

The relative impact of culture, strategic orientation and capability on new service development performance

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**THE RELATIVE IMPACT OF CULTURE, STRATEGIC ORIENTATION AND
CAPABILITY ON NEW SERVICE DEVELOPMENT PERFORMANCE**

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ABSTRACT

Purpose: This research attempts to understand the operant resources required for new service development (NSD). It aims to construct a more intricate understanding of how operant resources interact to drive NSD. Specifically, it looks at the impact of culture, strategic orientation and NSD capability for number of new services, the success rate of new services and the resulting financial contribution by NSD to overall firm performance.

Design/methodology/approach: To investigate these relationships, data was collected from 105 leading UK-based service firms via a key informant survey. Regression analysis was employed to test the model presented.

Findings: Analysis reveals that a different culture (entrepreneurial culture) is needed to drive the number of new services from that required for a higher success rate (learning culture). A NSD capability has an important role supporting both of these aspects of NSD performance. The quantity and quality of NSD go on affect the financial contribution made by NSD. A firm's strategic orientation is also found to directly affect contribution. NSD performance is further enabled by the appropriate alignment of culture, capability and strategic orientation.

Research limitations/implications: The results demonstrate that existing research only partially explain NSD performance. The impact of culture, capability and strategic orientation is contingent on how performance is measured. Understanding how different operant resources interweave to deliver NSD will facilitate more informed decision-making leading to the effective use of organizational resources.

Practical implications: The results show that there are different pathways to NSD performance depending on existing organizational conditions. Firms with an entrepreneurial culture should employ a Prospector orientation, whereas firms with a learning culture benefit from an Analyzer orientation. Defenders need to build on existing capabilities.

Originality/value: To date no study has assessed the relative effect of culture, strategic orientation and capability on NSD performance. The complex contingency model presented here offers a timely contribution to the theory base underpinning the development of operant resources for NSD.

Keywords: New service development, culture, capability, strategic orientation, operant resources.

THE RELATIVE IMPACT OF CULTURE, STRATEGIC ORIENTATION AND CAPABILITY ON NEW SERVICE DEVELOPMENT PERFORMANCE

1. INTRODUCTION

Whilst there is a growing body of important research into the factors that separate successful new services from unsuccessful ones, there is a lack of firm level research (Harmancioglu, Droge and Calantone, 2009). In particular, there is little research into the conditions that service firms need to have in place to undertake new service development (NSD) in the first place (Froehle and Roth, 2007; John and Storey, 1998). A singular or accidental success does not imply a NSD capability; rather this requires a reliable practice over time (Schreyögg and Kliesch-Eberl, 2007). In contrast to the existing prescriptive research on NSD, this research seeks to understand the factors that drive the extent to which service firms engage in NSD and “to discredit the view that new services happen as a result of intuition, flair and luck” (Menor, Tatikonda and Sampson, 2002, p.135). NSD performance is viewed as a confluence of the number of new services, the new service success rate, and the financial contribution of NSD to overall firm performance (Barczak et al., 2009; Griffin and Page, 1996; Storey and Kelly, 2001). NSD is brought about by the organizational context of the service firm. It is a firm’s ‘operant’ resources that create the requisite environment to motivate and enable NSD to take place (Chandy, Prabhu and Antia, 2003; Madhavaram and Hunt, 2008). Three key operant resources put forward in innovation theory are a firm’s organizational culture (Barney, 1986; de Brentani, Kleinschmidt and Salomo, 2010), its strategic orientation (Paladino, 2009), and its capabilities (Day, 1994). However, these factors are likely to produce different NSD outcomes.

A culture reinforces to employees how they might seek to generate new service offerings that are meaningful to the marketplace, efficiently and effectively. The values and behavioural norms reinforced by an organizational culture filter what NSD activities are perceived as being desirable (De Long and Fahey, 2000). However, it is important to distinguish between internally and externally focused cultures (Deshpande et al., 1993). The framework presented here distinguishes between an externally focused entrepreneurial culture and an internally focused learning culture. Both drive organizational performance via NSD (Hult, Hurley and Knight, 2004). But an entrepreneurial culture seeks to change an organization's relationship with its environment whilst a learning culture seeks to understand this relationship (Hakala, 2010). Therefore, it is expected that they will influence NSD activities in different ways.

While culture captures the environment in which NSD activities take place, the firm's strategic orientation then defines the nature of these activities. Miles and Snow (1978) propose three strategic orientations—Prospectors, Analyzers and Defenders—that engage in NSD (McKee et al., 1989; Barczak et al., 2009) but will differ in terms of the innovativeness of new services introduced and the range of markets to which they aspire. Empirical studies suggest these types all outperform a fourth type—Reactors (Conant, Mokwa and Varadarajan, 1990; Miles and Snow, 1978).

It is perhaps an organization's NSD capability that crystallize how and why firms can differ in their ability to enact NSD activities. Capabilities are complex bundles of skills and accumulated knowledge that enable firms to coordinate activities and make use of their assets to shape complex advantages (, 1990, 1994b). A firm's NSD capability captures its expertise and excellence (or otherwise) at developing new services. It is

brought about by time and investment building tacit and explicit knowledge about NSD and its accompanying processes (Storey and Kahn, 2010).

Prior research *separately* stresses the importance of organizational culture (Barney, 1986; Camerer and Vepsalainen, 1988; Deshpande, Farley and Webster, 1993), the strategic orientation of the firm (McKee, Varadarajan and Pride, 1989; Miles and Snow, 1978) and a NSD capability (Kusunoki, Nonaka and Nagata, 1998). However, few studies examine their relative effect on organizational outcomes (Song et al., 2007), and no study assesses the relative effect of culture, strategic orientation and capability on NSD performance. Thus this research attends to an important gap identified in the literature (Hakala, 2010).

The framework put forward in this paper proposes that three NSD performance dimensions can be manipulated independently by relevant operant resources. Specifically, an entrepreneurial culture drives the number of new services developed. Its bias towards creative, flexible market-leading actions fused with an efficient NSD capability result in rapid idea generation. The success rate is driven by better NSD decisions made on the back of a learning culture twinned with existing organizational intelligence. And it is the strategic orientation that drives NSD's contribution to the firm's financial performance as strategies closer to the Prospector end seek to lead markets and secure positional advantage (Miles and Snow, 1978; Olson et al., 2005). The findings of this research have important implications for the performance measures firms employ and the decisions firms must make to achieve their NSD goals. Improved understanding in this area will facilitate more informed decision-making leading to the effective use of organizational resources.

An important final contribution to theory offered by this research is that it addresses our understanding of the interactions among operant resources. It is argued that alternative configurations of operant resources may be used to achieve the same objectives (Hakala, 2010). Hult, Ketchen and Arrfelt (2007) argue that neither culture nor capabilities by itself is a sufficient condition to achieve superior performance. Strategic orientation characterizes the decisions taken to align the firm with its environment (Daft, 1995; Venkatraman, 1989), and in turn will direct how firms exploit emerging opportunities in the market for NSD. This study constructs a more intricate understanding of NSD activity than has previously been presented. This research offers a timely contribution to the theory base underpinning operant resources, specifically NSD—a base that at present is far from comprehensive (Madhavaram and Hunt, 2008). Figure 1 summarizes the conceptual model and is discussed in detail below.

[Figure 1 about here]

2. ORGANIZATIONAL CULTURE

A business culture that is focused externally to the firm has been shown to outperform those dominated by internal cohesiveness or by rules (Deshpande and Farley, 2004; Deshpande et al., 1993). However, Paladino (2009) found that firms that emphasized internal resources were more innovative than those with an external orientation. To explain this contradictory evidence it is important to look at how different cultures affect the behavioural environment of the firm and hence affect NSD performance in different ways (de Brentani et al., 2010; Spanjol, Qualls and Rosa, 2011).

