

Methodological issues in dynamic capabilities research – a critical review

Abstract

Purpose: Since ensuring methodological rigour is a prerequisite for high quality empirical research, this study examines methodological choices in empirical studies on dynamic capabilities (DC), and analyses how well they accommodate the complexity of the concept.

Design/methodology/approach: A systematic review of 142 published peer reviewed journal articles on DC.

Findings: Although DC research comprises of balanced mix of qualitative and quantitative studies, there are many problem areas in terms of research methods. First, the use of past performance data against current status of DC must be addressed. Second, as DC deals with change, caution needs to be exercised in the use of cross-sectional data. Third, the essence of DC should not be lost in operationalization, and the research setting needs to be meaningful from the DC perspective. Finally, DC scholars must devote more attention to proper reporting of the research process and justification of the choices made.

Research limitations/implications: Inadequate rigour encumbers DC research. This study shows the areas for immediate attention. The implications are relevant for DC researchers, journal reviewers and editors as well as readers of scholarly DC articles.

Originality/value: This study is a novel contribution towards understanding the methods used in DC research. It introduces the issue of methodological fit into the DC discussion and highlights the methodological aspects that need to be considered and reported in more detail in future research articles. It also has implications on how to conceptualise DC.

Key words: dynamic capabilities, research methods, review, literature review.

1. Introduction

Research methods necessitate increasing attention as the phenomena examined become more complex. The selection of methods, which is crucial for the quality of research (cf. Edmondson and McManus 2007) is ideally guided by the research question (Arbnor and Bjerke 1997). Nevertheless, other factors, such as convenience and journal preferences may also exert an influence. The increasing complexity can be seen, for instance, in the domain of the resource based view of the firm. Since the seminal ideas of Penrose (1959), the discussion has extended into new directions; the dynamic capabilities (DC) view is just one example (Barreto 2010).

The DC approach stems from the seminal articles of Teece *et al.* (1994, 1997), which were followed by a number of other conceptual analyses (e.g. Eisenhardt and Martin 2000, Makadok 2001, Zollo and Winter 2002, Winter 2003). DC has been understood as the ability to create new resources and resource configurations (Teece *et al.* 1997, Ambrosini and Bowman 2009, see also Barreto 2010), or as the ability to renew organisational capabilities (Wang and Ahmed 2007). This study adopts the definition of Teece (2007) wherein DC is about sensing and seizing opportunities and reconfiguring the organisation through transformational activities (see also Helfat *et al.* 2007, Barreto 2010). The DC concept is therefore multidimensional. This is illustrated in Figure 1, which is based on the ideas of Teece (2007).

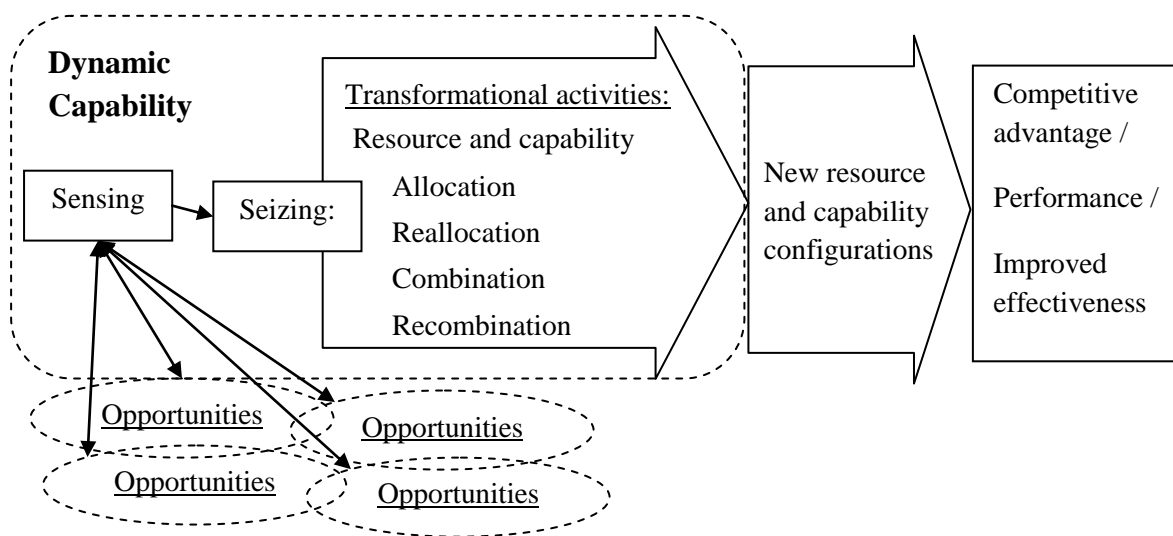


Figure 1. DC framework

Changes in both resources and capabilities are important and necessary aspects of DC (Eisenhardt and Martin 2000, Helfat *et al.* 2007). Thus, the DC concept is complex (e.g. Di Stefano *et al.* 2010), and capturing DC in empirical settings requires a multidimensional construct (Wang and Ahmed 2007). Moreover, due to the nature of the concept, the study of DC must consider the context, and hence rich contextual data are necessary (Ambrosini and Bowman 2009).

There are considerable challenges in empirical DC research (Hitt *et al.* 1998, Williamson 1999, Peng 2001, Zahra *et al.* 2006, Prieto *et al.* 2009, Pavlou and El Sawy 2011). For instance, the lack of established definition (Ambrosini and Bowman 2009) complicates the decisions on operationalisation. Additionally, the versatility of the theoretical basis behind the DC approach (Wang and Ahmed 2007, Di Stefano *et al.* 2010) may complicate the selection of research methods. Paying attention to methodological issues is a necessity for the advancement of the field (cf. Meglio and Risberg 2010), where conceptual complexity calls for sophisticated research methods (cf. Hitt *et al.* 1998).

Three fairly recent DC reviews (Wang and Ahmed 2007, Ambrosini and Bowman 2009, Barreto 2010) touch only briefly on the aspect of methods, and the limited findings of the previous reviews are partly contradictory. According to Wang and Ahmed (2007), quantitative research is underdeveloped while the majority of key studies on DC are qualitative, and they therefore call for additional quantitative studies. Ambrosini and Bowman (2009) argue that the discussion on DC is mainly conceptual while empirical support remains limited. Contrary to the previous authors, Ambrosini and Bowman (2009) state that the majority of the studies are either conceptual or based on secondary data, and are quantitative in nature. They call for qualitative and mixed methods studies. The differences between the previous reviews may stem from the fact that they have somewhat different foci. In sum, there is a need for more thorough discussion on methods in DC research.

The aim of this study is to examine:

1. Which research methods have been applied in DC research?
2. Which problem areas can be identified in the use of these methods in DC research?

Finding answers to these questions improves our understanding of how DC can be studied empirically and which issues are decisive in reporting empirical DC research. The majority of DC research is conducted on business enterprises, and therefore this review is also limited to those studies.

2. Methodology

2.1 Sampling procedures

This review is based on the analysis of 142 empirical articles found in systematic searches. All in all, the review benefitted from earlier reviews that served as benchmarks (e.g. Keupp and Gassmann 2009, Barreto 2010). To enable a comprehensive and unbiased search (cf. Tranfield *et al.* 2003), the search criteria in the keyword search were that the term dynamic capability, or capabilities, should occur in at least one of the following parts of the article: the title, the abstract, or the key words..

Two databases, ProQuest ABI/Inform and EBSCO Business Source Complete, were searched for articles. Both represent a good overview of management journals and were hence considered suitable for the purposes of this review. The search included articles published up

to the end of 2009. Fifteen years had passed since the seminal articles by Teece & Pisano (1994) and Collis (1994), giving DC research time to develop beyond the initial conceptual discussions. This study encompasses a slightly broader scope of time compared to the earlier reviews. The search was limited to peer reviewed journal articles, because they represent the academic discussion on DC well, present valid knowledge, and have the strongest impact on the field (cf. Podsakoff *et al.* 2005). The searches yielded 373 journal articles, only 19 of which were published before 2000, the earliest in 1991; the majority were published after 2005.

