Success Traps, Dynamic Capabilities and Firm Performance

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Abstract

Dynamic capabilities (DCs) are fundamental to the understanding of differential firm performance. However, the question remains as to why some firms are better at developing and applying DCs than others. Especially, successful firms have been warned against the tendency to fall into a success or competence trap, where success reinforces exploitation of existing competences and crowds out exploration of new competences, hindering the development of DCs. Therefore, this study examines the effects of success traps on DCs and consequently firm performance, taking into account firm strategy and market dynamism. To facilitate this, our study also identifies the commonalities of DCs across firms. Drawing on survey data from 113 UK high-tech small and medium-sized firms, we find that success traps have a significant, strong negative effect on DCs, which in turn have a weak positive effect on firm performance; DCs are manifested through absorptive and transformative capabilities as two common features across firms. We also find that the development and application of DCs is related to internal factors (such as success traps) rather than external factors (such as market dynamism).

Keywords: Dynamic capabilities, success or competence trap, firm strategy, market dynamism and firm performance.

Success Traps, Dynamic Capabilities and Firm Performance

Introduction

Dynamic capabilities (DCs), defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano and Schuen, 1997, p.516), are fundamental to firms' differential performance. Their importance is now amplified in large sectors of the global economy, especially in high-tech sectors, given that business operations are often organizationally and geographically distributed and that increasingly firms must combine multiple sources of invention, innovation and manufacturing to deliver marketplace value (Teece, 2007). The accelerating pace of technological change also means that high-tech firms often have no choice but to exploit existing competences for short-term commercial benefits and simultaneously explore new competences for long-term success (Gibson and Birkinshaw, 2004). To achieve this, firms must develop and apply DCs that enable them to pursue opportunities in new and potentially effective ways (Zahra, Sapienza and Davidson, 2006). Moreover, to outperform competition, firms are increasingly required to change the 'rules of the game' through developing and applying their DCs (Teece, 2007). Research has found that DCs are conducive to superior firm performance, especially in high-tech sectors (Danneels, 2002; Yung- Chul, 2013).

However, the question as to why some firms are better at developing and applying DCs than others, our core research question, remains under-researched. An interesting dilemma is that firms' success or existing competence is often the result of their capabilities for adaptation. However, when firms have successfully adapted to the environment, they tend to perceive this as a rationale for current organizational logic, norms and practices, and hence become less open to learning from new knowledge and less prepared to adapt when the environment changes. Success breeds the enthusiastic adoption and the persistent utilization of the routines and practices that led to that success (March and Olsen, 1976; Weick, 1984; Audia, Locke and Smith, 2000), resulting in firms repeating actions undertaken in the past (Sitkin et al., 2011). Prior research has warned firms against the tendency to fall into a 'success trap' (Levitt and March, 1988; Levinthal and March, 1993) or a 'competence trap' (Leonard-Barton, 1992), where success reinforces existing routines leading to greater exploitation of current competences and less exploration of new competences (Maidique and Zirger, 1985; Levitt and March, 1988; Lant, Milliken and Batra, 1992; Sitkin et al., 2011). Therefore, success traps are highly relevant to the development of DCs, especially in high-tech sectors featuring dynamic changes. However, little empirical evidence exists to help advance our understanding of the effects of success traps on DCs and consequently firm performance in high-tech firms. This, therefore, is our primary objective.

Pertinent to our core research question, scholars (e.g. Eisenhardt and Martin, 2000) have called for the identification of 'best practice' of DCs or the commonalities of DCs across firms. Nevertheless, extant research has largely focused on firm-specific, idiosyncratic processes and routines of DCs based on conceptual discussion or anecdotal evidence at best (see reviews by Helfat et al., 2007 and Wang and Ahmed, 2007). However, more research is needed to understand DCs' commonalities, given that they have important implications for the equifinality, substitutability and fungibility of DCs, and hence implications for firms' competitive advantage (Eisenhardt and Martin, 2000). Therefore, our secondary objective is to conceptualize and operationalize DCs and identify DCs' commonalities that exist across firms in different high-tech sectors. This will facilitate our primary objective.

We pursue the above objectives through the theoretical lens of organizational learning, which underpins the concepts of success trap (March, 1991) and DCs (Zollo and Winter, 2002). Our findings contribute to the strategic management literature by advancing our understanding of how firms develop and apply DCs with a view to improving firm performance. Specifically, we advance the conceptual work on DCs (Teece et al., 1997; Eisenhardt and Martin, 2000; Teece, 2007) and success traps (Levitt and March, 1988; Levinthal and March, 1993; Ahuja and Lampert, 2001) by examining the effect of success traps on DCs and consequently firm performance within the contexts of firms' strategy and market dynamism, and by identifying DCs' commonalities across firms. We draw on evidence from a survey of UK high-tech small and medium-sized enterprises (SMEs). Our findings have managerial implications for SMEs, especially those in high-tech sectors, in terms of balancing existing competences and developing new competences in light of competition. This responds to the specific call for understanding DCs in SMEs (Sapienza et al., 2006; Zahra et al., 2006).

Theoretical Background

DCs: Hierarchies and Commonalities

The DCs perspective encapsulates the evolutionary and outward-looking nature of organizational resources and capabilities responding to environmental change (Teece and Pisano, 1994; Teece et al., 1997; Helfat, 1997; Eisenhardt and Martin, 2000; Zahra and George, 2002; Teece, 2007). Despite extensive debate, the concept has been criticized for being vague and tautological and lacking empirical grounding (Williamson, 1999; Priem and Butler, 2001). Recent debate also surrounds its operationalization.

We focus on two issues to clarify its conceptualization: the hierarchies and the commonalities of DCs across firms. First, DCs have been conceptualized as two broad categories of capability hierarchies: operating routines (the operational functioning of the firm including both staff and line activities) and DCs (the modification of operating routines) (Zollo and Winter, 2002). These are later referred to as zero-level capabilities (i.e. the 'how we earn a living now' capabilities, such as producing and selling a product) and first-order DCs (i.e. capabilities that change the zero-level capabilities, such as changing the product or the customers/markets served) (Winter, 2003). Similarly, Zahra et al. (2006) categorize a substantive capability as an ability to solve a problem, and DCs as an ability to change or reconfigure substantive capabilities. Operating routines and zero-level capabilities are underpinned by a passive experiential process of 'learning by doing', whilst DCs are underpinned by a proactive and deliberate process of learning involving cognitive changes and questioning the status-quo (Zollo and Winter, 2002). We take the view that DCs are higher-order organizational capabilities of changing existing, or creating new, organizational resources and capabilities; these are in turn underpinned by firms' ability to undertake deliberate learning to change the status-quo and even learning to learn.

Second, ambiguity also surrounds DCs' commonalities across firms. Eisenhardt and Martin (2000, p.1108) argue that DCs are "idiosyncratic in their details", but also exhibit "common features that are associated with effective processes across firms." They also argue that, despite their commonalities, DCs may be developed from different starting points and follow unique paths (equifinality). This also means that DCs may differ in form and detail (substitutability) although the important commonalities are present, and that particular DCs may be effective across a range of industries (fungibility). The characteristics of equifinality, substitutability and fungibility lead Eisenhardt and Martin (2000) to argue that the scale of the "idiosyncratic firm effects' in the empirical literature (e.g. Wernerfelt and Montgomery, 1988; McGahan and Porter, 1997; Brush, Bromiley and Hendrickx, 1999) is probably overstated. We follow this school of thought, and consider that DCs' commonalities are imperative for the advancement of empirical work beyond evidence of ad-hoc and piecemeal nature.

