabilities
<p>^Cand ^DAct-bui: More indicators for her active role in building human resources.</p> <p>^EAnother indicator for her commitment toward learning.</p>	<p>I: Are you involved in any training programs?</p> <p>R: Well, as an employer I do appraisals so I do individual appraisals with them and I have nominated one of the top members of staff, she does a unique training program, an individual training program for each one of them so, also if there are areas if they would be weak on she would take them on different times one-to-one and strengthen their, build up whatever they need trained on. ^CWe also do outside training where we would go to product knowledge training or we also go to the UK. ² We would go to it once a year so we try and keep up where budget is possible, ³ as much training as we can. I think it is very important. I am from an ex-training background myself. I was a teacher for seven years so it's kind of naturally in me anyway to keep the training going, you know but keeping learning going keeps the brain going, keeps you stimulated. It prevents boredom. It does, definitely. ^E</p>	<p>²Bui-hr: Participation in training programs was an indicator for building human resources, because only the high performers did that.</p> <p>³Bui-cr: Understanding of market trends was an indicator for building customer relationships.</p>
<p>^FCom-bui: More indicators for activity and commitment toward learning</p>	<p>I: Did you have a lot of change inside your company in the last years?</p> <p>R: Well we have had extreme growth and due to that then a lot of change. We have expanded, there has been a lot of growth⁴ and I would also be involved in training the London guys so I go over every three months to make sure, to give them a training plan, make sure they are implementing what I have done prior and make sure the managers are managing and training the staff properly but we do all of that so the growth has been huge that way, you know. ^F</p>	<p>⁴Rec-hr: The company structure and the business processes were changed.</p>