An externally-oriented entrepreneurial culture focuses attention on creating value from the opportunities that are to be discovered outside the firm's boundaries. This is a dynamic, aggressive culture which places an emphasis on NSD by being adaptable to emerging market conditions and taking risks (Deshpande and Farley, 2004). In firms with an entrepreneurial culture, top management encourage the firm to proactively pursue new market opportunities (Lumpkin and Dess, 1996; Miller, 1983). Thus an entrepreneurial culture leads to greater market search behaviour and in turn to more new service ideas (Spanjol et al., 2011). Entrepreneurially-oriented service firms have been found to offer a wider range of innovative services (Jambulingam, Kathuria and Doucette, 2005).

An internally-oriented learning culture focuses on value creation from and around the established, proven and long-standing activities of the firm. A learning culture is the degree to which the firm sees knowing the causes and effects of its actions as the key to competitive advantage (Baker and Sinkula, 1999; Dickson, 1996). A long-term competitive advantage is maintained by a mechanism of continuous improvement. A firm that is oriented towards learning will seek to capture knowledge about past and current projects, and will use this knowledge to benefit its NSD programme. This stops mistakes being repeated, thereby enabling a greater success rate for new services.

Whilst an entrepreneurial culture and a learning culture are both key drivers of innovativeness and organizational performance (Calantone, Cavusgil and Zhao, 2002; Deshpande and Farley, 2004; Hughes and Morgan, 2007; Hult et al., 2004), the *modus operandi* each one embeds and reinforces are different (Hughes, Hughes and Morgan, 2007). Specifically it is proposed that an entrepreneurial culture will spur a wave of opportunity identification and risk taking that will generate many new

services. As such the creation of new services may persist even in the face of their possible failure hence we do not hypothesise a link with success rate. Whereas the more methodical nature of a learning culture will decelerate the innovating process to focus instead on generating a handful of successful new services. While learning benefits the quality of new service ideas the capacity to introduce new ideas is not directly affected (Hurley and Hult, 1998; Spanjol et al., 2011).

Thus:

H1: Entrepreneurial culture is positively related to the number of new services.

H2: Learning culture is positively related to the new service success rate.

3. STRATEGIC ORIENTATION

The firm's strategic orientation guides how it bundles and leverages organizational resources in pursuit of emerging market opportunities and the exploitation of existing markets (Menor and Roth, 2007; Hughes and Morgan, 2008).

The Miles and Snow (1978) typology is widely employed in strategy and marketing research. Empirical studies suggest Reactors are outperformed by the other types however there is no consensus on the best strategic orientation (Conant, Mokwa and Varadarajan, 1990; Desarbo et al., 2005). Reactors tend to respond to environmental pressures with minimal changes and do so only when required to (Song et al., 2007).

Prospectors develop new services to lead markets (Miles and Snow, 1978), tend to innovate on technological grounds, seeking out market opportunities with a view to acting in advance of competitors (Song et al., 2007; Hughes and Morgan, 2008). This

allows Prospectors to steal a march towards securing positional advantage in the market place resulting in outperforming other orientations (Olson et al., 2005).

Analyzers tend to monitor market and competitor trends to develop value-enhancing new services (Hughes and Morgan, 2008; Song et al., 2007). As such, Analyzers tend to be more customer-oriented when entering markets with new services and their bias is towards out-thinking the competition instead of outmanoeuvring them. Defenders develop new services to enhance their links with customers and channels (Song et al., 2007). They are less avid followers of change and are more risk averse than the previous two types (Miles and Snow, 1978). Defenders focus on protecting competitive advantages by incrementally improving quality and/or reducing cost (Slater and Narver, 1993).

Relative to Reactors, each strategic orientation is expected to have a positive financial contribution of NSD to overall firm performance. McKee et al. (1989) found that the four types constitute a continuum with Prospector firms generally the most engaged in NSD and Reactors the least. Orientations closer to the Prospector end reflect greater performance in terms of sales and profits from NSDs than other strategic orientations (Barczak et al., 2009; Paladino, 2009). In addition as Prospectors aspire to more markets they may develop more new services (Miles and Snow, 1978; Jambulingam, Kathuria, and Doucette, 2005). However research has shown no difference in reported success rates between orientations (Kelly and Storey, 2000) demonstrating the need to accommodate multiple measures of NSD performance. Thus:

H3: A Prospector (Reactor) orientation will have the greatest (least) effect on (a) the number of new services and (b) the financial contribution of NSD to overall firm performance.

4. NSD CAPABILITY

A firm's NSD capability captures its proficiency and excellence (or otherwise) at developing new services. It reflects its knowledge and expertise in this area, and its set of differentiated skills, complementary assets and routines for NSD (Barney, 1991). Yet one of the main barriers to innovation in service firms is a lack of expertise in the skills and processes required to undertake NSD (Kelly and Storey, 2000). Experience and expertise should speed up execution, reduce development costs, decrease mistakes and lead to superior solutions (Kyriakopoulos and de Ruyter, 2004; Montoya-Weiss and Calantone, 1994). A NSD capability should increase the efficiency and effectiveness of a firm's innovation activities, driving the quantity and quality of NSD in turn:

H4: NSD capability is positively related to (a) the number of new services and (b) the new service success rate.

5. INTERACTIONS AMONG STRATEGIC ORIENTATION, CULTURE AND NSD CAPABILITY

Strategy and culture should be aligned. Moorman (1995) suggests that organizational processes are more likely to be effective when strategic orientation supports culture than when they are not congruent. The effective implementation of a strategy is influenced by the guiding beliefs of the organization (Arogyaswamy and Byles, 1987). Similarly, a strong culture without a strategy to focus it results in highly enthusiastic

and committed individuals pulling the firm toward different directions (Wang, 2008). Miles and Snow (1978) posit that any strategic orientation can be performance enhancing when the firm deploys appropriate capabilities to support implementation. It follows that a NSD capability will be deployed differently and its effects will likely vary depending on the organizational culture that informs decision-making and on the strategic orientation of the firm (Hughes and Morgan, 2008; Song et al., 2007).

5.1. Alignment of Strategic orientation and Culture

Wang (2008) found being a Prospector to have a positive interactive effect with entrepreneurial culture but did not improve the impact of learning on firm performance. Prospectors tend to innovate on technological grounds seeking out new service markets in doing so. These often involve radical departures from the firms' existing products, administrative procedures, mental models and dominant logic (Miles and Snow, 1978; Wang 2008). This implies that Prospectors will perform better if they have an entrepreneurial culture in place.

Analyzers in contrast are often depicted as imitators. They aim to overtake prospectors by making better decisions when developing new services, tailoring them closer to customer needs (Hughes and Morgan, 2008; Song et al., 2007). Analyzers rely on superior market knowledge and continuous improvement hence the need for a learning culture. An entrepreneurial focus on experimentation and risk taking is likely to cause tension for Analyzers.

We propose that a firm's strategic orientation will moderate the culture-performance link. Where culture and strategic orientation are aligned—an entrepreneurial culture for Prospectors and a learning culture for Analyzers—performance will increase. Building upon the previous hypotheses, we argue that:

H5: A Prospector orientation positively moderates the relationship between an entrepreneurial culture and (a) the number of new services and (b) the financial contribution of NSD to overall firm performance.