Prior research has attempted to conceptualize the commonalities of DCs (see Table 1). Especially, Eisenhardt and Martin (2000) suggest three categories of DCs: resource integration capabilities, resource reconfiguration capabilities, and resource gaining and releasing capabilities. Teece (2007) disaggregates DCs into three elements: sensing and shaping opportunities and threats, seizing opportunities, and maintaining competitiveness through enhancing, combining, protecting, and reconfiguring/transforming organizational resources. Moving on from conceptualization to operationalization, two studies propose component factors of DCs: Pandza and Holt (2007) propose two components of DCs, namely absorptive capability - "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990, p.128) and transformative capabilities - a firm's ability to constantly redefine a portfolio of product or service opportunities based on knowledge endogenous to the firm (Pandza and Holt, 2007); and Wang and Ahmed (2007) suggest three components, namely absorptive, adaptive and innovative capabilities. The two studies bear resemblance: Pandza and Holt's (2007) transformative capabilities hinge on firms' ability to strategically adapt themselves in line with environmental change (adaptive capabilities) and their ability to engender innovative behaviour, new methods of production and new ways of doing things within the firms (innovative capabilities) as Wang and Ahmed (2007) suggest.

Absorptive and transformative capabilities are both internal capabilities, though the former is outward-looking whilst the latter is inward-looking. They form integral parts of DCs: the internal transformation is dependent on firms' absorptive capability that often involves assimilating external new knowledge with internal existing knowledge; and the ability to undertake internal transformation and update its prior knowledge can feed back into the development of absorptive capability. Transformative capability allows a firm to use internal knowledge for novel and unanticipated applications, ultimately triggering novel progression of knowledge whilst making the most of existing knowledge (Pandza and Holt, 2007). Absorptive and transformative capabilities are conceptually distinct, but mutually reinforcing components of DCs. Therefore, we conceptualize DCs as a high-order reflective construct consisting of the first-order component factors as postulated by Pandza and Holt (2007) and Wang and Ahmed (2007).

Insert Table 1 here

Success Traps

DCs arise from organizational learning (Teece et al., 1997; Zollo and Winter, 2002). Learning underpins every aspect of a firm's ability to sense and seize opportunities and reconfigure capabilities (Teece, 2007). However, learning has its own traps associated with an imbalance between two types of learning (Levinthal and March, 1993): exploratory learning that involves "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation", and exploitative learning that involves "refinement, choice, production, efficiency, selection, implementation, execution" (March, 1991, p.71). Each learning type is inherently self-reinforcing, causing a 'success trap' or a 'failure trap' (Im and Rai, 2008). Exploration often leads to failure due to the broad dispersion in the range of possible outcomes, and failure promotes the search for even newer ideas and more exploration, thereby creating a failure trap (Gupta, Smith and Shalley, 2006). Conversely, exploitation often leads to early success, reinforcing further exploitation along the same trajectory and thereby creating a success trap (Gupta et al., 2006). Success traps may lead to excessive exploitation at the cost of exploration required for long-term sustainability, whilst failure traps may lead to excessive exploration negating short-term commercial benefits (Levinthal and March, 1993). Success traps reflect organizational inertia that causes the organization to focus on existing competences based on past success and prevents it from adapting to the changing environment (Junni et al., 2013). Although past success is a precondition for existing competences, it does not always lead to success traps. Hence, past success is not a proxy for success traps; only those organizations experiencing organizational inertia that prevents them from breaking out of existing competences when the environment has changed are trapped by past success.

Success traps may have stronger impact on firm performance than failure traps (Lee and Van den Steen, 2010). The direct informational value of successful practices is higher than that of failures, because information about a success tells employees exactly what to do, whereas information about a failure only excludes one of many possible courses of actions (Lee and Van den Steen, 2010). Under performance-based reward systems, employees are motivated to learn from success and take the actions that they associate with high performance, resulting in their reluctance to experiment. In contrast, once employees stop experimenting, it is in a firm's best interest that its employees take the well-proven action (Lee and Van den Steen, 2010). This self-reinforcing effect of success suggests that from the perspectives of both the firm and its employees only best practices among all observed successes matter. This powerful effect of success explains why firms want to share best practices and replicate success and why success has more prominence than failures (Lee and Van den Steen, 2010). Hence, we focus on the effect of success traps on DCs.

Despite their significance, empirical evidence of success traps is largely *ad hoc* based on qualitative studies. For example, Ahuja and Lampert (2001) observe how success traps affect firms in the global chemical industry and identify three types of organizational pathologies which hinder breakthrough inventions: the familiarity trap as a tendency to favour the familiar over the unfamiliar; the maturity trap as a tendency to prefer the mature over the nascent; and the propinquity trap as a tendency to search for solutions that are near to existing solutions rather than to search for completely new solutions. A firm can be caught in all three types of success traps at varying levels (Ahuja and Lampert, 2001). This conceptualization informs our operationalization of success traps (see Research Methods).

Research Hypotheses

In this section, we articulate the success traps-DCs-firm performance relationship. Additionally, scholars have advocated a contingent view in that DCs' benefits depend on the context in which DCs are deployed (Levinthal 2000; Sirmon and Hitt, 2009; Schilke, 2013). Effective modes of DCs are not only affected by environmental change, but also from changes in organizational conditions (Zahra et al., 2006). Therefore, we also delineate the moderating effects of firm strategy as an internal contingent factor and market dynamism as an external contingent factor.

Insert Figure 1 here

Success Traps and DCs

Organizational learning offers a useful theoretical lens to understand the effect of success traps on DCs. Success traps reflect a firm's excessive emphasis on exploitative learning (Gupta et al., 2006; Levinthal and March, 1993) - a passive experiential learning process that focuses on operating routines (Zollo and Winter, 2002) and replicating zero-level capabilities (Winter, 2003). This may hinder a higher level of deliberate learning to change the status-quo and development of new knowledge and capabilities (Zollo and Winter, 2002; Zahra et al., 2006). Burgelman (2002) identifies that success signals positive feedback that increasingly ties the previous success of Intel's strategy to that of its existing product-market environment, making it difficult to change strategic direction even when the environment has changed. Success generates optimism, enthusiasm and commitment (March and Olsen, 1976; Weick, 1984; Sitkin et al., 2011), resulting in increased feelings of self-efficacy (Audia et al., 2000) and the likelihood of complacency (Miller and Chen, 2004). As a firm successfully improves its capabilities and efficiencies in exploitation, its desire to change diminishes

(Levitt and March 1988). Consequently, the ability to alter its course in a changing market may be stifled (Cyert and March, 1992), and core competences associated with past successes may turn into core rigidities (Leonard-Barton, 1992). Prior research has particularly warned against the danger of success traps in high-tech industries (Rosenkopf and Nerkar, 2001). Hence, we hypothesize that (see Figure 1):

H_1: Success traps have a negative effect on DCs.