Over a third of the articles were conceptual, and therefore excluded from this study. A further five were based on simulation data and also excluded because, simulation data are not collected from empirical sources. Moreover, DC has apparently become a buzzword in many areas. In 42 of the articles, DC is mentioned only in the abstract and not really discussed in relation to the research findings. To enhance validity of the review, these articles were excluded. Another eight employ the concept in contexts other than business (e.g. robotics). These two groups were not considered relevant to this review, and hence were excluded. In addition, five studies examining DC in organisations other than business enterprises were excluded.

Methodological fit is a key aspect of good quality research (Hurmerinta-Peltomäki and Nummela 2006) and was utilised here for quality control. The four key elements of methodological fit: research question(s), the literature review, data collection and analysis, and contribution to the literature (Edmondson and McManus 2007) need to be aligned. To decide whether the article was eligible for the analysis, the research question, the data (sources, collection methods, and analysis), the contributions to the DC literature, and the alignment with DC theory in terms of the literature review were analysed. Consequently, 28 articles were found to have methodological discrepancies. Three different types of inconsistency were found in the studies: discrepancy between the research question and the data, discrepancy between the data and the conclusions, and discrepancy between the research question and the theoretical background. This is illustrated in Table 1.

Table 1. The methodological discrepancies

Discrepancy between:	Data & research question	Data & contribution to the literature	Research question & the literature review
Data & research question	3	-	-
Data & contribution to the literature	8	2	-
Research question & the literature review	-	-	15

Importantly, there are many different paradigms with somewhat different approaches to methodological issues regarding, for example, processes and the kind of data that may be used in studying processes (Van de Ven 2007). Therefore, the aim is not to condemn any particular

approach, but to identify challenges in empirical studies. In the following, the discrepancies are analysed in more detail.

The studies suffering from discrepancies between *the data and the research question*, or *the data and the contributions to the DC literature* illustrate similar problems, and in a number of studies they exist in parallel. It appears that the studies' authors do not fully acknowledge the limits of their data, although it may also be that the review processes, or a poor understanding of the methods by the journal, exert influence on the articles.

To examine processes one can either focus on relationships between variables or on sequences of events (Langley 1999). Studies focusing on the change process necessitate data on the sequence of events (Van de Ven 2007). Nonetheless, there are studies that suggest they examine change processes, while relying on a cross-sectional design. For example, Menguc & Auh (2006) examine how market orientation can be transformed into dynamic capability. Yet, the study utilises only cross-sectional survey data, which, based on the items reported, do not appear to capture transformation processes. The research model is a variance model, although the aim and conclusions would require a process model (cf. Van de Ven 2007). Another example is Marsh & Stock (2006), where the objective of examining how organisations can integrate internal knowledge over time is combined with cross-sectional data.

Then there are studies where the discrepancy lies between *the research question and the literature review*. For example, Sawers *et al.* (2008) examine the number of DC and their influence on partnership success. Because the DC approach does not consider the number of DC to be relevant, but focuses on the level and type of DC (Eisenhardt and Martin 2000, Teece 2007, Wang and Ahmed 2007, Ambrosini *et al.* 2009), the study setting does not seem meaningful. On the other hand, some studies operationalise the concept in such a way that the complexity of DC is lost. For instance, in the López-Mielgo *et al.* (2009) study, past innovation performance is seen to manifest DC, and in the Rothaermel and Hess (2007) study patent data are used to measure DC. Although simplification of theoretical constructs is part of operationalisation, it can be taken too far, and thus the essence of the key concept may be lost.

As a result, 28 articles were excluded from further analyses due to discrepancies in methodology. Moreover, seven articles did not include sufficient information on the research process and had to be omitted from the analysis. Figure 2 depicts the process of selecting the articles for the analyses, and the 142 analysed articles are listed in Appendix 1.

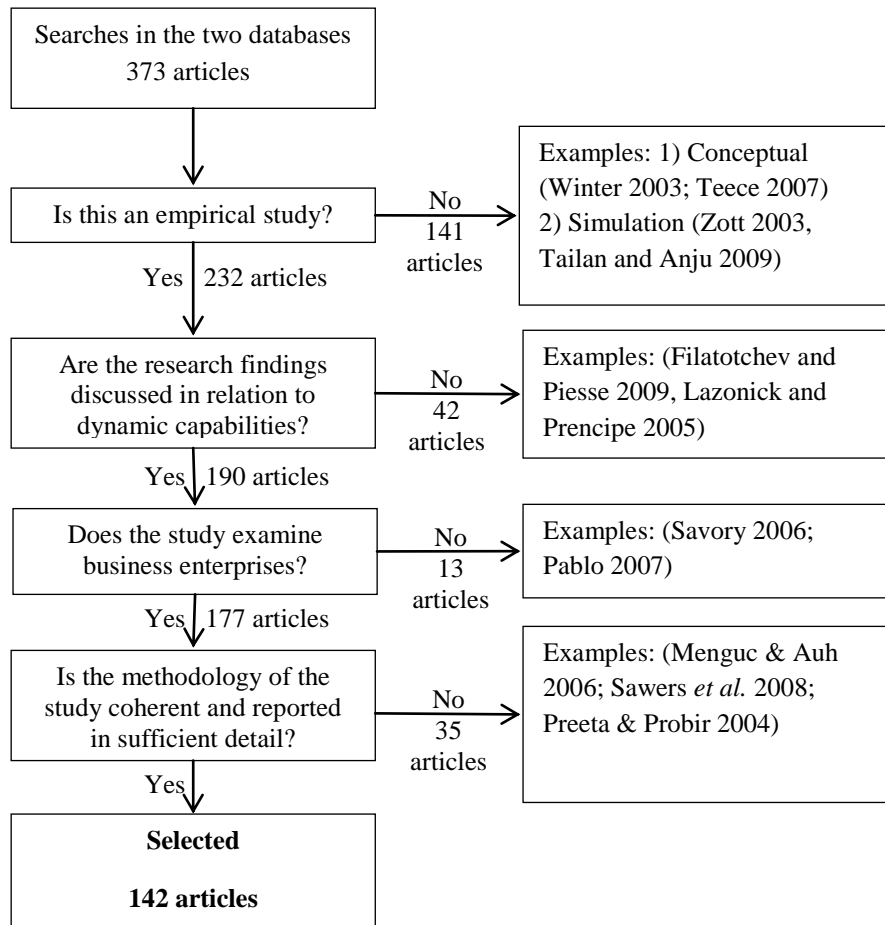


Figure 2. Selection analysis of the articles

It was considered necessary to include a wide variety of journals so that the range of methodologies could be analysed. Additionally, searching beyond the best known journals enabled studies to be found from areas that are not mainstream DC research. These studies may take different perspectives on DC and apply somewhat different research methods. Moreover, smaller or younger journals may be more receptive to novel ideas and unconventional approaches. Therefore, the search was not limited to particular journals. However, only journals employing a peer review process were accepted. A list of the journals in which the 142 articles are published can be seen in Appendix 2.

2.2 Coding procedures

The review culminated in the analysis of the 142 studies, which began by coding all 142 articles against the criteria listed in Table 2.

Table 2. Coding criteria

Coding criteria	Description of criteria
Year of publication	Which year the article was published?
Journal	Which journal the article was published in?