H6: An Analyzer orientation positively moderates the relationship between a learning culture and (a) the new service success rate, and (b) the financial contribution of NSD to overall firm performance.

5.2. Alignment of Culture and NSD Capability

Organizational culture informs the actions of individuals within the firm, but capabilities within the firm coordinate these actions around bundles of accumulated skills and knowledge (Day, 1990). An entrepreneurially-oriented firm spots market opportunities and generates new service ideas. However, when a strong NSD capability is present, the throughput of new service ideas to end service outcomes should increase because the firm will be more proficient at converting entrepreneurial insights into service outcomes. Put simply, NSD capability enables the transformation and allocation of complex resource bundles to better convert opportunities into meaningful outcomes (Sirmon, Hitt and Ireland, 2007). Thus:

H7: NSD capability positively moderates the relationship between entrepreneurial culture and the number of new services.

A capability is framed by past commitments and investments (Day, 1994), and deep levels of knowledge and experience can act as a perceptual filter hindering the firm's ability to assimilate new knowledge (Leonard-Barton 1992), thereby creating biases in the results of learning processes (Holcomb et al., 2009). A strong NSD capability may therefore constrain the learning efforts of the firm around what is believed to be 'excellence' (Day, 1994). It is on this basis that firms run the risk of developing core

rigidities (Atuahene-Gima, 2005). In addition, a learning culture will in part result in the discarding of existing knowledge, rather than building on it, limiting the impact of the existing capability. Therefore:

H8: NSD capability negatively moderates the relationship between learning culture and the new service success rate.

5.3. Alignment of NSD Capability and Strategic Orientation

An effective NSD capability increases the firm's efficiency and capacity in developing new services. It is Prospectors that are best placed to take advantage of this. Prospectors rely on rapid NSD for success and aspire to enter multiple new markets. Prospectors compete by responding rapidly to early signals of change in the competitive environment and service marketplace, devoting significant resources to generating unique knowledge assets that can be deployed in a timely manner when taking new services to market (Zheng et al., 2010).

NSD capability should also make the firm more effective by reducing new service failures. For Analyzers this is crucial. Unlike Prospectors, their new services are unlikely to be radical. Instead they rely on effective service implementation to maintain presence in multiple markets (Conant et al., 1990; Hughes and Morgan, 2008; Song et al., 2007). Prospectors tolerate failure whereas Analyzers tend to treat failures as unaffordable.

Defenders are effective at being efficient in their niche (Slater and Narver, 1993; Song et al., 2007). They focus on existing markets and improving business processes within their familiar domain. Defenders protect competitive advantages by

incrementally improving quality, margins, and/or reducing cost. Existing capabilities are important for Defenders, improving the contribution NSD makes to the firm.

Each strategic orientation would appear to benefit from a strong NSD capability inasmuch as this capability augments the effective conversion of strategy into competitive advantage. Thus:

H9a: NSD capability positively moderates the relationship between a Prospector orientation and the number of new services.

H9b: NSD capability positively moderates the relationship between an Analyzer orientation and the new service success rate.

H9c: NSD capability positively moderates the relationship between a Defender orientation and the financial contribution of NSD to overall firm performance.

6. INTERRELATIONSHIPS AMONG DIMENSIONS OF NSD PERFORMANCE

Research has demonstrated that the number of new products enhances a firm's value (Pauwels et. al, 2004). However Barczak et al. (2009) found no difference in the number of new products commercialized between leading companies and less successful ones, suggesting that the best are not being successful by sheer numbers of products launched but by being more effective. Thus, it is both the number of new services and the relative success of those new services that drive the financial contribution NSD makes to the firm:

H10: The number of new services is positively related to the financial contribution of NSD to overall firm performance.

H11: The new service success rate is positively related to the financial contribution of NSD to overall firm performance.

Notwithstanding these hypotheses, a key factor behind NSD success is resource availability. Often firms have too many projects and not enough resources (Cooper et al., 1994). If firms undertake too many projects, they spread development resources too thinly across projects and do a less-than-proficient job on each. Thus, it is proposed that the number of new services will have an adverse effect on the firm's success rate:

H12: The number of new services is negatively related to the new service success rate.

7. METHOD

7.1. Measurement Model

A questionnaire survey was designed to test the conceptual model. The questionnaire consisted of measures of NSD performance, operant resources and controls. Established scales were used throughout. The development of the questionnaire was pretested with a small number of marketing directors to ensure face validity and to determine if respondents possessed sufficient knowledge to answer. The final version of the questionnaire was also pretested with a number of senior managers within a leading consultancy firm and a panel of expert academics to ensure content validity.

NSD Performance: The firm's NSD activity over the last three years was measured on a number of dimensions identified in previous research (Barczak et al., 2009, Griffin and Page, 1996): The number of new services launched; the percentage of

new services launched classified as successful; and the financial contribution of NSD to overall firm performance (the percentage of sales and of profits attributable to new services launched in the last three years). Quantitative rather than perceptual measures were employed to reduce common method bias (Frambach, Prabhu and Verhallen, 2003).

NSD Capability: This is the accumulation of facts, insights, experiences, and lessons learned from previous and emergent service development activities. The firm's NSD capability was operationalized by measuring the amount of knowledge, the degree of experience and the investment made in NSD (Hult et al., 2007; Moorman and Miner, 1997).

Learning Culture: The learning culture of the firm represents the degree to which the organisation values knowing the causes and effects of its actions. This was measured using a scale where learning is seen as a necessity, underpins the values of the company and viewed as key to competitive advantage. This scale has been widely employed (Baker and Sinkula, 1999; Calantone et al., 2002; Sinkula, Baker and Noordewier, 1997).

Entrepreneurial Culture: An entrepreneurial culture is one that values new opportunities. It was measured by the firm's commitment to innovation, being dynamic, risk-tolerant and entrepreneurial, and possessing a leader who reflects these values (Deshpande and Farley, 2004; Deshpande et al., 1993). This scale has been employed in a wide range of contextual situations including technological adoption (Srinivason et al., 2002), supply chain management (Braunscheidel, Suresh and Boisnier, 2010) and product development (Moorman, 1995).

Strategic Orientation: Respondents were asked to identify their strategic orientation in terms of the four Miles and Snow (1978) typologies, which have been found to be valid across industries (Hambrick, 2003; Manion and Cherion, 2009). A self-typing approach used in previous studies was adopted (McKee et al., 1989; Wang, 2008).

Controls: Two controls were included—firm size and market turbulence. Firm size can have a direct effect on the number of new services introduced because larger firms operate in more markets, have more resources and are able to develop more new services. Firm size was measured on a five-point scale based on turnover. Market turbulence affects the pace of change and thus might influence the level of NSD (Calantone, Harmancioglu and Droge, 2010). Turbulence was measured based on a scale from similar studies of product and service development (Atuahene-Gima, 2005)

7.2. Sample

A sample of 385 service businesses was identified from the Times Top 1000 UK-based firms. These were the leading service firms from the financial services, travel/transportation, retail, and ICT sectors, based on number of employees. The senior executive having directorial responsibility for NSD was identified by contacting each firm. These respondents were chosen because of their organizational knowledge and access to relevant information. Literature suggests such people are suitable respondents (Bello, Katsikeas and Robson, 2010). A total of 105 completed questionnaires were returned, which equated to a 27.3% response rate. Of these firms, 30 classified themselves as *Prospectors*, 44 as *Analyzers*, 20 as *Defenders* and 11 as *Reactors*. These proportions are in line with those reported in previous research (Song et al., 2007), giving support to the representativeness of the sample.