DCs and Firm Performance

The question as to what extent DCs directly impact short-term firm performance and long-term sustained competitive advantage remains at the centre of debate (Barreto, 2010). Some argue for a direct relationship between DCs and firm performance (e.g. Teece et al., 1997), though this is dependent on firms possessing the resources on which DCs can act (Makadok, 2001). Some suggest that having DCs does not guarantee successful outcomes (Zahra et al., 2006), and that DCs may influence performance through modifying and creating resource bundles (Eisenhardt and Martin, 2000; Zott, 2003). Zahra et al. (2006) also warn that DCs may even damage performance if they are misused, and opportunity cost for developing and using DCs must be considered (Winter, 2003). Given the difficulty of obtaining firms' financial performance and the need to unpack how performance outcome comes about, Stadler, Helfat and Verona (2013) examine the direct effect of DCs on the success of resource acquisition and resource development, and the indirect effect of DCs on the amount of resource acquisition and resource development, both of which they find to be statistically significant. Further, Schilke (2013) argues that the effect of DCs on firm performance is contingent upon market dynamism. These studies highlight the complexity of the DCs-firm performance relationship and the need for further empirical investigation.

We argue that from a cross-sectional viewpoint, firms with a higher level of DCs, regardless of their starting points, the paths they take and the forms of DCs, are more likely to actively scan the environment, acquire and absorb new information, and transform internally responding to the external change. This is especially the case in high-tech sectors where both superior performance and viability of firms are transient for firms without DCs (Zollo and Winter, 2002). Hence, firms with a higher level of DCs are more likely to outperform those with lower level of DCs in a cross-sectional setting, although the DCs-firm performance relationship may be more complex, rather than a simple, direct effect (Wang and Ahmed, 2007). Hence, we hypothesize that:

H_2: DCs have a positive effect on firm performance.

Moderating Effect of Firm Strategy

The equifinality nature of DCs suggests that firms may follow different paths to developing DCs, and such paths may be connected with firm strategy (Wang and Ahmed, 2007). However, Wang and Ahmed (2007) view firm strategy as a result of a firm's DCs over time, rather than considering their relationship in a cross-sectional setting. For example, when a firm’s strategy is to achieve differentiation, its DCs may direct resources toward new product development capability, whereas a cost leader may focus on efficient manufacturing and overall cost cutting over time. Firms have to face organizational trade-offs in choosing between alternative capability development (Teng and Cummings, 2002) in line with their strategic choice. In a cross-sectional setting, we consider firm strategy as an organizational context, in which organizational resources and capabilities are aligned to create competitive advantage; the more a firm is equipped with resources and capabilities, the more likely it develops a more complex and advantageous strategy responding to the external environment (Day and Wensley, 1988; Amit and Schoemaker, 1993; Spanos and Lioukas, 2001).

However, prior research has not examined the success traps-DCs-firm performance relationships under different firm strategies. To theorize their relationships, we refer to evidence in strategic management literature arguing that firms pursuing different strategy types (e.g. Miles and Snow, 1978) may engage in different types of learning, which lead to different degrees of DCs and consequently firm performance. Prospectors, in Miles and Snow's (1978) typology, continuously seek new product-market opportunities, engage in more environmental scanning and do it more frequently compared with other strategy types (Hambrick, 1982). Under a Prospector strategy, a firm must engage in a high level of learning through exploration and experimentation (March, 1991), aiming to beat its competitors and achieve first-mover advantage (Hambrick, 1982). Defenders attempt to focus on a narrow domain by controlling secure niches in their markets, engaging in little or no product-market development, and stressing efficiency of operations. Hence, Defenders are likely to have a tendency to persistently follow the routines and practices that led to past success (Audia et al., 2000), which may not favour DCs. Analyzers are in an intermediate position between Prospectors and Defenders, through observing and responding to market conditions. Therefore, we hypothesize that:

> H_{3a}: Firm strategy moderates the success traps-DCs relationship; the negative effect of success traps on DCs is likely to be stronger for Prospectors than for Analyzers and Defenders.

H_{3b}: Firm strategy moderates the DCs-firm performance relationship; the positive effect of DCs on firm performance is likely to be stronger for Prospectors than for Analyzers and Defenders.

Moderating Effect of Market Dynamism

Given their outward-looking nature, DCs are influenced by market conditions (Eisenhardt and Martin, 2000; Zahra et al., 2006). DCs may exhibit different patterns under different levels of market dynamism - the rate of change of different elements in the market in which a firm operates (Jaworski and Kohli, 1993; Miller and Friesen, 1983). In moderately dynamic markets where established and complicated organizational routines are in operation (Eisenhardt and Martin, 2000), DCs are manifested through incremental development of existing resources (Ambrosini and Bowman, 2009; Ambrosini et al., 2009). Conversely, in high velocity markets firms tend to operate on the basis of simple routines that allow managers to break away from established routines and give them wide latitude in decision making and flexibility in allocating resources to deal with the speed and frequency of environmental change (Eisenhardt and Martin, 2000, p.1117).

The types of learning that underpin DCs vary in different market conditions. In a moderately dynamic markets, firms' incremental development of existing resources mainly depends on prior experience and routines, and hence is largely underpinned by exploitative learning (March, 1991; Gupta et al., 2006) or 'learning before doing' (Pisano, 1994). Conversely, in a high velocity market, firms are more likely to engage in radical changes or even creation of resources and capabilities (Ambrosini and Bowman, 2009; Barrales-Molina, Bustinza and Gutiérrez-Gutiérrez, 2013). This requires greater exploratory learning (March, 1991; Gupta et al., 2006), or learning through experimentation (Pisano, 1994). Therefore, it is expected that success traps, which overemphasize exploitative learning and crowd out exploratory learning, may have different effects on DCs in different market conditions. More specifically, the hypothesized negative effect of success traps on DCs is likely to be stronger in high velocity markets.

Further, the moderating effect of market dynamism on the DCs-firm performance relationship is debatable. Some authors (e.g. Schilke, 2013) argue that firms may find it hard to match unfamiliar environmental conditions with organizational changes, resulting in DCs being less effective in highly dynamic environments than in moderately dynamic environments. However, we follow the argument that in high velocity markets firms' simple routines that allow more flexibility and adaptation are associated with a higher degree of causal ambiguity (Eisenhardt and Martin, 2000), compared with established and complicated routines that promote stability and standardization in moderately dynamic markets. Therefore, it can be argued that DCs associated with a high degree of causal ambiguity are more likely to lead to performance effect in high velocity markets than in moderately dynamic markets. Zahra et al. (2006) also propose that firms' potential gain from DCs is greater in dynamic environments. The debate surrounding the DCs-firm performance relationship in different market conditions demands better theorizing and an empirical investigation into the moderating effect of market dynamism. Hence, we hypothesize that:

> H_{4a}: Market dynamism moderates the success traps-DCs relationship; under high market dynamism, the negative effect of success traps on DCs is likely to be stronger than under low market dynamism.

> H_{4b}: Market dynamism moderates the DCs-firm performance relationship; under high market dynamism, the positive effect of DCs on firm performance is likely to be stronger than under low market dynamism.

Research Methods

Our study is based on a survey of UK high-tech SMEs, including micro firms (<10 employees), small firms (10-49 employees) and medium-sized firms (50-249 employees) (The European Commission, 2009). High-tech firms are defined as those with a Standard Industrial Code that falls into one of the five high-tech industries (OECD, 2003): (1) aerospace, (2) pharmaceutical and biotechnology, (3) office and computing, (4) radio, TV and communication, and (5) medical and optical equipment. High-tech SMEs were selected because of: (a) their theoretical relevance to DCs, as they have been described as "firms with advanced knowledge and capabilities in technology, an educated workforce, and the ability to adapt quickly to fast changing environments" (Crick and Spence, 2005:168); (b) their practical relevance in the context of current economic climate where there is increased business closure rate and firms are reviewing their business models and looking for new opportunities (Zurich, 2012); and (c) their policy relevance to economic growth, as the Government recognizes the need to support SMEs in developing DCs (CBI, 2011).