Data collection methods	Which data collection methods were used?
Data sources	From which sources the data were collected?
Data source triangulation	Were multiple data sources utilised?
Key informant	Who were the key informants?
Type of data	Is the data cross-sectional or longitudinal? If longitudinal, were they collected in real time or retrospectively?
Data timeframe	Which time period the data concerns?
Sampling approach	What kind of sampling strategy was used?
Size of the sample	What was the size of the sample?
Data analysis methods	Which analysis methods were used?
Justification of methods	Are the selected research methods justified?
Unit of analysis	Is the unit of analysis clearly stated in the article?
Research outcomes	What kinds of research outcome were produced? (e.g. frameworks, propositions, or revised hypotheses)

The coding results were summarised on a spreadsheet and imported to SPSS software for statistical analyses. The coding enabled analysis of the data both quantitatively and qualitatively, and hence enhanced the formation of a balanced view of the methods used in DC research. Quantitative analysis concerned the data collection and analysis methods, data sources, and types of data. These aspects were readily quantifiable as an inclusive categorisation could be formed. Distributions and correlations of the factors were examined. The distributions were utilised for descriptive analysis alone. The analysis of correlations was carried out by calculating the Pearson correlation coefficient and the statistical significance of the correlations was tested with a 2-sided Chi-Square test. Additionally, numerous coding criteria were cross-tabulated against the research approach (qualitative, quantitative, or mixed method) to see whether there are significant differences between the research approaches, for instance, in terms of the data timeframe. The statistical significance between the observed and expected counts in cross-tabulation was also tested with a 2-sided Chi-Square test. Qualitative analysis involved the initial assessment of methodological fit and the research approaches, as well as a more detailed discussion of data collection and analysis, sampling, and data sources. This was necessary to reflect the empirical research against the DC approach.

3. Review findings

3.1 Qualitative, quantitative and mixed method approaches

This review examined both the data collection and data analysis methods. Contrary to what is often argued (cf. Wang and Ahmed 2007), this review indicates a fairly equal number of quantitative and qualitative studies, as the sample comprises 71 qualitative studies, 59 quantitative studies, and 12 mixed methods¹. Figure 3 depicts the annual proportion of the

¹ The concept of mixed method study is used here to refer to studies in which both quantitative and qualitative methods are employed (Creswell and Plano-Clark 2007, Johnson *et al.* 2007). Typically, the mixed method studies analysed include a quantitative element (quantitative data and analysis) and a qualitative element (qualitative data and analysis) (Hurmerinta-Peltomäki and Nummela 2006). Only one of the articles was labelled

three different research approaches. Mixed method studies have of late become slightly more prevalent. Two good examples of extant mixed method articles on DC are Newell and Edelman (2008) and Ettl and Pavlou (2006), both of which describe thoroughly the conduct of the study. Moreover, the link between qualitative and quantitative elements is evident in both studies.

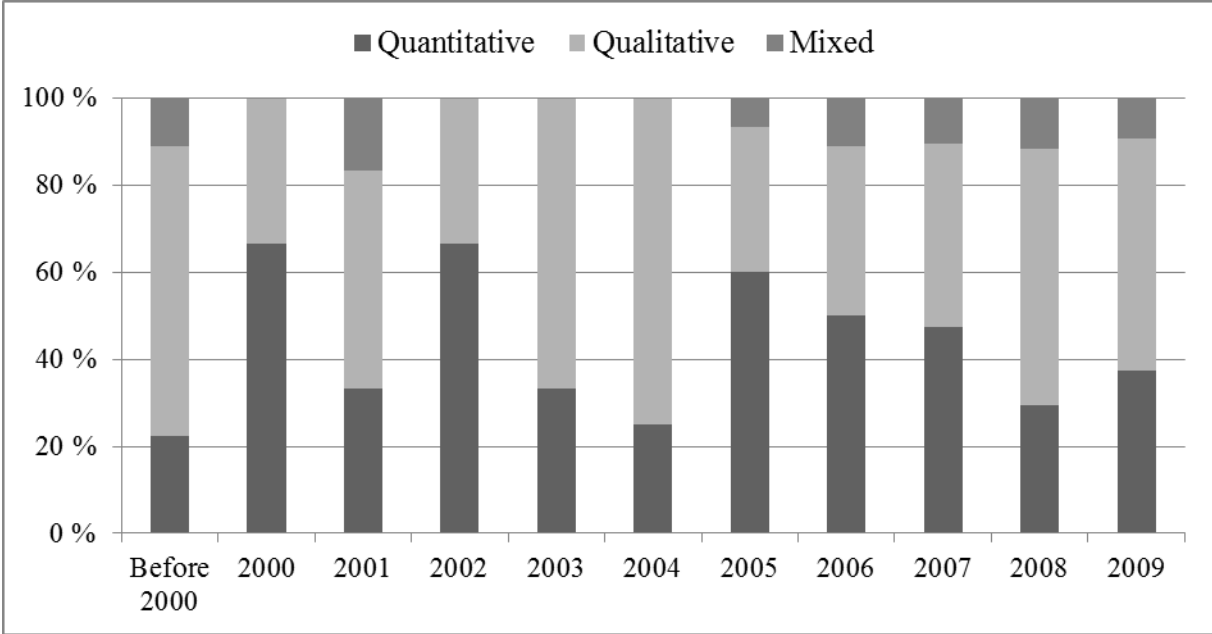


Figure 3. Proportion of quantitative, qualitative and mixed method articles

Because the DC approach is neither nascent nor mature (Miller and Shamsie 1996, Wang and Ahmed 2007), but somewhere in between, it can be argued to benefit from combining qualitative and quantitative research approaches (cf. Edmondson and McManus 2007). The slightly increasing emphasis on mixed method research is also in line with Hitt *et al.* (1998), in that integration of qualitative and quantitative methods will become increasingly common as the phenomena investigated become increasingly complex. Moreover, the integration of positivist and interpretivist approaches, namely mixing methods, has become increasingly accepted (cf. Miles and Huberman 1994).

The studies were analysed in terms of the research outcomes. As expected, based on the differing aims of qualitative and quantitative research, nearly all of the studies providing descriptive insights or frameworks/models are qualitative and nearly all of the hypotheses testing studies are quantitative. The numbers can be seen in Table 3. However, it is noteworthy that only five studies, all of which are qualitative, offer formally stated propositions. This impacts future research, because the propositions tend to offer fruitful avenues for further research. Thus far DC research has remained relatively fragmented, and

by its authors as mixed method study and three as multi-method studies. The remaining studies report, for example, that “we use both survey and interview data” (Newell and Edelman 2008).

knowledge has not accumulated effectively. As these two issues may be connected this is the kind of problem area that may also prevail in other fields at a similar stage of development.

Table 3. Comparison between research approaches

	Qualitative methods		Quantitative methods		Mixed methods		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Research outcomes								
Framework/model	21	15	3	2	2	1	26	18
Propositions	5	4	0	0	0	0	5	4
Hypothesis testing	2	1	50	35	6	4	58	40
Revised hypotheses/ frameworks	1	1	0	0	1	1	2	2
Descriptive insight	42	30	5	4	4	3	51	36
Totals	71	50	58	41	13	9	142	100
Choice of methods justified²								
Yes	19	13	0	0	0	0	19	13
Partial	22	16	8	6	6	4	36	25
No	30	21	50	35	7	5	87	61
Totals	71	50	58	41	13	9	142	100
Unit of analysis								
Clearly stated	12	9	11	8	2	1	25	18
Not clearly stated	59	41	47	33	11	8	117	82
Totals	71	50	58	41	13	9	142	100

An intriguing difference between the qualitative and quantitative studies concerns the justification of the selected research methods. A surprisingly large proportion of the articles did not contain any justification for the choice of methods. However, as shown in Table 3, there is a significant difference between qualitative and quantitative studies in this regard. Nearly two thirds of qualitative articles at least partially justify the choice of methods, whereas over 85% of quantitative studies contain no justification. Half of mixed method studies justify the choice of methods partially with the other half not justifying the choice. It is probable that quantitative research methods are so widely accepted that their use does not need to be justified. This is also the case in DC research despite the stage of development of the literature and the complexity of the phenomenon (see e.g. Ambrosini and Bowman 2009). This is an important issue, as justifying the choices made is crucial for high quality research in any field.