The data was tested for sector, respondent position and firm size differences between respondents and non-respondents (Bello, Katsikeas and Robson, 2010). Differences between early and late respondents for all constructs in the model were tested for. No systematic differences were identified suggesting non-response bias was not a significant issue (Armstrong and Overton 1977).

8. ANALYSIS AND RESULTS

8.1. NSD Activity

Table 1 shows the mean scores for the measures of NSD activity and the drivers of this activity. The success rate (72%) is in line with previous research on NSD (Storey and Kelly, 2001). New services account for around one-quarter of total profits or sales. A recent study that looked predominately at new products found a success rate of 59% but a contribution to profits of 28% (Barczak et al., 2009). As these data are in line with previous studies this give confidence in the generalizability of the results from the relatively small sample.

The results are broken down by sector. Analysis shows a lack of significance between the sectors. Table 1 also shows the results by strategic orientation. As expected Prospectors are the most innovative, Reactors the least, based on number of new services and contribution supporting hypothesis H3. Analyzers have the highest success rate although the differences are not significant.

[Table 1 about here]

8.2. Measurement Model

Results show the reliability, convergent validity and discriminant validity of the measurement model to be acceptable. Exploratory factor analysis revealed that the items load cleanly on their intended constructs and provide evidence of discriminant validity. The first factor accounted for 37% of the total variance (76%). As no one factor accounted for the majority of the variance, common method bias does not appear to be a significant problem (Podsakoff and Organ, 1986).

Confirmatory factor analysis (CFA) was carried out to further test the validity of the model. The results of the CFA are shown in the Appendix. The model exhibited an acceptable fit with the data ($\chi^2 = 138.0$, $df = 80$, $p = 0.00$, $CFI = 0.93$, $TLI = 0.91$, $RMSEA = 0.08$). The standardized loadings were all above 0.5 providing evidence for convergent validity. For each factor, its composite reliability (CR) was calculated. These ranged from 0.72 to 0.92, well above acceptable levels (Hair et al., 2007). Discriminant validity was further examined by calculating the average variance extracted (AVE) for each construct and comparing to the highest shared variance (HSV) with the other factors in the model. The AVE was always greater than the HSV supporting the validity of the model (Fornell and Larcker 1981). Correlations between all constructs and variables are shown in Table 2.

[Table 2 about here]

8.3. Regression Analysis: Main Effects

[Table 3 about here]

As the measurement model is deemed acceptable, multiple regression analysis was used to test the effects of the independent variables on NSD activity. The results are

shown in Table 3. Dummy variables were used for the different strategic orientations with Reactors as the reference group.

A significant relationship was found between an entrepreneurial culture and the number of new services developed (Table 3, Model M1, $\beta = 0.28$, $t = 2.23$) and between a learning culture and the success rate (M2, $\beta = 0.21$, $t = 1.84$). These support H1 and H2. Relationships were also found between NSD capability and both the number (M1, $\beta = 0.26$, $t = 2.20$) and the success rate of new services (M2, $\beta = 0.20$, $t = 1.65$), supporting H4a and H4b.

Compared with Reactors, all three alternative orientations have a positive relationship with the financial contribution NSD makes to overall firm performance (M3). As expected the largest effect is for the orientation at the opposite end of the spectrum to the Reactors, Prospectors ($\beta = 0.36$, $t = 2.35$). The two middle orientations have a smaller but still positive impact (Analyzers - $\beta = 0.21$, $t = 1.43$; Defenders - $\beta = 0.22$, $t = 1.82$). These results provide support for H3b. But there is no evidence supporting the effect of strategic orientation on the number of new services (M1, H3a).

Firm size also influences the number of new services (M1, $\beta = 0.20$, $t = 2.20$). More experienced and larger firms are able to launch more new services. Together the model accounts for 22% of the variance in the number of new services launched.

The number of new services negatively affects the success rate (M2, $\beta = -0.28$, $t = 2.66$, H12). Learning and expertise increases the success rate but this benefit is negated if this encourages the firm to develop too many new services. Together the operant resources explain 21% of the variation in firm's NSD success rates.

The number of new services (M3, $\beta = 0.48$, $t = 5.27$) and the success rate (M3, $\beta = 0.25$, $t = 2.87$) have strong positive effects on contribution, supporting H10 and H11. In addition turbulence has a small positive effect (M3, $\beta = 0.12$ $t = 1.38$). Together the antecedents account for 44% of the variance in financial contribution of NSD to overall firm performance.

8.4. Interaction Effects

[Table 4 about here]

The hypotheses specify that the impact of the individual antecedents on NSD performance is contingent upon their fit with other elements of the model. To assess this, a series of moderated regression analyses were undertaken with the relevant interaction terms. A residual centering approach was employed in accordance with the recommendations of Lance (1988), who indicates residual centering as having the advantage of minimizing multicollinearity between the interaction term and its component variables. The residual centering technique involves regressing the interaction term on its two components via ordinary least squares and then using the residuals of this regression in the structural model instead of the interaction term. We employed a hierarchical approach. Taking a model (M1 to M3) from Table 3, an interaction term was added and the model respecified. The results are shown in Table 4. To avoid Type 2 errors, this process was carried out for each interaction term separately and repeated across the three dependent variables captured in models M1 to M3. Given the relatively limited sample size and the potential for multicollinearity when several interaction terms that share underlying constructs are used, the potential for dismissing theoretically sound interactions is high (Aguinis, 1995). This problem is confounded when considering multiple moderators simultaneously. As an aim of the research was to identify significant interactions

amongst operant resources, separate models were therefore analysed to combat the aforementioned risk (Aguinis, 1995; Filippini, Salmaso and Tassarolo, 2004).

First, there is evidence supporting the fit between strategic orientation and culture. No interaction was found between an entrepreneurial culture and Prospector orientation on the number of new services launched (Table 4, Model M1a). However there is a significant impact on the financial contribution (M3a). R^2 increases from 0.435 to 0.466 ($t = 2.32$) partially supporting H5. The interaction term between learning culture and Analyzers on the success rate is significant (M2b). R^2 increases from 0.207 to 0.230 ($t = 1.68$) partially supporting H6 (there is no effect on contribution, M3b). To help understand the interaction effects the significant relationships were graphed: Firm's fail to benefit from an entrepreneurial culture if they do not employ a Prospector orientation (Figure 2a); Analyzers benefit from having a learning culture (Figure 2b).

[Figure 2 about here]

The interactions between NSD capability and culture are as expected. An entrepreneurial culture and NSD capability increases the number of new services launched (M1b). R^2 increases from 0.223 to 0.252 ($t = 1.91$). An entrepreneurial culture will have more of an impact when a firm has an existing NSD capability (Figure 2c). This supports H7. Second, NSD capability and a learning culture have a significant interaction effect on the success rate (M2b). R^2 increases from 0.207 to 0.226 ($t = 1.54$). At low levels of existing capabilities learning is more important than at high levels (Figure 2d), supporting H8.

[Figure 3 about here]

The results also show interaction effects between strategic orientation and NSD capability. There is a positive interaction effect between Prospectors and NSD capability on the number of new services (M1c). R^2 increases from 0.223 to 0.250 ($t = 1.85$). And there is a positive interaction effect between Defenders and NSD capability on financial contribution (M3c). R^2 increases from 0.435 to 0.468 ($t = 2.39$). This gives strong support for H9a and H9c. The results are also shown in Figures 3a and 3c. Unexpectedly the interaction between Analyzers and NSD capability on the success rate is negative (M2c). R^2 increases from 0.207 to 0.221 ($t = 1.32$). Analyzers do not get the benefit that other firms do from a high NSD capability (Figure 3b).