Using the Experian Database that pools data from Companies House, Yellow Pages and Thomson Directory data, we identified 1211 UK high-tech SMEs matching our sampling criteria. Questionnaires were posted to the 1211 SMEs in 2011. We followed the postal survey with a telephone call, and identified that only 522 surveys reached the intended addressees. Out of 522, 134 completed questionnaires were returned; after deducting 21 unusable responses, 113 effective responses were entered in the analysis, a 21.65% effective response rate. The 113 responses included 16 (14.16%) from the aerospace industry, 11 (9.73%) from pharmaceutical and biotech, 36 (31.86%) from office and computing, 25 (22.12%) from radio, TV and communication, and 25 (22.12%) from medical and optical equipment. Respondents were typically Company Directors, Chief Executive Officers, and Senior Managers.

Following Armstrong and Overton's (1977) approach to testing non-response bias, we divided respondents into two groups: early responses with a post mark on or before the survey due date (n=54; 47.8%), and late responses after the due date (n=59; 52.2%). The Analysis of Variance test results on the key constructs indicated that there was no significant non-response bias (*F*-statistics were insignificant ranging from 0.02 to 2.28).

Common method bias is a potential threat arising from using self-reported data from single informants (Podsakoff et al., 2003). While some scholars suggest that common method bias tends to be small and rarely statistically significant (Spector, 1987), other scholars report that it could account for about 25% of the variance in the measures (Williams, Cote and Buckley, 1989). We adopted both procedural and statistical methods to minimize and test for bias (Podsakoff et al., 2003). Procedurally, respondents were assured of confidentiality and anonymity to reduce evaluation apprehension (Podsakoff et al., 2003). Statistically, we conducted the Harman's one-factor test (Podsakoff and Organ, 1986). All continuous variables of success traps, DCs, market dynamism and firm performance were entered into an exploratory factor analysis. The results revealed that no single factor emerged, nor was there a general factor that could account for the majority of variance in these variables; the first factor accounted for only 11% of the total variance. This indicated that common method bias was not a major problem.

The difficulty of obtaining objective data for SMEs is well acknowledged (Dess and Robinson, 1984; Runyan, Droge, and Swinney, 2008), especially financial data (Stadler et al., 2013). We managed to obtain 2010 and 2011 objective data on firm size (i.e. the number of employees) for 33 firms in our sample. Firm size as reported in our survey data had significant positive correlation coefficients with the objective data for 2011 (0.66, $p<0.01$), and that for 2010 (0.71, $p<0.01$). This provided additional evidence against common method bias. Additionally, we asked respondents to both rate their firms' growth in comparison to the previous year and provide actual sales and profit growth rates. We used this data to run a separate model in our analysis to further assess the impact of common method bias. The different types of data (rating scales versus actual percentages) help to reduce the potential common method bias.

Measures

Where possible, existing constructs and measures were used to ensure their validity. Given that success traps and DCs were new scales developed for this study (see below), we conducted exploratory factor analysis (EFA) using SPSS19 to search for factor structures, and then confirmatory factor analysis (CFA) using AMOS20 as a more stringent test to validate the factor structures (Hair et al., 1998). All continuous variables were measured using seven-point Likert scales, ranging from 1, strongly disagree, to 7, strongly agree.

Dynamic capabilities. We adopted the construct as conceptualized by Pandza and Holt (2007) and Wang and Ahmed (2007). We started with Wang and Ahmed's (2007) three components (absorptive, adaptive and innovative capabilities), given their conceptual clarity and the existing measures for each of the three components. In particular, we adopted García-Morales, Lloréns-Montes and Verdú-Jover’s (2008) four-item scale of absorptive capability, which was based on Cohen and Levinthal's (1990) definition of absorptive capability. Absorptive capability measures firms' realized rather than intended capability in relation to Zahra and George's (2000) conceptualization. We adapted Gibson and Birkinshaw's (2004) three items originally used to measure adaptability as indicators of adaptive capability. We based our measures of innovative capability on the four items used by Hughes and Morgan (2007) plus an additional item measuring the firm-level behavioural innovativeness adopted from Wang and Ahmed (2004). Innovative capability in this study focused on the behavioural aspect as inputs of organizational innovation, rather than the outputs of innovation (i.e. new product development). In sum, we measured DCs as a higher-order reflective construct using 12 items (see Table 2). A reflective formulation suggests that the component factors are closely connected to each other rather than providing a relatively unique contribution to the overall DCs construct as would be the case under a formative formulation (Jarvis, Mackenzie and Podsakoff, 2003).

The EFA results revealed that the three initial dimensions suggested by Wang and Ahmed (2007) merged into two dimensions: absorptive capability remained a component of DCs as we originally defined it (except for AC4, see Footnote to Table 2); adaptive and innovative capabilities loaded together forming the other component of DCs, which is akin to transformative capability proposed by Pandza and Holt (2007). All the items clearly loaded onto one of the two components with strong factor loadings above 0.50. We then performed CFA and further removed Item TC2 (see Footnote to Table 2), as it cross-loaded with Item TC3. The final construct consisted of nine items, including three items for absorptive capability and six items for transformative capability. The model fit indices and item loadings were satisfactory (Table 2).

We performed multigroup CFA to test whether DCs varied across firms in different industry categories, following Anderson and Gerbing's (1982) procedures: First, we tested the unconstrained model (where absorptive and transformative capabilities were allowed to vary freely across groups) resulting in χ^2 =234.20, df=130. Second, we tested the constrained model (where the correlation between absorptive and transformative capabilities was specified as equal across firms in five industry categories) resulting in χ^2 =245.87, df=134. The results of the constrained model was significantly worse than the unconstrained model ($\Delta\chi^2$=11.67, Δdf=4, $p<0.05$). This suggests that the DCs construct varied across firms in different industries, and that the relationships of absorptive and transformative capabilities varied: it was strongest in aerospace (0.81) and medical and optical equipment industries

(0.75), medium in pharmaceutical and biotech (0.44) and office and computing (0.28), and weakest in radio, TV and communication (-0.07). The results highlight the heterogeneity of firms within high-tech sectors.

Success traps. We followed Levinthal and March (1993) and Ahuja and Lampert (2001) and operationalized success traps in terms of learning traps associated with firms' tendency to favour familiarity, maturity and propinquity. Such learning traps "embody the conflict between routines that enable the organization to perform well in the short run but may position the organization unfavorably for the future" (Ahuja and Lampert, 2001, p. 523). Given our sample was based on high-tech firms, our measures of success traps focused on whether firms were trapped in, or breaking out of, their existing technological competences, which are highly pertinent to their competitive advantage. We developed four items based on these insights (see Table 2). The EFA results indicated that all the four items loaded onto one component, each resulting in a strong factor loading exceeding the recommended cutoff point, 0.50 (Hair et al., 1998). These items measured success traps as a single dimensional construct encompassing all the elements of familiarity, maturity and propinquity traps as conceptualized by Ahuja and Lampert (2001). Further, the CFA results suggested that the model fit index and item loadings were satisfactory (Table 2).