Additionally, the unit of analysis was examined in terms of whether it is explicitly stated or not in the article. An alarming 82% of the articles did not clearly state the unit of analysis. In this regard there were no differences between qualitative, quantitative, or mixed method studies. This finding calls for immediate attention to the reporting of empirical studies. DC can be examined on numerous different analytical levels (individual, projects, organisation's

² Describes whether the selection of research methods was justified in the article. "Yes" implies that the choice of methods (including data collection and analysis) was clearly explained. "Partial" means that only some aspects of the choice of methods were justified. "No" means that there was no attempt to justify the choice of methods. (cf. Barratt *et al.* 2011)

unit, whole organisation etc.), and therefore explicitly stating the unit of analysis is crucial for rigour.

3.2 Data collection and analysis

Half of the studies reviewed rely solely on primary data (Scandura and Williams 2000), while a quarter employ only secondary data. The remainder combine both primary and secondary data. The type of data used correlates somewhat with the research approach³. Only seven per cent of the quantitative studies employ both primary and secondary data, whereas 33% of the mixed method studies and 41% of the qualitative studies make use of both types (e.g. Macpherson *et al.* 2004, Morgan *et al.* 2009, Salvato 2009). Although it is challenging to incorporate different kinds of data into quantitative studies, it is important as it can help, for example, overcome common method bias (cf. Podsakoff and Organ 1986, Podsakoff *et al.* 2003).

The data are drawn from a variety of sources. As shown in Table 4, interviews were the key source in approximately half of the studies. Surveys and secondary data have also been used to a significant degree. Managers are the most common informants in data collection.

Table 4. The main data source in the studies

Data collection method	Main type of data (proportion of the articles)	Informants/data sources
Interviews	49%	Managers (75%), other employees (17%), entrepreneur/owner (5%), experts (3%)
Survey	27%	Managers (84%), entrepreneur/owner (11%), other employees (5%)
Secondary	22%	Documents (45%), databases (42%), earlier case studies (13%)
Experiment	1%	Experiment with design engineers (100%)
Author's own experience	1%	Author's own recollection (100%)

A little over one third of the studies supplement the main data with other data, of which secondary documents are the most commonly used (in 28% of the studies). Also observational data, databases, and earlier studies were used as supplementary sources. In most cases, the employment of data from multiple sources enabled data triangulation (see Jick 1979), which was also possible in some of the studies relying on a single type of data (e.g. multiple informants from one firm). Because of the multidimensionality of the DC concept, research would certainly benefit from increased use of data triangulation (Scandura and Williams 2000, cf. Van de Ven 2007).

Moreover, there is a connection between the use of multiple data sources and the research approach. Only one in ten of the quantitative studies utilised multiple sources of data, whereas

³ Pearson correlation coefficient -0.239; significant at the 0.01 level.

nearly half (46%) of the qualitative studies relied on more than one source⁴. Even though the use of multiple different types of data is no guarantee of producing a high quality study, it can lead to a better understanding of the phenomenon. Data triangulation is indeed quite common in qualitative case studies (Piekkari *et al.* 2009, Welch and Paavilainen-Mäntymäki 2010) and is necessary for the holistic approach that is typical for qualitative research. This is also apparent in Table 5.

Table 5. Summary table of data collection and analysis

	Qualitative methods		Quantitative methods		Mixed methods		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Data triangulation								
Yes	33	23	6	4	10	7	49	34
No	38	27	52	37	3	2	93	66
Totals	71	50	58	41	13	9	142	100
Sampling approach								
Theoretical	43	30	28	20	6	4	77	54
Convenience	4	3	1	1	0	0	5	4
Random	1	1	10	7	1	1	12	9
Not explained	23	16	19	13	6	4	48	33
Totals	71	50	58	41	13	9	142	100
Sample size								
1	37	26	-	-	1	1	38	27
2-3	8	6	-	-	0	0	8	6
4-10	17	12	-	-	1	1	18	13
> 10	9	6	-	-	0	0	9	6
< 50 ⁵	-	-	4	3	0	0	4	3
50-100	-	-	9	6	4	3	13	9
>100	-	-	46	32	6	4	52	36
Totals	71	50	59	41	12	9	142	100
Data analysis (primary)								
Qualitative	71	50	0	0	4	3	75	53
Descriptive statistics	0	0	5	3	2	1	7	4
Regression	0	0	31	22	3	2	34	24
Structural equation modelling	0	0	15	11	3	2	18	13
Other	0	0	7	5	1	1	8	6
Totals	71	50	58	41	13	9	142	100

The sampling approach⁶ impacts the generalisability of the research findings. Statistical generalisation to the population is argued to be possible only when random sampling is employed (Johnston *et al.* 2011); qualitative studies typically rely on theoretical generalisation (Eisenhardt 1989). Theoretical sampling was prominent also in quantitative research, whereas random sampling was used very rarely. Although this finding is somewhat surprising, it is

⁴ The difference is statistically significant at the 0.0001 level.

⁵ All the quantitative studies with very small samples utilised panel data and analysed developments over time.

⁶ The sampling approach refers to the way the sample for the study is constructed. Theoretical sampling means that the sample is drawn purposefully based on the characteristics of the company, for instance, to select polar cases. Convenience sampling refers to sampling out of convenience, for example, due to the location of the companies. Random sampling means drawing the sample randomly from a specified group of companies, the sampling frame, such as all ICT companies in a given country (cf. Barratt *et al.* 2011).

well fitted for DC research. Because DC is difficult to observe and capture, careful sampling is necessary. Identifying organisations that are interesting to study is not straight forward as DC cannot be identified *ex ante*. On the other hand, the high proportion of articles where the sampling approach is not explained is worrying. Rigorous research requires transparent reporting of the whole research process, something that needs to be better addressed in future DC research.

The sample sizes of the studies vary considerably. Slightly over half of the studies are qualitative studies with a very small sample. The second largest group are quantitative studies with a sample size greater than 100. The proportion of larger sample studies is surprisingly high, indicating efforts to develop quantitative measures for DC. The number of large sample size studies has actually been rising in recent years, some good examples of which were found during this research. Studies with the most advanced survey instruments include, for example, McKelvie and Davidsson (2009), Newell and Edelman (2008), Ettlie and Pavlou (2006), Danneels (2008), and Lichtenthaler (2009). All of these studies develop a survey instrument that embraces multiple elements of DC. Additionally, each element is examined with multiple items thus taking a holistic view of DC.

The selection of measures is one of the main challenges in DC research. The key concepts are highly intangible, and there are no established ways of operationalizing them. Quantitative studies mainly employ subjective measures, and the objective measures utilised deal with the performance of the companies (e.g. Kor and Mahoney 2005, Tan and Mahoney 2005). However, objective measures of research and development expenditure are also used in many studies (e.g. Helfat 1997, Narasimhan *et al.* 2006). Furthermore, data on patents or patent applications have been utilised in combination with other indicators (e.g. Griffith *et al.* 2005). The studies employing objective measures are primarily those that rely on secondary data alone. Even though it can be questioned whether it is possible to capture DC based on secondary data alone, there are some good examples (see Helfat 1997, Karim 2006, Karim 2009) that utilise either multiple different secondary sources or a single secondary source containing an extensive range of detailed information on the firms, which are therefore able to preserve the characteristics of DC in their analysis. Nonetheless, many of the studies relying solely on secondary data exhibit considerable weaknesses, because the data were not collected with the objective of capturing DC. Therefore, researchers must rely on proxy measures that can easily oversimplify the concept.

The analysis of empirical data is yet another key research factor. 53% of the studies relied on qualitative data analysis, only one of which employed narrative analysis (Narayanan *et al.* 2009). The other qualitative studies relied on some type of qualitative content analysis or thematic analysis. All in all, the qualitative analysis methods were scarcely reported, understandably so given that the qualitative data analysis process is often rather tacit. Therefore, formalised procedures and the use of software have can be recommended for qualitative researchers (Sinkovics *et al.* 2008). Of the studies employing quantitative methods, analysis was limited to the use of descriptive statistics in just seven cases; the majority employed either regression models (primary analysis method in 24% of the studies) or structural equation modelling (13%). The quantitative studies employed relatively

sophisticated analysis methods, although only ten per cent of the studies utilised more than one analysis method.