9. DISCUSSION AND CONTRIBUTIONS

This work makes a number of important contributions to the theory base underpinning NSD. The first contribution is the presentation of an intricate model of service innovation that disentangles the effects of different operant resources on distinctive dimensions of NSD performance. This study disaggregates NSD performance into the number of new services developed, the success rate and the financial contribution of NSD to overall firm performance, each requiring different operant resources. Thus previous research provides only a partial explanation of the drivers of NSD activity. An entrepreneurial culture drives the number of new services developed; a learning culture drives the success rate. An existing NSD capability plays an important role in supporting both these aspects of NSD performance, but it is the firm's strategic orientation that drives NSD's financial contribution. Compared to Reactors all three orientations show performance benefits but it is being a Prospector that is the key to growth.

A second contribution is the finding that the number of new services deleteriously affects the success rate of new services. This is the first time this relationship has been evidenced. One reason for this can likely be found in theories of organization slack (Voss, Sirdeshmukh and Voss, 2008). Developing a greater number of new services is resource-intensive leaving fewer resources for their effective commercialization. A second reason can be found in the flaw inherent in entrepreneurial orientation (Hughes et al., 2007). Entrepreneurial orientation can self-reinforce a culture of increased opportunity identification, novel idea generation and escalated risk-taking that can lead to higher numbers of failures. This suggests that management may be more effective in managing their NSD activities by *a priori* selecting their set of success measures based on their organization's conditions.

The study shows how a conceptualization of NSD performance that fails to account for its multiple dimensions is flawed. We found no direct effect from culture or NSD capability on the financial contribution made by NSD to overall firm performance. The third contribution then is the discovery that NSD capability moderates the relationships between culture and performance shedding light on the core rigidity problem. Past research proposes that existing knowledge in the form of a powerful capability might reduce innovation due to the core rigidity problem (Leonard-Barton, 1992; Subramaniam and Youndt, 2005). The lack of a direct relationship between NSD capability and contribution may be a symptom of this problem.

This study shows that the core rigidity problem is much more intricate than initially apparent. First, NSD capability positively moderates the relationship between entrepreneurial culture and the number of new services developed. Thus, a synergistic relationship exists between the entrepreneurship of the firm and its NSD

capability such that together they increase the number of services generated. In this sense, there is augmentation of the innovation core of the firm.

On the other hand, NSD capability negatively moderates the relationship between learning culture and the success rate of NSD. It is this relationship that begins to capture the core rigidity problem. At low levels of capabilities, learning has a large impact on success. However the benefit from learning is reduced as the knowledge and expertise of the firm increases. Existing, powerful capabilities define how individuals in the firm believe the NSD process is meant to be performed. Intelligence generated via learning may be suppressed by past expertise. The innovation core of the firm then becomes more rigid to this past body of expertise as the NSD capability is reinforced but not redeveloped. These findings show capabilities can augment and undermine organizational initiatives adding a timely contribution to the recent body of knowledge on how operant resources develop (Madhavaram and Hunt, 2008).

A final contribution is to further our understanding of the fit between strategic orientation and organizational conditions. Evidence suggests Prospectors perform better with an entrepreneurial culture and Analysers with a learning culture. Conversely a misaligned culture can damage performance. For example an entrepreneurial climate focusing on exploring new opportunities, taking risks and embracing change produces egregious misfit with defensive, reactive or even analyser orientations. Without the correct focus, entrepreneurial efforts are thinned without reaping performance benefits.

This has important implications for managers. If senior management perceive the need for an innovative strategy, for competitive or market reasons, but the organization lacks an entrepreneurial culture, management has a dilemma. Does it

press ahead and risk poor performance or does it ignore the strategic imperative? It is certainly easier to choose a less innovative strategy than to change culture. Moreover, the culture may override the articulated strategic orientation, derailing management plans. It may be preferable to adopt a more modest strategy, even at the expense of missed opportunity, while investing time and effort gradually changing the culture of the organization.

The correct strategic orientation also reinforces the effect of NSD capability on performance. A high NSD capability enabled Prospectors to develop significantly more new services. At low levels of capability the innovative new services being developed by Prospectors may run into trouble and delays, thereby limiting the capacity for further NSD. An NSD capability also benefits Defenders. A defensive orientation focused on protecting existing competitive advantages can build on existing capabilities as well.

We expected that Analyzers would benefit from a NSD capability to boost their success rate. However it was the other firms that received this benefit. Analyzers have the highest success rate, although the differences are not significant. It seems that increasing a success rate past a certain point may be problematic. It is possible that as success rates rise then firms' expectations also rise thus limiting the increase in the success rate (i.e., NSD projects that in the past would have been seen as being successful may now be viewed as marginal at best and even as failures). How managers define success and what influences this definition is an area for further study. However it remains that strategy must be formulated based on the interpretation of organizational conditions.

Findings suggest different pathways to NSD. It is apparent that not one of the cultures is superior to the other as both cultures work in different ways. An entrepreneurial culture aligned with a prospector orientation drives the number of new services developed and hence the financial contribution of NSD to overall firm performance. However the number of new services constrains the success rate. Therefore there is a second path to NSD-driven growth. This is via a higher success rate driven by an Analyzer orientation coupled with a learning culture. Which path firms should choose depends on existing capabilities. One may conjecture an evolutionary sequence as firms grow and change in their competitive environments. At low levels of NSD capability a culture oriented towards learning may be preferable. Over time a learning culture will help build the firm's NSD capability. At high levels of NSD capability an entrepreneurial culture can take better advantage of this capability than a learning culture. However, in time, a culture geared towards seeking change and novelty will breakdown the usefulness of existing knowledge (Carlile and Reberich, 2003).

10. LIMITATIONS AND FUTURE RESEARCH

This study contains some limitations. First, this study is cross-sectional and thus no inference on causation over time is possible. The causal mechanisms put forward in the study (culture, strategic orientation, NSD capability and NSD prowess) are ones that take time to form and thus their origins and evolution are of interest to scholars. Future studies may wish to trace how different operant resources form, evolve and impact on each other. Second, the sample consisted of relatively successful firms from across multiple sectors in the Times Top 1000 UK-based firms. A larger and more varied sample including smaller and less successful firms would enable further empirical evaluation of the relationships contained in this study.

Several directions for future research emerge from this study. The findings suggest that to increase NSD performance, top management must devise and manage an environment where different operant resources come together in different but mutually synergistic ways according to the dimension of performance. To date however, few if any studies have sought to disentangle this problem. Further work in this area may require more intricate measures of the operant resources than presented in this research. For example, the scale employed to capture entrepreneurial culture might not capture the full intricacies of its components. An alternative conceptualisation of entrepreneurial culture comprised of sub-scales of risk-taking, proactiveness and innovativeness could enable a richer and more robust understanding of how entrepreneurial culture influences NSD because these individual components can influence performance differently (Hakala, 2010).

A related problem is that firms should look to strike a balance between the quantity and quality of their new services. The key issue in both instances therefore is how to balance conflicting cultures and strategies. Recent developments in the field of organizational ambidexterity (Judge and Blocker, 2008; Raisch and Birkinshaw, 2008) may enable marketing and innovation scholars to make new and fruitful theory developments to understand how competing demands can be managed as part of the NSD process.