Since the success trap and DCs constructs are both underpinned by organizational learning theory, we paid particular attention to their discriminant validity. First, the EFA results showed that each item only loaded onto their respective construct without significant cross-loading, providing initial support for their discriminant validity. Second, we performed more stringent tests using CFA involving four steps: (a) the unconstrained model (where absorptive capability, transformative capability and success trap were allowed to freely correlate) resulted in χ^2 =90.98, df=62; (b) the constrained model 1 (where the correlation between absorptive and transformative capabilities was specified as 1) resulted in χ^2 =105.00, df=63; a much worsened model compared with the unconstrained model ($\Delta\chi^2$=14.02, Δdf=1, p<0.001). This provided evidence for the discriminant validity between absorptive and transformative capabilities; (c) the constrained model 2 (where the correlation between transformative capability and success trap was specified as 1), resulted in χ^2 =176.00, df=63; a much worsened model compared with the unconstrained model ($\Delta\chi^2$=71.00, Δdf=1, p<0.001). This provided evidence for the discriminant validity between transformative capability and success trap; and (d) the constrained model 3 (where the correlation between absorptive capability and success trap was specified as 1), resulted in χ^2 =144.97.00, df=63; a much worsened model compared with the unconstrained model ($\Delta\chi^2$=39.97, Δdf=1, p<0.001). This provided evidence for the discriminant validity between absorptive capability and success trap.

Insert Table 2 here

Strategy type. We measured strategy type using categorical data following Miles and Snow's (1978) typology: Prospectors, Analyzers and Defenders and Reactors. A self-typing measure (where informants are asked to identify the description of a strategy type that is closest to their firm strategy) was adapted from Snow and Hrebiniak (1980). This self-typing approach has been used by many scholars (e.g. McKee, Varadarajan and Pride, 1989; Vorhies and Morgan, 2003), proving to be a viable and valid measure for strategy type in a wide array of settings (e.g. hospitals, colleges, banking, industry products, and life insurance) (Hambrick, 2003). Reactors are usually excluded from analysis as they are not considered to have a consistent strategy. We also excluded reactors (n=10) due to their small number and their insignificant role in the industry competition.

Market dynamism. We adapted the six-item scale developed by Atuahene-Gima (2005), adapted from Jaworski and Kohli (1993). The market dynamism scale measured changes in technology, competition and customers (Atuahene-Gima, 2005; Jaworski and Kohli, 1993). The EFA results suggested that market dynamism consisted of three component factors: speed of change in technology and competition, unpredictability of change in technology and competition, and uncertainty of customer behaviour. These were different from the factor structure in previous studies (Atuahene-Gima, 2005; Jaworski and Kohli, 1993), and each of the component factors had a relatively low Cronbach's alpha value. The CFA results suggested that the three-factor structure was better than the original two-factor structure, and its model fit indices were marginally acceptable. The overall reliability of market dynamism was acceptable (Table 2).

Firm performance. We assessed firm performance using both financial and non-financial measures as recommended by Panigyrakis and Theodoridids (2007). Specifically, we included four items: growth in sales (He and Wong, 2004; Wu et al., 2006), growth in profitability (Lumpkin and Dess, 2006; Wu et al., 2006), employment growth (Baum, Calabrese and Silverman, 2000), and growth in the premises (Morris et al., 2006). Each of the four items were rated on a seven-point Likert scale ranging from 1, much worse, to 7, much better, comparing a firm's performance at the time of the survey with its own performance two years ago. The EFA results revealed that growth in sales and growth in profitability loaded onto an overall financial performance factor, while the other two items did not load well and were removed from the final analysis. Additionally, we conducted a separate analysis which included actual sales growth and profit growth percentages to reduce common method bias. Table 3 summarizes descriptive statistics.

<u>*Insert Table 3 here*</u>

Control variables. We included two control variables: industry types: (1) aerospace (n=16), (2) pharmaceutical and biotechnology (n=11), (3) office and computing (n=36), (4) radio, TV and communication (n=25), and (5) medical and optical equipment (n=25); and firm size: (1) micro firms with less than 10 employees (n=23), (2) small firms with 10 to 49 employees (n=45), and (3) medium-sized firms with 50 to 250 employees (n=45).

Analysis and Results

We tested H_1 and H_2 using structural equation modelling (SEM), with success traps as the antecedent to DCs (H_1), and financial performance (i.e. firms' rating of sales and profit growth) as the outcome of DCs (H_2); DCs as a higher-order construct consisted of two component factors - absorptive and transformative capabilities (see Figure 2). The results indicated that success traps had a significant, negative effect on DCs (β= -0.50, $p<0.01$); DCs had a positive but weak effect on financial performance (β= 0.21, $p<0.10$). The overall model fit index were satisfactory: χ^2=25.23, df=18, χ^2/df=1.40, GFI=0.95 and CFI=0.96. Additionally, we replaced the performance rating scales with actual sales growth percentage (n=109) and actual profit growth percentage (n=105), producing similar results: success traps had a significant, negative effect on DCs (β= -0.52, p=0.005); DCs had a positive but weak effect on financial performance (β= 0.10, p=0.042). These results support H_1: success traps have a negative effect on DCs and H_2: DCs have a positive effect on firm performance.

Insert Figure 2 here

To test the moderating effect of firm strategy, we used multigroup SEM (Baumgartner and Steenkamp, 1998; Jöreskog et al., 1999; Byrne, 2004) to compare the strengths of the success traps-DCs-firm performance relationships among firms adopting different strategies, following Anderson and Gerbing's (1982) procedures: First, the unconstrained model (where both paths of success traps-DCs and DCs-firm performance were allowed to vary freely across groups) was tested, resulting in χ^2 =81.60, df=60. Second, two constrained models were tested: the constrained model A (where only the success traps-DCs path was specified as equal across groups) resulted in χ^2 =81.91, df=62; and the constrained model B (where only DCs-financial performance path was specified as equal across groups) resulted in χ^2 =85.14, df=62. The results of both constrained models were not significant. Hence, $H_{3a\ \mathrm{and}}$ H_{3b}: Firm strategy moderates the success traps-DCs-firm performance relationships are not supported. However, we note that, although the overall moderating effects were insignificant, the success traps-DCs relationship varied among firms adopting different strategies in the unconstrained model (see Table 4): for Prospectors and Defenders, success traps had a strong negative impact on DCs, whereas this relationship was insignificant significant for Analyzers. Further, Prospectors' DCs had a strong, positive impact on firm performance, whereas Analyzers and Defenders' DCs did not statistically influence firm performance.

Similarly, we tested the moderating effect of market dynamism by analyzing the differences of the success traps-DCs-firm performance relationships between the Low Market Dynamism group and the High Market Dynamism group (see Footnote to Table 4). The results suggested that the hypothesized relationships did not vary significantly between the unconstrained model and the two constrained models following Anderson and Gerbing's (1982) procedures. Therefore, H_{3a} and H_{3b}: Market dynamism moderates the success traps-DCs-firm performance are not supported. However, we note that, although the overall moderating effects were insignificant, success traps appeared to be more likely to hinder DCs in high market dynamism than in low market dynamism (see Table 4).