3.3 Data timeframe

Incorporating time into the research design is by definition characteristic of DC research. As shown in Table 6, only 18% of the 142 studies utilised purely cross-sectional data, while the remaining 82% had longitudinal elements in the data; for example, multiple rounds of data collection or retrospectively inquiring about the past (cf. Kimberly 1976, Pettigrew 1990). However, the division between cross-sectional and longitudinal studies differs between quantitative and qualitative approaches⁷. Qualitative studies utilise longitudinal designs more than quantitative studies, which is understandable due to the differences in, for example, data collection methods between qualitative and quantitative research, as well as having different ultimate aims.

Table 6. Summary table of data timeframe

	Qualitative methods		Quantitative methods		Mixed methods		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Data timeframe								
Retrospective	56	39	38	27	12	8	106	74
Real time	11	8	0	0	0	0	11	8
Cross-sectional	4	3	20	14	1	1	25	18
Totals	71	50	58	41	13	9	142	100

Cross-sectional designs have the potential to offer insights; for example, into the antecedents of change and connections between variables related to the change (cf. Van de Ven 2007). Most of the longitudinal studies, however, utilise retrospective data, and only eight per cent collected real-time data (see Pandza *et al.* 2003b, Colarelli O'Connor and DeMartino 2006, Narayanan *et al.* 2009). The scarcity of studies utilising real-time data predisposes DC research to criticism concerning post-rationalisation (Leonard-Barton 1990, Williamson 1999).

A variety of ways to incorporate time into research design were found. One commonly used method enquires into performance of the firm over the past three to five years (cf. Chang 2003, Hung *et al.* 2007)⁸, which entails significant limitations. From the theoretical perspective, DC influences operational capabilities and may therefore lead to improved performance (e.g. Collis 1994); so, inquiring about the current level of DC allied to past performance is confusing. When applying this kind of approach, the researcher must exercise caution in drawing conclusions based on the data. Many studies, however, employ a more advanced longitudinal design, such as conducting several rounds of survey (Danneels 2008, Yiu and Lau 2008) or interview data collection at multiple points in time (e.g. Colarelli O'Connor and

⁷ The differences are statistically significant at the .0001 level. 84% of the studies employing a cross-sectional design are quantitative, whereas 100% of those collecting data real-time are qualitative.

⁸ See also Schlemmer & Webb (2006) on SMEs financial and internet performance. This quantitative study employs a survey questionnaire containing inquiries on performance over the last three years, and the current status of DC, divided into aspects of integration, learning, and reconfiguration.

McDermott 2004). DC research would certainly benefit from more longitudinal studies employing sophisticated designs; especially those collecting data in real time would be significant in overcoming the post-rationalisation dilemma.

4. Conclusions and implications for dynamic capabilities research

This review makes the first contribution towards helping scholars recognise and to deal with the key challenges of empirical DC research. The review has aimed to answer two research questions:

- 1) Which research methods have been applied in DC research?
- 2) Which problem areas can be identified in the use of these methods in DC research?

Based on the above findings, it can be stated that DC research comprises a well balanced mix of qualitative and quantitative approaches. Although the findings indicate that only small share of empirical DC studies suffer from severe problems, there are many issues that need to be addressed in future research.

First, DC deals with change (Collis 1994, Teece 2007), highlighting the need to incorporate time into research designs (cf. Pettigrew 1990). Although the majority of DC studies included time in their design it was found to be rather common for data to be collected on past performance and the current status of DC. This is highly problematic because current DC impacts only future and not past performance (Teece 2009). This may also be a factor hampering the development of the DC approach.

Second, DC scholars may easily ignore the limitations of their data, particularly when relying on cross-sectional data. Examining change processes with purely cross-sectional data results in confusing outcomes. This concern is not limited to DC research, but applies in any field. Nevertheless, this is not to say that cross-sectional data would not contribute to DC research. On the contrary, they can be utilised, for instance, in examining connections between factors that influence DC.

Third, concepts must not be over simplified in operationalisation. Even though the development and use of quantitative measures is vital, the ease of measurement must not be put before the content of the measures. Use of measures that can capture the essence of DC is pivotal for the rigour of the study. It is also crucial that the research setting is truly meaningful from the DC perspective. Measuring issues that are not relevant in the DC approach does not advance our understanding, with the number of DC being a prime example.

Fourth, numerous DC studies appear to be reported rather poorly. This has had severe implications on the development of the DC approach. Poor reporting has made it very difficult for scholars to properly build on earlier research. The most notable issues being that studies are not explicit in their positioning and do not properly justify the choices made⁹. Insufficient detail in reporting may hamper future studies in terms of building on the research

⁹ Good examples of studies that build well on earlier research are Boccadelli and Magnusson (2006), Pan *et al.* (2006) and McKelvie and Davidsson (2009).

findings. Moreover, it hampers researchers in evaluating the quality of the study and transferability of the research findings. Transparency in the research process should be the focal goal for all DC researchers. Also, the lack of propositions in earlier DC studies has probably hampered the effective accumulation of knowledge.

To tackle the four aforementioned problem areas, it is vital that future DC research addresses the issues presented in Table 7.

Table 7. Key issues for future DC research

Methodological issue	Why is it important?
Ensuring methodological fit	Methodological fit is of utmost importance for the advancement of the field.
Developing the <i>ex ante</i> identification of DC	Recognising DC from current events, resources and capabilities, as opposed to past performance, is needed for: <ul style="list-style-type: none"> 1) Real-time data collection. 2) More rigorous sample selection.
Combining qualitative and quantitative approaches	Mixed methods research has considerable potential to advance the DC approach, e.g. in terms of breadth and depth of knowledge creation (cf. Hurmerinta-Peltomäki and Nummela 2006).
Development of quantitative measures	Widely accepted quantitative measures that can respect the nature of DC are important for more robust and influential future research.
More in-depth research is needed	Both qualitative and quantitative studies need to collect more comprehensive data on the organisations they examine. For instance by using also other informants besides managers.
Wider use of sophisticated longitudinal designs	Advanced use of longitudinal data and analyses is needed to understand the processes of DC.
Use of more varied analysis methods (e.g. narrative analysis)	Moving beyond the traditional qualitative analysis and quantitative regression analysis and SEM provides new perspectives to DC. For instance, narrative analysis enhances taking multiple levels of analysis into consideration (Narayanan <i>et al.</i> 2009), and achieving deep understanding of the phenomenon over time (Langley 1999).

Most importantly, DC scholars must ensure methodological fit in their studies. The three key pitfalls in DC research appear to be discrepancies between the data and the research question, the data and the contribution to the literature, and finally the research question and the literature. Ensuring alignment in these elements of the study is crucial for good quality DC research.

Also, the development of *ex ante* understanding of DC is a focal task for future DC research. Instead of researchers indicating retrospectively that a company has demonstrated DC, we

should know in advance which kinds of firm develop DC. DC research has been accused of post-rationalisation, so more studies that collect and analyse real-time data are needed as changes in capabilities and the environment unravel (see e.g. Pandza *et al.* 2003b, Prieto and Easterby-Smith 2006). Moreover, sampling is also a key issue here, particularly in DC research. Currently there are no general rules as to which kinds of firm are appropriate from the theory development perspective. Therefore, the extant literature examines a very wide variety of disparate organisations, which may be one of the factors contributing to the incoherence of the field. Future theory development needs to focus on how to identify analytically relevant organisations in DC research.

In addition to the two primary issues discussed above, there is a need for mixed methods studies, which have the potential to uncover relationships between new and established constructs (Edmondson and McManus 2007), and thus advance theory development. This is also linked to the development of quantitative measures for DC. It is necessary so that research might yield generalisable results on DC. Also combining different data sources was found to be an issue requiring consideration in future studies, because a holistic view is necessary in DC research (Pandza *et al.* 2003a). Triangulation is thus argued to benefit DC research.

The use of more varied analysis methods may also enhance the development of the DC approach. Narrative analysis, which was found to be almost nonexistent in DC research, is the prime example. Narratives could assist in increasing our understanding of how DC develops and functions, because the method is well suited for process research and can accommodate ambiguous boundaries. Additionally, narrative analysis provides detailed in-depth understanding (Langley 1999). Therefore, narratives could be useful in examining, for instance, the development of DC or the role of different actors in its development.