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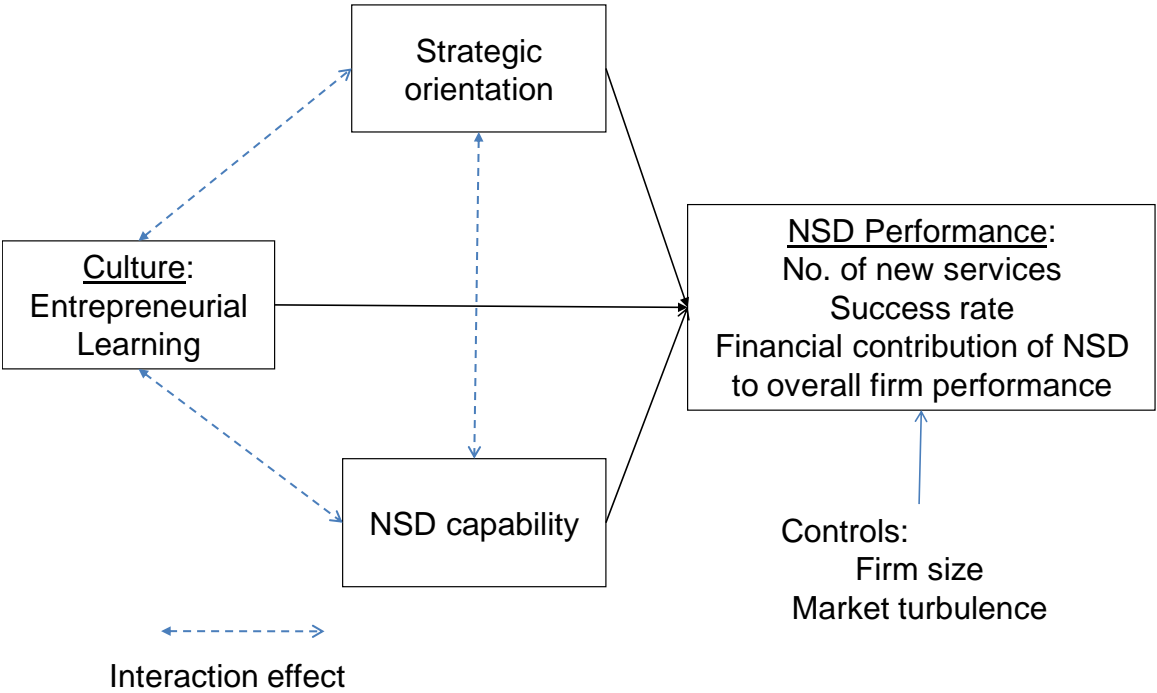
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Appendix. Items and Loadings of Constructs in the Model

CONSTRUCTS AND COMPONENT VARIABLES ¹	Standardized loadings ²
<p>Entrepreneurial Culture ($\alpha = 0.80$, CR = 0.81; AVE = 0.59, HSV = 0.36)³</p> <ul style="list-style-type: none"> • The head of the business is generally considered an entrepreneur, an innovator, a risk-taker 0.90 • The business is dynamic, entrepreneurial 0.70 • The business is committed to innovation 0.69 	
<p>NSD Capability ($\alpha = 0.84$, CR = 0.85, AVE = 0.65, HSV = 0.36)</p> <p>Compared to competitive businesses, this business has:</p> <ul style="list-style-type: none"> • greater knowledge of NSD tasks and activities 0.87 • has extensive practical experience in implementing NSD tasks and activities 0.68 • invested substantial time and money in NSD expertise 0.86 	
<p>Learning Culture ($\alpha = 0.92$, CR = 0.92, AVE = 0.79, HSV = 0.31)</p> <ul style="list-style-type: none"> • The basic values of the company include learning 0.90 • Staff and management view the ability to learn as key to competitive advantage 0.93 • Learning is seen as necessary for organizational survival 0.84 	
<p>Financial Contribution of NSD to Overall Firm Performance ($\alpha = 0.94$, CR = 0.94, AVE = 0.88, HSV = 0.23)</p> <ul style="list-style-type: none"> • % Sales from new services introduced in last 3 years 0.96 • % Profit from new services introduced in last 3 years 0.92 	
<p>Market Turbulence ($\alpha = 0.70$, CR = 0.72, AVE = 0.40, HSV = 0.19)</p> <p>In the markets in which this business operates:</p> <ul style="list-style-type: none"> • It is very difficult to forecast where the technology will be in the next 5 years 0.55 • A large number of new service ideas have been made possible through technological breakthrough 0.60 • Customer's service preferences change rapidly over time 0.75 • Customers look for new services all the time 0.58 	
<p>1. All scales were assessed on seven-point Likert scales</p> <p>2. Confirmatory factor analysis (CFA): $X^2 = 138.0$; $X^2/df = 1.73$; $p = .00$; CFI = 0.93; RMSEA = 0.08.</p> <p>3. α = Scale reliability coefficient; CR = Composite reliability; AVE = Average variance extracted, HSV = Highest shared variance.</p>	

Figure 1. Conceptual Model



	<u>Number of firms</u>	<u>No. of new services launched</u>	<u>Success rate (%)</u>	<u>Sales from new services (%)</u>	<u>Profits from new services (%)</u>
Total	105	21.5	72.5%	28.3%	25.7%
<u>Service Sector</u>					
Financial services	35	27.2	73.6%	35.2% ^a	29.5%
ICT services	26	23.0	67.7%	29.2%	27.4%
Other services	44	16.0	74.5%	22.2% ^a	21.7%
Paired test (Duncan): a – significant at 10% level.					
<u>Strategic Orientation</u>					
Prospector	30	29.9 ^b	72.9	42.0 ^{b2,c}	37.0 ^{b2,c}
Analyzer	44	21.2	75.8	26.6 ^{b1}	25.2 ^{b1}
Defender	20	15.8	65.0	21.6 ^{b2}	20.3 ^{a,b2}
Reactor	11	9.9 ^b	71.9	9.5 ^{b1,c}	6.6 ^{a,b1,c}
Paired test (Duncan): a – significant at 10% level; b – significant at 5% level; c – significant at 1% level					

Table 1. Innovation Activity by Sector and Strategic Orientation

	No. of New Services	Success Rate	Financial Cont. by NSD	NSD Capability	Entrep. Culture	Learning Culture	Firm size
Success Rate	-.15	-					
Financial Cont. by NSD	.53***	.19**	-				
NSD Capability	.37***	.25**	.43***	-			
Entrepreneurial Culture	.37***	.20**	.36***	.54***	-		
Learning Culture	.17*	.32***	.25**	.50***	.46***	-	
Firm Size	.21**	-.12	.13	.06	-.02	.00	-
Market Turbulence	.16*	.08	.27***	.31***	.30***	.25***	.12
* Correlation is significant at the 0.10 level; ** Correlation is significant at the 0.05 level; *** Correlation is significant at the 0.01 level.							