Industry type and firm size as control variables were not statistically significant (see Table 4). However, we must note that the different strengths of the hypothesized relationships among firms in different industries and of different sizes. The negative relationship between success traps and DCs was stronger in the aerospace, and pharmaceutical and biotechnology industries, while the positive relationship between DCs and firm performance was stronger in the pharmaceutical and biotechnology, and the medical and optical equipment industries. Further, the negative effect of success traps on DCs increased as firm size increased, and the same pattern existed for the positive effect of DCs on firm performance.

Insert Table 4 here

Discussion

Our study focuses on one core question: why some firms are better at developing and applying DCs than others. By answering this question, we contribute to the strategic management literature in four ways. First, we theorized and empirically tested one of DCs' most important antecedent factors - success traps. The self-reinforcing effect of success (Sitkin et al., 2011) often results in firms overemphasizing existing competences and exploitative learning at the cost of exploratory learning (Levinthal and March, 1993). Prior research has long warned against the danger of learning traps, success traps and competence traps (March, 1991; Levinthal and March, 1993; Ahuja and Lampert, 2001). However, no systematic evidence exists to gauge the effect of success traps on DCs and firm performance. Our study is the first to examine the direct effect of success traps on DCs, and found a strong negative effect. This confirms that firms' ability to avoid being trapped in own success is crucial to the strategic renewal and creation of their resources and capabilities in light of environmental change. Our findings reinforce the message that firms must avoid excessive exploitative learning in order to embrace a balanced approach to exploitative and exploratory learning (Gibson and Birkinshaw, 2004).

Second, we identified DCs' commonalities across firms - absorptive and transformative capabilities, consistent with Pandza and Holt's (2007) proposition. Absorptive capability enables firms to recognize opportunities from outside a firm and learn from external new knowledge and assimilate it with internal knowledge (Cohen and Levinthal, 1990; Garud and Nayyar, 1994), whilst transformative capability allows firms to strategically adapt to external change and engender innovative behaviour and new ways of doing things (Pandza and Holt, 2007; Garud and Nayyar, 1994). Absorptive and transformative capabilities are integral elements of DCs required to renew and create firms' resources and capabilities (Teece et al., 1997; Eisenhardt and Martin, 2000; Teece, 2007). Absorptive and transformative capabilities are mutually reinforcing internal capabilities, their conceptual distinction being supported empirically through their discriminant validity.

This helps to fill the gap where DCs' commonalities have been believed to exist in theory (Eisenhardt and Martin, 2000; Wang and Ahmed, 2007; Pandza and Holt, 2007), but only limited empirical evidence exists identifying what they are. We are aware of only two confirmatory studies (i.e. Pavlou and El Sawy, 2011; Protogerou et al., 2012) that empirically tested the DCs components. Pavlou and El Sawy (2011) tested a second-order formative construct consisting of sensing, learning, and integrating and co-ordinating, whilst Protogerou et al. (2012) tested a reflective construct consisting of coordination, learning and strategic competitive response. Both studies found support for their respective three-factor constructs albeit one is a formative construct and the other a reflective one. Our results support the reflective construct approach. However, unlike Pavlou and El Sawy (2011), we only found support for a two-factor construct. This is consistent with Jantunen, Ellonen and Johansson's (2012) finding that sensing capabilities are likely to be similar across firms whilst seizing and reconfiguring capabilities are more likely to differ between firms (Eisenhardt and Martin, 2000).

Third, we operationalized success traps - a key concept in strategic management. The risk of learning traps or competence traps (Levitt and March, 1988; Levinthal and March, 1993; Leonard-Barton, 1992) is widely recognized. Especially, the influence of success traps on firm performance may be more significant than failure traps (Lee and Van den Steen, 2010). However, prior research on success traps is largely conceptual, and empirical work is piecemeal in nature due to the lack of effective measures. We developed and validated success traps based on Ahuja and Lampert's (2001) conceptualization. The model fit index and item loadings were satisfactory, indicating that our construct could be adopted by future research to measure firm-level success traps to increase the comparability and generalizability of research findings, which anecdotal evidence cannot deliver.

Fourth, DCs bridge the gap between the outside-in and the inside-out approaches to competitive advantage at the centre of the strategic management research. However, to what extent DCs influence short-term firm performance and sustained competitive advantage over time remains a theoretical debate (e.g. Teece et al., 1997; Eisenhardt and Martin, 2000; Zahra et al., 2006). Although it is argued that DCs cannot be the sources of sustained competitive advantage due to their equifinality, substitutability and fungibility nature (Eisenhardt and Martin, 2000), several longitudinal studies revealed that firms' abilities to absorb new information, adapt themselves internally and innovate are crucial to their long-term survival and success (e.g. Rindova and Kotha, 2001; Lampel and Shamsie, 2003). However, there is little empirical evidence on the effect of DCs on firms' short-term performance. Our study found support for the direct but weak effect of DCs on financial performance in a cross-sectional setting. The weak effect suggests that the relationship may be complex as several scholars have warned (Wang and Ahmed, 2007; Schilke, 2013). Our finding adds to the debate as to whether DCs have a direct or indirect effect on performance (Stadler et al., 2013).

Further, we tested the moderating effects of market dynamism and strategy types, following the dominant contingent view arguing that DCs' benefits depend on their context (Levinthal 2000; Sirmon and Hitt, 2009; Schilke, 2013), and especially, DCs are affected by changes in the environment and organizational conditions (Zahra et al., 2006). Although we did not find significant moderating effects, we have pointed out the varied strengths of the success traps-DCs-firm performance relationships across firms under different market dynamism and different strategy types. This warrants future research. Similarly, we have also discussed the differences in the hypothesized relationships in relation to firm size and industry type, though they were statistically insignificant, to call for future research to examine the success traps-DCs-firm performance relationships in more complex nomological framework to take into account both external and internal contexts of capability development using a much larger sample size.

Managerial implications

Success is a double-edged sword; its drawback cannot be underestimated. Managers' ability to avoid being trapped in existing competences based on past success and to develop new capabilities with foresight is instrumental to firms' ability to develop and pursue firm strategy effectively and respond to environmental changes. The negative effect of success traps on DCs is likely to increase as a firm grows in size and more organizational systems and routines are in place, hindering the adoption of new ideas. Furthermore, two key DCs that managers need to develop in achieving differential performance are absorptive capability and transformative capability. Whilst these two capabilities have commonalities across firms competing within the same sectors, they also differ across firms due to firm-specific factors (such as resources) and internal processes required to develop them (Jantunen et al., 2012), which lead to the differential performance.

Limitations

Our study is not without limitations. First, our measures of DCs focus on the two most common features of firm-level DCs. Such generalized measures allow the construct to be adopted in different firms and industry sectors. However, generalization comes at a cost of specificity. Future research may develop alternative measures specific to a particular industry given the differences across industry groups, or adapt our measures to a particular study context. Second, the insignificant moderating effect of market dynamism could have resulted from our choice of high-tech industry sectors, whereas a comparison between high-tech and low-tech sectors may provide a greater variance of market dynamism. Third, our study focuses on success traps given its comparative prominence over failure traps. Future research may incorporate both success and failure traps to examine to what extent a balance between exploratory and exploitative learning helps the development and application of DCs. Fourth, our study uses cross-sectional data, which may have restricted our understanding of the DCs-firm performance relationship. The objective data that we included were limited due to the difficulty of obtaining them, especially in SMEs. Future research could include time-lagged performance data to examine the mid to long term performance effect of DCs, as well as the reverse causality of past performance on DCs. Finally, our multigroup analysis results may be restricted by the small sub-group sample sizes. Future research employing a large sample size may provide additional evidence on the effects of external and internal factors on the relationships between success traps, DCs and firm performance.