This review naturally has limitations. As the analysis only includes articles published in journals, there may be a bias towards certain types of study. Nonetheless, since the scope was not limited to any particular journals, the methodological bias of any one journal is unlikely to influence the findings. Moreover, it is important to bear in mind that DC has been examined under a variety of concepts and this review only includes articles containing the DC concept. Therefore, while including a good proportion of the studies, it is not an all embracing review of studies relevant to the DC literature. To enhance the validity and reliability of this review, the choices made have been reported in detail.

As this is the first attempt to focus on the methodological issues in DC research, there is certainly a need for further work. Operationalisation of the DC concept, which is one of the fundamental issues in empirical research, but beyond the scope of this study, is one of the most important avenues for further examination. Identifying different ways of operationalising the concept, and analysing their strengths and weaknesses, would add considerable value to theory development. On the other hand, of the methodological issues identified in this study, the lack of transparency merits further research. The fact that the majority of the studies do not clearly state the unit of analysis or justify the choice of methods is alarming. It would be interesting to contrast the findings of these studies with those from more transparent studies. Additionally, it is necessary to consider issues related to the

successful identification of the organisations to be studied. In other words, the approaches to sampling deserve more attention. Also, the use of past performance data in the analysis in relation to the current level of DC needs to be examined in detail. Finally, examining methodological choices in combination with the research topics also represents an avenue for further review studies.

References

- Ambrosini, V. and Bowman, C. (2009), "What are dynamic capabilities and are they a useful construct in strategic management?", *International Journal of Management Reviews*, Vol. 11, No. 1, pp. 29-49.
- Ambrosini, V., Bowman, C. and Collier, N. (2009), "Dynamic capabilities: An exploration of how firms renew their resource base", *British Journal of Management*, Vol. 20, No. 1, pp. 9-24.
- Arbnor, I. and Bjerke, B. (1997), *Methodology for Creating Business Knowledge*, 2nd edn, Sage Publications, Thousand Oaks, CA.
- Barratt, M., Choi, T.Y. and Li, M. (2011), "Qualitative case studies in operations management: Trends, research outcomes, and future research implications", *Journal of Operations Management*, Vol. 29, No. 4, pp. 329-342.
- Barreto, I. (2010), "Dynamic capabilities: A review of past research and an agenda for the future", *Journal of Management*, Vol. 36, No. 1, pp. 256-280.
- Boccardelli, P. and Magnusson, M.G. (2006), "Dynamic capabilities in early-phase entrepreneurship", *Knowledge and Process Management*, Vol. 13, No. 3, pp. 162-174.
- Chang, Y. (2003), "Benefits of co-operation on innovation performance: Evidence from integrated circuits and biotechnology firms in the UK and Taiwan", *R & D Management*, Vol. 33, No. 4, pp. 425-437.
- Colarelli O'Connor, G. and DeMartino, R. (2006), "Organizing for radical innovation: An exploratory study of the structural aspects of RI management systems in large established firms", *The Journal of Product Innovation Management*, Vol. 23, No. 6, pp. 475-497.
- Colarelli O'Connor, G. and McDermott, C.M. (2004), "The human side of radical innovation", *Journal of Engineering and Technology Management*, Vol. 21, No. 1/2, pp. 11-30.
- Collis, D.J. (1994), "How valuable are organizational capabilities?", *Strategic Management Journal*, Vol. 15, No. Special Issue, pp. 143-152.
- Creswell, J.W. and Plano-Clark, V.L. (2007), *Designing and conducting mixed methods research*, SAGE Publications, Thousand Oaks.
- Danneels, E. (2008), "Organizational antecedents of second-order competences", *Strategic Management Journal*, Vol. 29, No. 5, pp. 519-543.

- Di Stefano, G., Peteraf, M. and Verona, G. (2010), "Dynamic capabilities deconstructed: a bibliographic investigation into the origins, development, and future directions of the research domain", *Industrial and Corporate Change*, Vol. 19, No. 4, pp. 1187-1204.
- Edmondson, A.C. and McManus, S.E. (2007), "Methodological fit in management field research", *Academy of Management Review*, Vol. 32, No. 4, pp. 1155-1179.
- Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14, No. 4, pp. 532-550.
- Eisenhardt, K.M. and Martin, J.A. (2000), "Dynamic capabilities: What are they?", *Strategic Management Journal*, Vol. 21, No. 10, pp. 1105-1121.
- Ettlie, J.E. and Pavlou, P.A. (2006), "Technology-based new product development partnerships", *Decision Sciences*, Vol. 37, No. 2, pp. 117-147.
- Griffith, D.A., Kiessling, T.S. and Dabic, M. (2005), "An exploratory examination into the challenges to technology transfer in the transitional economy of Croatia", *Thunderbird International Business Review*, Vol. 47, No. 2, pp. 163-181.
- Helfat, C.E. (1997), "Know-how and asset complementarity and dynamic capability accumulation: The case of R&D", *Strategic Management Journal*, Vol. 18, No. 5, pp. 339-360.
- Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M.A., Singh, H., Teece, D.J. and Winter, S.G. (2007), *Dynamic capabilities: Understanding strategic change in organizations*, Blackwell Publishing, Malden, MA.
- Hitt, M.A., Gimeno, J. and Hoskisson, R.E. (1998), "Current and future research methods in strategic management", *Organizational Research Methods*, Vol. 1, No. 1, pp. 6-44.
- Hung, R.Y., Chung, T. and Lien, B.Y. (2007), "Organizational process alignment and dynamic capabilities in high-tech industry", *Total Quality Management & Business Excellence*, Vol. 18, No. 9, pp. 1023-1034.
- Hurmerinta-Peltomäki, L. and Nummela, N. (2006), "Mixed methods in international business research: A value-added perspective", *Management International Review*, Vol. 46, No. 4, pp. 439-459.
- Jick, T.D. (1979), "Mixing qualitative and quantitative methods: Triangulation in action", *Administrative Science Quarterly*, Vol. 24, No. 4, pp. 602-611.
- Johnson, R.B., Onwuegbuzie, A.J. and Turner, L.A. (2007), "Toward a definition of mixed methods research", *Journal of Mixed Methods Research*, Vol. 1, No. 2, pp. 112-133.
- Johnston, S.P., Jones, M.V., Morgan-Thomas, A. and Vlachos, G.I. (2011), "Sampling frames for cross-national survey research in international entrepreneurship", Nummela, N.(Ed.), *International Growth of Small and Medium Enterprises* Routledge, New York, pp. 191-209.