Table 2. Variable Correlations

Dependent variable:	No. of New Services	Success Rate	Financial Contribution of NSD
Independent variables:	M1	M2	M3
NSD Capability	0.26 ¹ (2.20) **	0.20 (1.65) **	0.12 (1.09)
Learning Culture	-0.08 (0.67)	0.21 (1.84) **	0.01 (0.08)
Entrepreneurial Culture	0.28 (2.23) **	0.16 (1.22)	-0.08 (0.73)
Prospector Strategy ²	-0.01 (0.07)	-0.21 (1.20)	0.36 (2.35) ***
Analyzer Strategy ²	0.01 (0.04)	-0.14 (0.81)	0.21 (1.43) *
Defender Strategy ²	0.02 (0.12)	-0.18 (1.26)	0.22 (1.82) **
Firm Size	0.20 (2.20) **	-0.06 (0.68)	0.04 (0.48)
Market Turbulence	0.00 (0.00)	-0.02 (0.25)	0.12 (1.38) *
No. of New Services	-	-0.28 (2.66) ***	0.48 (5.27) ***
Success Rate	-	-	0.25 (2.87) ***
R ²	0.223	0.207	0.435
F (all sig at 0.01 level)	3.45	2.75	7.23
<p>1. Standardized coefficient (t-statistic); * – significant at 0.10 level; ** - significant at 0.05 level; *** - significant at 0.01 level.</p> <p>2. Dummy variable (Reactor strategy excluded from analysis)</p>			

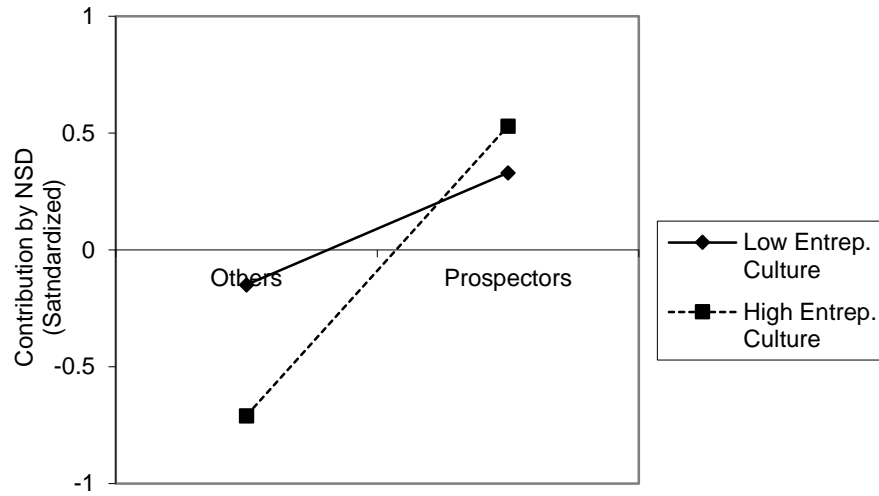
Table 3. Regression Analysis on NSD Performance Measures

Dependent Variable: Model no.	No. of New Services			Success Rate			Financial Contribution of NSD			Relevant Hypoth.
	M1a ¹	M1b	M1c	M2a ¹	M2b	M2c	M3a ¹	M3b	M3c	
NSD Capability	.25 ² (2.06)**	.26 (2.25)**	.26 (2.29)**	.19 (1.52)*	.20 ² (1.64)*	.23 (1.86)**	.08 (0.77)	.12 (1.13)	.07 (0.68)	
Learning Culture	-.07 (0.62)	-.08 (0.71)	-.08 (0.74)	.23 (2.01)**	.22 (1.90)**	.21 (1.80)**	.03 (0.26)	.00 (0.02)	.02 (0.22)	
Entrepreneurial Culture	.28 (2.17)**	.28 (2.28)**	.24 (1.89)**	.17 (1.31)*	.18 (1.35)*	.16 (1.22)	-.09 (0.87)	-.09 (0.77)	-.06 (0.54)	
Prospect Strategy	.01 (0.06)	.01 (0.03)	.05 (0.28)	-.28 (1.53)*	-.24 (1.34)*	-.28 (1.52)*	.43 (2.85)***	.38 (2.45)***	.41 (2.71)***	
Analyzer Strategy	.02 (0.12)	.06 (0.32)	.06 (0.37)	-.18 (1.04)	-.18 (1.03)	-.18 (1.02)	.30 (2.01)**	.23 (1.52)*	.24 (1.69)**	
Defender Strategy	.03 (0.20)	.04 (0.33)	.03 (0.22)	-.19 (1.37)*	-.19 (1.36)*	-.18 (1.30)*	.26 (2.14)**	.23 (1.89)**	.26 (2.13)**	
Firm Size	.20 (2.17)**	.21 (2.27)**	.20 (2.17)**	-.07 (0.76)	-.07 (0.69)	-.07 (0.71)	.03 (0.35)	.04 (0.47)	.01 (0.07)	
Market Turbulence	-.02 (0.21)	-.02 (0.21)	-.01 (0.09)	-.04 (0.36)	-.04 (0.35)	-.02 (0.19)	.13 (1.52)*	.12 (1.44)*	.13 (1.61)*	
No. of New Services	-	-	-	-.26 (2.54)***	-.27 (2.57)***	-.28 (2.71)***	.46 (5.17)***	.47 (5.18)***	.51 (5.67)***	
Success Rate	-	-	-	-	-	-	.24 (2.82)***	.26 (2.95)***	.24 (2.87)***	
<u>Interaction term</u>										
Entrep Culture x Prospector	.05 (0.57)	-	-	-	-	-	.19 (2.32)**	-	-	H5
Learning Culture x Analyzer	-	-	-	-.16 (1.68)**	-	-	-	.06 (0.74)	-	H6
NSD Capability x Entrep Culture	-	.18 (1.91)**	-	-	-	-	-	-	-	H7
NSD Capability x Learning Culture	-	-	-	-	-.14 (1.54)*	-	-	-	-	H8
NSD Capability x Prospector	-	-	.17 (1.85)**	-	-	-	-	-	-	H9a
NSD Capability x Analyzer	-	-	-	-	-	-.13 (1.32)*	-	-	-	H9b
NSD Capability x Defender	-	-	-	-	-	-	-	-	.19 (2.39)***	H9c
R ²	.226	.252	.250	.230	.226	.221	.466	.438	.468	
Δ R ²	.003	.028	.027	.023	.020	.014	.031	.003	.033	
F (all sig at 0.01 level)	3.08	3.55	3.52	2.81	2.75	2.67	7.37	6.59	7.43	

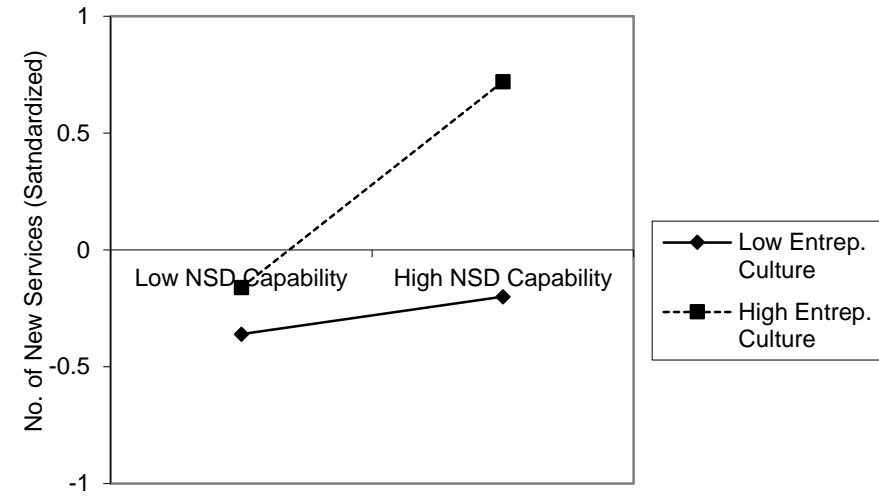
1. Comparison against model M1, M2 or M3 (see table 3).

2. Standardized coefficient (t-statistic); * – significant at 0.10 level; ** - significant at 0.05 level; *** - significant at 0.01 level.