Conclusion

The challenge for firms to manage existing competences based on past success and constantly renew themselves in light of environmental change is relevant to superior firm performance. We find that those firms that are better at developing and applying DCs are able to avoid success traps and possess stronger absorptive and transformative capabilities. Our findings also suggest that the effects of firm strategy, market dynamism, industry type and firm size on developing and applying DCs deserve further attention. Overall, we find that the development and application of DCs is more related to internal factors (such as success traps) rather than external factors (such as market dynamism). Our results also point out the complex relationship between DCs and environmental and organizational factors. This warrants future research.

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Figure 1. The Research Model and Hypotheses

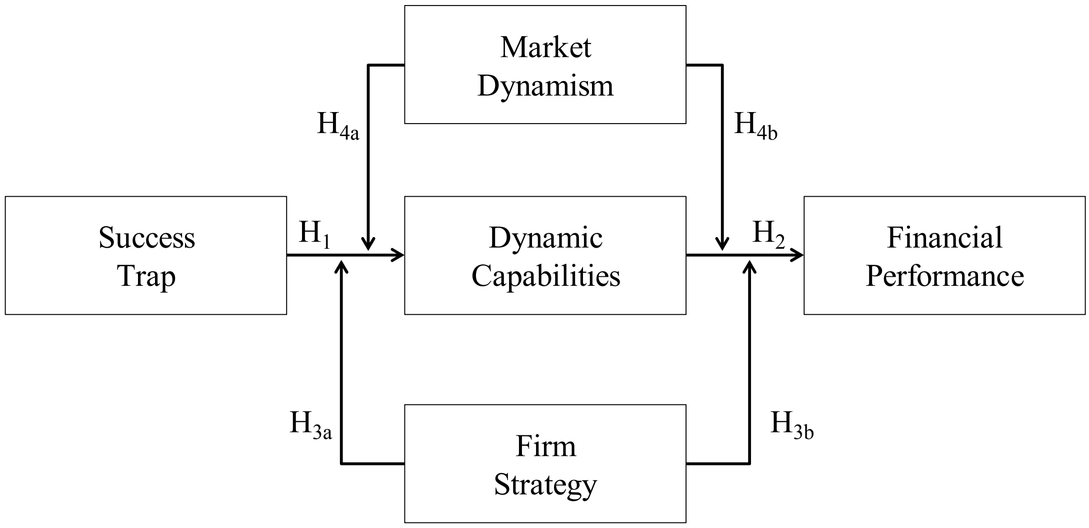
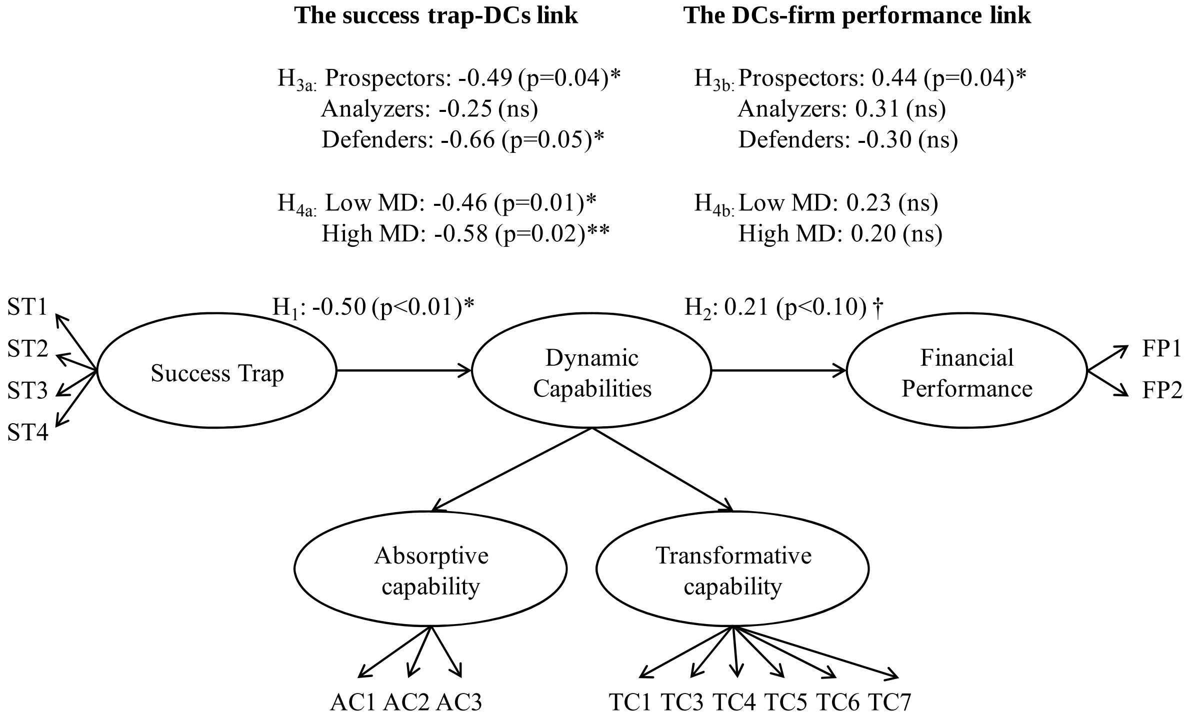


Figure 2. Research Results



Figures are standardized coefficient with p-value in brackets.
† p <0.10; * p<0.05; ** p<0.01; *** p<0.001, ns: non significant

Table 1: Commonalities of DCs

Study	**Type of study**	**Components/Dimensions of DCs**
Eisenhardt and Martin (2000)	Conceptual	Resource integration, resource configuration, resource gaining and releasing
Verona and Ravasi (2003)	Empirical	Knowledge creation and absorption, knowledge integration, and knowledge reconfiguration capabilities.
Teece (2007)	Conceptual	Sensing, seizing, reconfiguring /transforming
Wang and Ahmed (2007)	Literature review	Absorptive, adaptive and innovative capabilities
Pandza and Holt (2007)	Empirical	Absorptive and transformative capabilities
Ellonen, Jantunen, and Kuivalainen (2009)	Empirical	Sensing, seizing and reconfiguring
Barreto (2010)	Literature review	Sensing opportunities, making timely market-oriented decisions, changing the resource base
Pavlou and El Sawy (2011)	Empirical	Sensing, learning, integrating and co-ordinating (forming a second-order formative construct DCs)
Jantunen, Ellonen and Johansson (2012)	Empirical	Sensing, seizing and reconfiguring (with sensing being less important than the other two)
Protogerou, Caloghirou and Lioukas (2012)	Empirical	Coordination, learning and strategic competitive response (i.e. understanding and adapting to environmental trends)