- Karim, S. (2009), "Business unit reorganization and innovation in new product markets", *Management Science*, Vol. 55, No. 7, pp. 1237-1254.
- Karim, S. (2006), "Modularity in organizational structure: the reconfiguration of internally developed and acquired business units", *Strategic Management Journal*, Vol. 27, No. 9, pp. 799-823.
- Keupp, M.M. and Gassmann, O. (2009), "The past and the future of international entrepreneurship: A review and suggestions for developing the field", *Journal of Management*, Vol. 35, No. 3, pp. 600-633.
- Kimberly, J.R. (1976), "Issues in the Design of Longitudinal Organizational Research", *Sociological Methods & Research*, Vol. 4, No. 3, pp. 321-348.
- Kor, Y.Y. and Mahoney, J.T. (2005), "How dynamics, management, and governance of resource deployments influence firm-level performance", *Strategic Management Journal*, Vol. 26, No. 5, pp. 489-496.
- Langley, A. (1999), "Strategies for theorizing from process data", *The Academy of Management Review*, Vol. 24, No. 4, pp. 691-710.
- Leonard-Barton, D. (1990), "A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites", *Organization Science*, Vol. 1, No. 3, pp. 248-266.
- Lichtenthaler, U. (2009), "Absorptive capacity, environmental turbulence, and the complementarity of organizational learning process", *Academy of Management Journal*, Vol. 52, No. 4, pp. 822-846.
- López-Mielgo, N., Montes-Peón, J.M. and Vázquez-Ordás, C.J. (2009), "Are quality and innovation management conflicting activities?", *Technovation*, Vol. 29, No. 8, pp. 537-545.
- Macpherson, A., Jones, O. and Zhang, M. (2004), "Evolution or revolution? Dynamic capabilities in a knowledge-dependent firm", *R&D Management*, Vol. 34, No. 2, pp. 161-177.
- Makadok, R. (2001), "Toward a synthesis of the resource-based and dynamic-capability views of rent creation", *Strategic Management Journal*, Vol. 22, No. 5, pp. 387-401.
- Marsh, S.J. and Stock, G.N. (2006), "Creating dynamic capability: The role of intertemporal integration, knowledge retention, and interpretation", *The Journal of Product Innovation Management*, Vol. 23, No. 5, pp. 422-436.
- McKelvie, A. and Davidsson, P. (2009), "From resource base to dynamic capabilities: an investigation of new firms", *British Journal of Management*, Vol. 20, No. 1, pp. 63-80.
- Meglio, O. and Risberg, A. (2010), "Mergers and acquisitions—Time for a methodological rejuvenation of the field?", *Scandinavian Journal of Management*, Vol. 26, No. 1, pp. 87-95.

- Menguc, B. and Auh, S. (2006), "Creating a firm-level dynamic capability through capitalizing on market orientation and innovativeness", *Academy of Marketing Science Journal*, Vol. 34, No. 1, pp. 63-73.
- Miles, M.B. and Huberman, A.M. (1994), *Qualitative data analysis an expanded sourcebook*, Sage, Thousand Oaks.
- Miller, D. and Shamsie, J. (1996), "The resource-based view of the firm in two environments: The hollywood film studios from 1936 to 1965", *The Academy of Management Journal*, Vol. 39, No. 3, pp. 519-543.
- Morgan, N.A., Vorhies, D.W. and Mason, C.H. (2009), "Market orientation, marketing capabilities, and firm performance", *Strategic Management Journal*, Vol. 30, No. 8, pp. 909-920.
- Narasimhan, O., Rajiv, S. and Dutta, S. (2006), "Absorptive capacity in high-technology markets: The competitive advantage of the haves", *Marketing Science*, Vol. 25, No. 5, pp. 510-524.
- Narayanan, V.K., Colwell, K. and Douglas, F.L. (2009), "Building organizational and scientific platforms in the pharmaceutical industry: A process perspective on the development of dynamic capabilities", *British Journal of Management*, Vol. 20, No. 1, pp. 25-40.
- Newell, S. and Edelman, L.F. (2008), "Developing a dynamic project learning and cross-project learning capability: synthesizing two perspectives", *Information Systems Journal*, Vol. 18, No. 6, pp. 567-591.
- Pan, S., Pan, G. and Hsieh, M.H. (2006), "A dual-level analysis of the capability development process: A case study of TT&T", *Journal of the American Society for Information Science & Technology*, Vol. 57, No. 13, pp. 1814-1829.
- Pandza, K., Horsburgh, S., Gorton, K. and Polajnar, A. (2003a), "A real options approach to managing resources and capabilities", *International Journal of Operations & Production Management*, Vol. 23, No. 9, pp. 1010-1032.
- Pandza, K., Polajnar, A., Buchmeister, B. and Thorpe, R. (2003b), "Evolutionary perspectives on the capability accumulation process", *International Journal of Operations & Production Management*, Vol. 23, No. 7/8, pp. 822-849.
- Pavlou, P.A. and El Sawy, O.A. (2011), "Understanding the elusive black box of dynamic capabilities", *Decision Sciences*, Vol. 42, No. 1, pp. 239-273.
- Peng, M.W. (2001), "The resource-based view and international business", *Journal of Management*, Vol. 27, No. 6, pp. 803-829.
- Penrose, E. (1959), *The theory of the growth of the firm*, reprinted 1995 edn, Oxford University Press, Oxford.

- Pettigrew, A.M. (1990), "Longitudinal field research on change: Theory and practice", *Organization Science*, Vol. 1, No. 3, pp. 267-292.
- Piekkari, R., Welch, C. and Paavilainen, E. (2009), "The case study as disciplinary convention: evidence from international business journals", *Organizational Research Methods*, Vol. 12, No. 3, pp. 567-589.
- Podsakoff, P.M., MacKenzie, S.B., Bachrach, D.G. and Podsakoff, N.P. (2005), "The influence of management journals in the 1980s and 1990s", *Strategic Management Journal*, Vol. 26, No. 5, pp. 473-488.
- Podsakoff, P.M., MacKenzie, S.B., Jeong-Yeon, L. and Podsakoff, N.P. (2003), "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies", *Journal of Applied Psychology*, Vol. 88, No. 5, pp. 879-903.
- Podsakoff, P.M. and Organ, D.W. (1986), "Self-Reports in Organizational Research: Problems and Prospects", *Journal of Management*, Vol. 12, No. 4, pp. 531-544.
- Prieto, I.M. and Easterby-Smith, M. (2006), "Dynamic capabilities and the role of organizational knowledge: an exploration", *European Journal of Information Systems*, Vol. 15, No. 5, pp. 500-510.
- Prieto, I.M., Revilla, E. and Rodríguez-Prado, B. (2009), "Building dynamic capabilities in product development: How do contextual antecedents matter?", *Scandinavian Journal of Management*, Vol. 25, No. 3, pp. 313-326.
- Rothaermel, F.T. and Hess, A.M. (2007), "Building dynamic capabilities: Innovation driven by individual-, firm-, and network-level effects", *Organization Science*, Vol. 18, No. 6, pp. 898-921.
- Salvato, C. (2009), "Capabilities unveiled: The role of ordinary activities in the evolution of product development processes", *Organization Science*, Vol. 20, No. 2, pp. 384-409.
- Sawers, J.L., Pretorius, M.W. and Oerlemans, L.A. (2008), "Safeguarding SMEs dynamic capabilities in technology innovative SME-large company partnerships in South Africa", *Technovation*, Vol. 28, No. 4, pp. 171-182.
- Scandura, T.A. and Williams, E.A. (2000), "Research methodology in management: Current practices, trends, and implications for future research", *The Academy of Management Journal*, Vol. 43, No. 6, pp. 1248-1264.
- Schlemmer, F. and Webb, B. (2006), "The impact of strategic assets on financial performance and on internet performance", *Electronic Markets*, Vol. 16, No. 4, pp. 371-385.
- Sinkovics, R.R., Penz, E. and Ghauri, P.N. (2008), "Enhancing the trustworthiness of qualitative research in international business", *Management International Review*, Vol. 48, No. 6, pp. 689-714.

- Tan, D. and Mahoney, J.T. (2005), "Examining the Penrose effect in an international business context: the dynamics of Japanese firm growth in US industries", *Managerial and Decision Economics*, Vol. 26, No. 2, pp. 113.
- Teece, D. (2009), *Dynamic capabilities and strategic management*, Oxford University Press, Oxford.
- Teece, D. (2007), "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, Vol. 28, No. 13, pp. 1319-1350.
- Teece, D. and Pisano, G. (1994), "Dynamic capabilities of a firm: an introduction", *Industrial and Corporate Change*, Vol. 3, No. 3, pp. 537-556.
- Teece, D., Pisano, G. and Shuen, A. (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18, No. 7, pp. 509-533.
- Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14, No. 3, pp. 207-222.
- Van de Ven, A. (2007), *Engaged Scholarship - A Guide for Organizational and Social Research*, Oxford University Press, Oxford.
- Wang, C. and Ahmed, P. (2007), "Dynamic capabilities: A review and research agenda", *International Journal of Management Reviews*, Vol. 9, No. 1, pp. 31-51.
- Welch, C. & Paavilainen-Mäntymäki, E. 2010, "Explaining the internationalisation process of the firm: A process-based critique", , December 9th-11th, 2010.
- Williamson, O.E. (1999), "Strategy research: governance and competence perspectives", *Strategic Management Journal*, Vol. 20, No. 12, pp. 1087-1108.
- Winter, S.G. (2003), "Understanding dynamic capabilities", *Strategic Management Journal*, Vol. 24, No. 10, pp. 991-995.
- Yiu, D.W. and Lau, C. (2008), "Corporate entrepreneurship as resource capital configuration in emerging market firms", *Entrepreneurship Theory and Practice*, Vol. 32, No. 1, pp. 37-57.
- Zahra, S.A., Sapienza, H.J. and Davidson, P. (2006), "Entrepreneurship and dynamic capabilities: A review, model and research agenda", *The Journal of Management Studies*, Vol. 43, No. 4, pp. 917-955.
- Zollo, M. and Winter, S.G. (2002), "Deliberate learning and the evolution of dynamic capabilities", *Organization Science*, Vol. 13, No. 3, pp. 339-351.