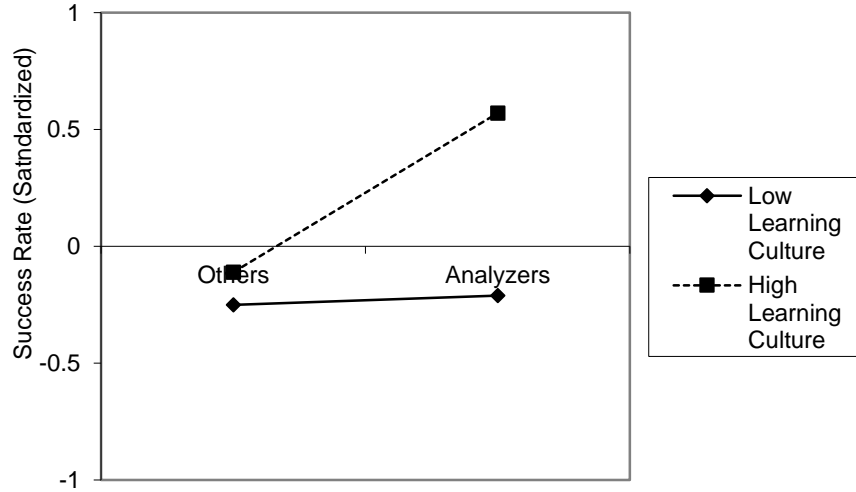
Table 4. Regression Analysis with Interaction Terms



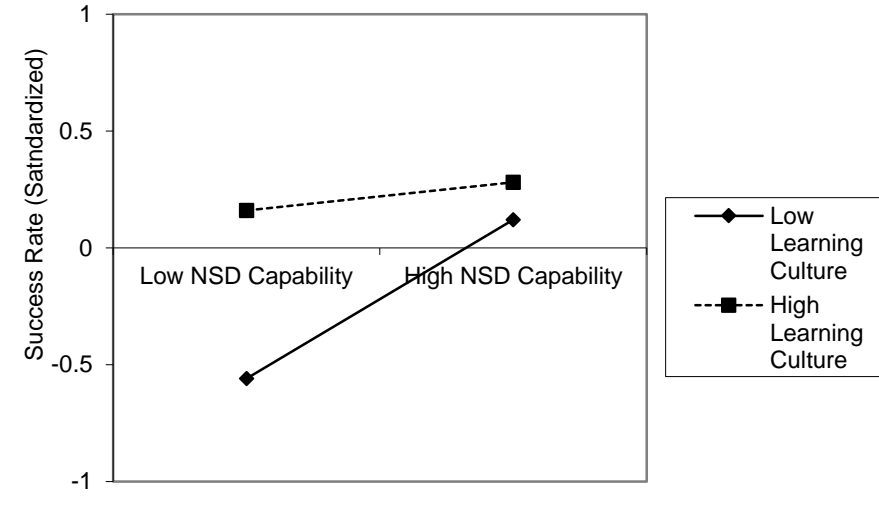
2a. Prospector and Entrepreneurial culture on Financial Contribution of NSD



2c. Entrepreneurial Culture and NSD Capability on No. of New Services

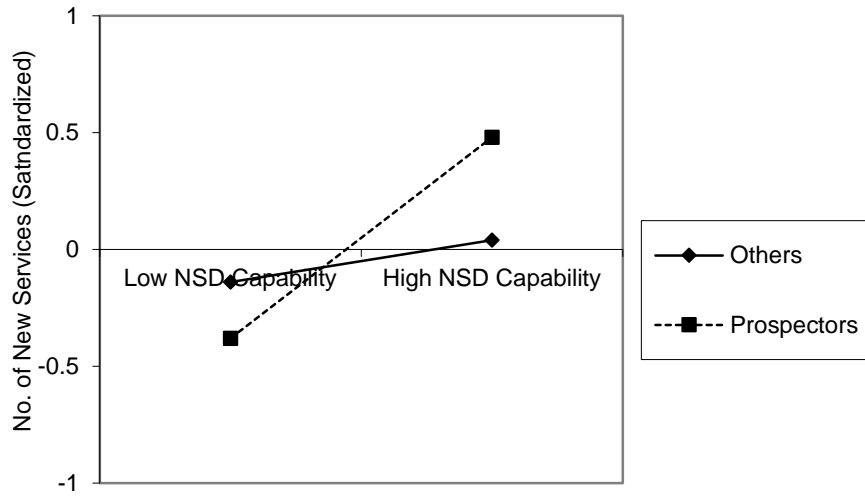


2b. Analyzer and Learning Culture on Success Rate

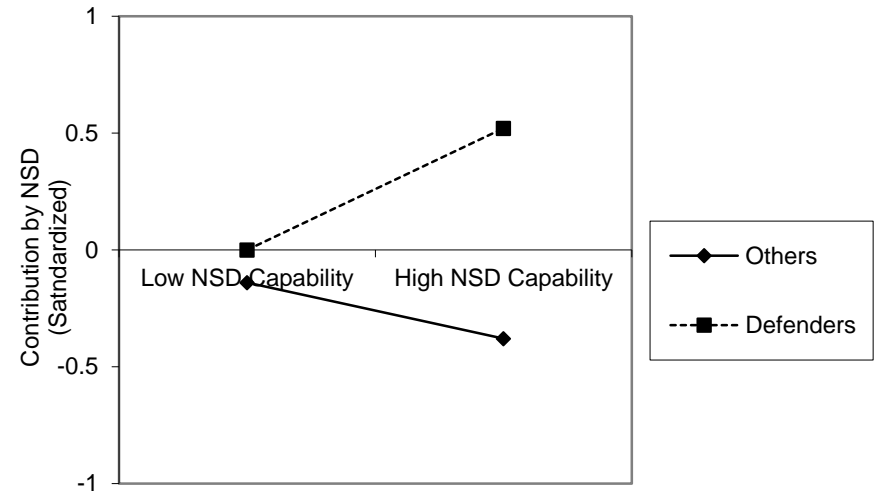


2d. Learning Culture and NSD Capability on Success Rate

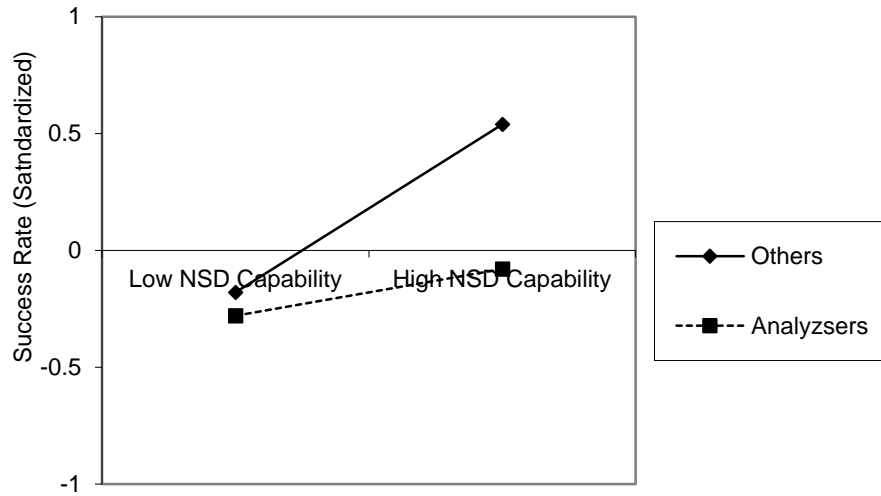
Figure 2. Interaction Effects



3a. Prospector and NSD Capability on Number of New Services



3c. Defender and NSD Capability on Financial Contribution of NSD



3b. Analyzer and NSD Capability on Success Rate

Figure 3. Interaction Effects – Strategic Orientations and NSD Capability