Table 2. Results of Confirmatory Factor Analysis*

		Item Loading
Success Trap (ST) (α = 0.74) χ^2=1.62, df=2, χ^2/df=0.81, GFI=0.99, CFI=1.00, RMSEA=0.00		
ST1	Rather than trying to move into new technologies, this firm has been relying on a set of familiar technologies	0.61
ST2	This firm has been focussing on solving problems mainly through further development of mature technologies.	0.68
ST3	This firm prefers to adopt technologies which are well- established in the industry rather than untested technologies in the industry.	0.77
ST4	The tendency of this firm to look for solutions closer to existing technologies in the industry has been a barrier to developing pioneering solutions.	0.53
Dynamic Capabilities (DC) (α = 0.90) χ^2=52.70, df=27, χ^2/df=1.95, GFI=0.91, CFI=0.96, RMSEA=0.09		
Absorptive Capability* (AC)* (α = 0.93)		
AC1	This firm has the necessary skills to implement newly acquired knowledge.	0.89
AC2	This firm has the competences to transform the new acquired knowledge.	0.98
AC3	This firm has the competences to use the new acquired knowledge.	0.94
Transformative Capability* (TC)** (α = 0.89)		
TC1	People in this firm are encouraged to challenge outmoded practices.	0.73
TC3	This firm evolves rapidly in response to shifts in our business priorities.	0.81
TC4	This firm is creative in its methods of operation.	0.85
TC5	This firm seeks out new ways of doing things.	0.92
TC6	People in this firm get a lot of support from managers if we want to try new ways of doing things.	0.79
TC7	This firm introduces improvements and innovations in our business.	0.79
Market Dynamism (MD) (α = 0.73) χ^2=20.39, df=6, χ^2/df=3.40, GFI=0.95, CFI=0.86, RMSEA=0.15		
Speed of change in technology and competition (α = 0.55)		
MD1	The actions of local and foreign competitors in our major markets were changing quite rapidly.	0.72
MD2	Technological changes in our industry were rapid.	0.53
Unpredictability of change in technology and competition (α = 0.59)		
MD3	Technological changes in our industry were unpredictable.	0.63
MD4	The market competitive conditions were highly unpredictable.	0.67
Uncertainty of customer behaviour (α = 0.65)		
MD5	Customers' product preferences changed quite rapidly.	0.74
MD6	Changes in customers' needs were quite unpredictable.	0.66
Financial performance (FP) (α = 0.82)		
FP1	Sales growth.	-
FP2	Growth in profitability.	-

*The results are based on confirmatory factor analysis using AMOS 20.
** Item AC4 (This firm has a clear division of roles and responsibilities for acquiring new knowledge) is removed from analysis due to its relative low factor loading (0.37) and relatively low item-total correlation coefficient (0.36) within the Absorptive Capability construct. The item also cross-loads onto the transformative capabilities (0.34).
***TC1, TC2 and TC3 were originally labelled as "adaptive capability", and TC4, TC5, TC6 and TC7 were originally labelled as "innovative capability" as defined by Wang and Ahmed (2007). However, the EFA results suggested that all these items (except TC2) loaded onto one factor, akin to "transformative capability" as defined by Pandza and Holt (2007). Item TC2 (This firm is flexible enough to allow us to respond quickly to changes in our markets) is removed from analysis as it cross-loads with TC3, as shown in the high modification index between TC2 and TC3.

Table 3. Descriptive Statistics and Correlation Coefficients

Measure	Mean	Standard deviation	Alpha	1	2	3	4	5	6
1. Success trap	3.79	1.22	0.74	-					
2. Dynamic capabilities	5.33	0.96	0.90	-0.40**	-				
3. Absorptive capability	5.18	1.20	0.93	-0.30**	0.89**	-			
4. Transformative capability	5.49	1.02	0.89	-0.40**	0.84**	0.50**	-		
5. Market dynamism	4.03	0.91	0.73	0.03	0.08	0.14	-0.02	-	
6. Financial performance	4.74	1.34	0.82	-0.02	0.14	0.06	0.19	-0.11	-

Notes: n=113; † p <0.10; * p<0.05; ** p<0.01; *** p<0.001. Correlation coefficients are reported in the left lower diagonal half of the matrix. Figures are based on 7-point Likert scales.

Table 4. Results of Multigroup Analyses

Model Description[1]		χ^2	df	χ^2/df	$\Delta\chi^2$ (Δdf) Statistical Significance[2]	Path Coefficients and Statistical Significance in Unconstrained Model	ST-DCs Link	DCs-FP Link
Multigroup analysis by firm strategy[3]	The unconstrained model	81.60	60	1.36	-	Prospectors	-0.49 (p=0.04)*	0.44 (p=0.04)*
	Constrained Model A:	81.91	62	1.32	0.31 (2), ns	Analyzers	-0.25 (ns)	0.31 (ns)
	Constrained Model B:	85.14	62	1.37	3.54 (2), ns	Defenders	-0.66 (p=0.05)*	-0.30 (ns)
Multigroup analysis by market dynamism[4]	The unconstrained model	50.42	40	1.26	-	Low market dynamism	-0.46 (p=0.01)**	0.23 (ns)
	Constrained Model A:	50.49	41	1.23	0.07 (1), ns	High market dynamism	-0.58 (p=0.02)**	0.20 (ns)
	Constrained Model B:	50.43	41	1.23	0.01 (1), ns			
Multigroup analysis by industry type[5]	The unconstrained model	149.97	100	1.50	-	Aerospace	-0.79 (p=0.002)**	0.13 (ns)
	Constrained Model A:	146.54	104	1.41	2.15 (4), ns	Pharmaceutical/biotech	-0.47 (ns)	0.70 (p=0.04)**
	Constrained Model B:	145.58	104	1.40	1.19 (4), ns	Office equipment/ computing	-0.33 (ns)	0.07 (ns)
						Radio/TV/communication	-0.53 (ns)	-0.06 (ns)
						Medial/optical equipment	-0.31 (ns)	0.45 (p=0.04)*
Multigroup analysis by firm size[6]	The unconstrained model	75.92	60	1.27	-	Micro firms	-0.27 (ns)	0.00 (ns)
	Constrained Model A:	82.14	62	1.33	3.96 (2), ns	Small firms	-0.50 (p=0.006)**	0.16 (ns)
	Constrained Model B:	78.92	62	1.27	0.74 (2), ns	Medium-sized firms	-0.80 (p=0.02)*	0.19 (ns)

Notes: n=113. †p <0.10; *p<0.05; **p<0.01; ***p<0.001, ns: non significant.
1. In the unconstrained model, parameters are freely estimated. In Constrained Model A, the path from 'Success Trap' (ST) to 'Dynamic Capabilities' (DCs) is specified as equal across groups. In Constrained Model B, the path from DCs to Firm Performance (FP) is specified as equal across groups. 2. $\Delta\chi^2$ **:** difference in χ^2 value between the constrained and the unconstrained models; Δdf: difference in the number of degrees of freedom between the constrained and the unconstrained models; ns: non significant. 3. Firm strategy: Prospectors (n=49), Analyzers (n=32), and Defenders (n=22). Reactors (n=10) are excluded due to the small sample size. 4. Market dynamism: Low market dynamism below the mean score 4.03 (n=56); and high market dynamism equal to or above the mean score 4.03 (n=57). 5. Industry type: aerospace (n=16), pharmaceutical and biotech (n=11), office equipment and computing (n=36), radio, TV and communication (n=25), and medical and optical equipment (n=25). 6. Firm size: micro firms with less than 10 employees (n=23), small firms with 10 to 49 employees (n=45), and medium-sized firms with 50 to 250 employees (n=45).