Appendix 1.

List of reviewed articles

Abrahamsson & Brege (2004)	Gjelsvik (2002)	McKelvie & Davidsson (2009)
Andren et al. (2003)	Gopesh et al. (2009)	Menguc & Barker (2005)
Athreye et al. (2009)	Green et al. (2008)	Miyake & Nakano(2007)
Ayuso et al. (2006)	Griffith et al. (2005)	Morgan et al. (2009)
Azadegan et al. (2008)	Griffith et al. (2006)	Mosey (2005)
Benner (2009)	Griffy-Brown & Chun (2007)	Narasimhan et al. (2006)
Bergman et al. (2004)	Hacklin et al. (2009)	Narayanan et al. (2009)
Bessant et al. (2002)	Hagen & Lodha (2004)	Newbert (2005)
Bhutto (2005)	Harreld et al. (2007)	Newbert et al. (2008)
Bianchi et al. (2009)	Harris (2009)	Newell & Edelman (2008)
Bierly & Chakrabarti (1996)	Helfat (1997)	Newey & Zahra (2009)
Bierly & Daly(2007)	Hung et al. (2007)	O'Connor & DeMartino (2006)
Blomqvist et al. (2004)	Iansiti & Clark (1994)	O'Connor & McDermott (2004)
Boccardelli & Magnusson (2006)	Jantunen (2005)	O'Connor et al. (2008)
Branzei & Vertinsky (2006)	Jarratt (2008)	O'Reilly et al. (2009)
Bruni & Verona(2009)	Jones & Kraft (2004)	Osegowitsch & Madhok(2001)
Camuffo & Volpato (1996)	Judge & Douglas(2009)	Oxtoby et al. (2002)
Camuffo (1995)	Järvenpää & Leidner (1998)	Pan et al. (2006)
Capron & Mitchell (2009)	Kale & Singh(2007)	Pandza et al. (2003)
Carpenter et al. (2001)	Karim (2006)	Pandza et al. (2003)
Cegarra-Navarro (2005)	Karim (2009)	Pavlou & El Sawy (2006)
Cetindamar et al. (2009)	Killen et al (2008)	Petroni (1998)
Chang (2003)	King & Tucci (2002)	Pierce (2009)
Chau & Witcher (2008)	Koolen (2005)	Prieto & Easterby-Smith (2006)
Chen & Jaw (2009)	Kor & Mahoney (2005)	Prieto et al. (2009)
Chen et al. (2008)	Lampel & Shamsie (2003)	Ramachandran & Ray (2006)
Chung & Beamish (2005)	Lawson & Samson (2001)	Readman & Grantham (2006)
Daniel & Wilson (2003)	Lee & Anderson (2006)	Rindova & Kotha (2001)
Danneels (2008)	Lee & Kelley (2008)	Rosenbloom (2000)
Ellonen (2009)	Lee & Slater (2007)	Russo (2009)
Espedal (2005)	Li et al. (2006)	Salvato (2003)
Ettlie & Pavlou (2006)	Lichtenthaler (2009)	Salvato (2009)
Fang & Zou (2009)	Luo (2003)	Schlemmer & Webb (2008)
Fleck (2007)	Ma & Dissel (2008)	Schlosser & Mcnaughton (2007)
Farrant & Flynn(1999)	MacCormack & Iansiti (2009)	Shamsie et al. (2009)
Fujimoto (2001)	Macher & Mowery(2009)	Shang et al. (2009)
Galunic & Eisenhardt (2001)	Macpherson et al. (2004)	Shiri et al. (2009)
Garcia-Morales (2007)	Madhok & Osegowitsch (2000)	Skilton (2009)
García-Morales et al. (2007)	Magali & Delmas (2002)	Slater et al. (2006)

George (2005)	Majumdar (2000)	Smart et al. (2007)
Gilbert (2006)	Mathiassen & Vainio (2007)	Song et al. (2005)
Soosay & Hyland (2008)	Wang et al. (2007)	Witcher et al. (2008)
Swift & Hwang(2008)	Vassolo & Anand (2007)	Wu (2006)
Söderlund & Tell (2009)	Verity (2005)	Wu (2007)
Tan & Mahoney (2005)	Verona & Ravasi (2003)	Yiu & Lau(2008)
Taylor & Helfat(2009)	Wilkens et al. (2004)	Zhang (2007)
Thompson (2007)	Wilson & Daniel (2007)	Zhu & Kraemer(2002)
Tripsas (1997)		

Appendix 2.

List of journals

Journal	No. Of Articles	Journal	No. Of Articles
Strategic Management Journal	11	Information Systems Journal	1
Industrial and Corporate Change	7	International Journal of Biotechnology	1
International J. of Operations & Production Mgt	6	Int. J. of Entrepreneurship and Innovation Mgt	1
British Journal of Management	5	Int. J. of Human Resource Management	1
International J. of Technology Management	5	International Journal of Information Management	1
Technovation	5	Int. J. of Innovation and Technology Management	1
Academy of Management Journal	4	Int. J. of Managing Projects in Business	1
Information Systems Research	4	Int. J. of Manufacturing Technology and Mgt	1
Organization Science	4	International Journal of Organizational Analysis	1
R & D Management	4	International Journal of Production Research	1
European Management Journal	3	International Journal of Project Management	1
Journal of International Business Studies	3	Journal of Business & Management	1
The Journal of Product Innovation Management	3	J. of Global Information Technology Management	1
California Management Review	2	J. of High Technology Management Research	1
European Journal of Information Systems	2	Journal of International Entrepreneurship	1
European Journal of Marketing	2	Journal of Knowledge Management	1
IEEE Transactions on Engineering Management	2	Journal of Marketing Channels	1
International J. of Automotive Technology and Mgt	2	Journal of Operations Management	1
International Journal of Innovation Management	2	Journal of Organizational Change Management	1
Journal of Business Research	2	Journal of Retailing	1
Journal of Business Venturing	2	J. of Small Business and Enterprise Development	1
J. of Engineering & Technology Management	2	Journal of Small Business Management	1
Journal of International Management	2	Journal of the American Society for Information Science and Technology	1
Journal of Strategic Marketing	2	Journal of World Business	1
Management Science	2	Knowledge and Process Management	1
The Journal of Management Studies	2	Management Decision	1
American Business Review	1	Management Research	1
Business History	1	Management Revue	1
Business Strategy and the Environment	1	Managerial and Decision Economics	1
Construction Management and Economics	1	Marketing Science	1
Corporate Governance	1	Scandinavian Journal of Hospitality & Tourism	1
Decision Sciences	1	Scandinavian Journal of Management	1
E - Service Journal.	1	Team Performance Management	1
Entrepreneurship Theory and Practice	1	Technology Analysis & Strategic Management	1

European Journal of Innovation Management	1	The Int. J. of Human Resource Management	1
Human Resource Development Review	1	The Journal of Entrepreneurship	1
Industrial Management + Data Systems	1	The Learning Organization	1
Industrial Marketing Management	1	Thunderbird International Business Review	1
Information & Management	1	Total Quality Management & Business Excellence	1