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HOW DO ESTABLISHED FIRMS PRODUCE BREAKTHROUGH INNOVATIONS? MANAGERIAL IDENTITY-DISSEMINATION DISCOURSE AND THE CREATION OF NOVEL PRODUCT-MARKET SOLUTIONS [1]

DIANA B. PERRA
Department of Strategic Management & Entrepreneurship
RSM Erasmus University
Burg. Oudlaan 50, 3062 PA Rotterdam, Netherlands
E-mail: dperra@rsm.nl
Telephone: +31 10 408

JATINDER S. SIDHU
Department of Strategic Management & Entrepreneurship
RSM Erasmus University
Burg. Oudlaan 50, 3062 PA Rotterdam, Netherlands
E-mail: jsidhu@rsm.nl
Telephone: + 31 6 24 90 98 33

HENK W. VOLBERDA
Department of Strategic Management & Entrepreneurship
RSM Erasmus University
Burg. Oudlaan 50, 3062 PA Rotterdam,Netherlands
E-mail: hvolberda@rsm.nl
Telephone: + 31 10 408 2761

[1] The first two authors contributed to the paper equally. Address correspondence to: Diana B. Perra. E-mail: dperra@rsm.nl

TITLE

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Running Head

Established Firms and Breakthrough Innovations

Keywords

Identity; Nonlocal Search; Knowledge Recombination; Transformational Leadership; Organization Structure.

Abstract

Despite the legacy of experience, some established firms are able to avoid a mindset, behaviors, and routines that can be expected to lead them down paths of local search and incremental product innovations of ever-declining value. Indeed, industry incumbents are often adept at introducing successful path-breaking innovations. To explain this apparent paradox, this article draws on the organizational identity literature to present a model that ascribes breakthrough innovations by established firms to managerial identity-dissemination discourse (MIDD). MIDD is argued to provide a sense-giving framework, which fosters an understanding of the firm as a nexus of values round which the firm can be continuously rediscovered and reconstituted in new ways. By exposing the firm as an idea that can assume fresh forms in terms of product-market scope, MIDD stimulates and coordinates creative endeavor, thus increasing the disposition to produce breakthrough innovations. The model also suggests that the impact of MIDD is likely to depend on transformational leadership and the level of centralization and formalization in the company. The results of a cross-sectional empirical study provide support for the model. In contrast to the focus of earlier research on behavioral and structural explanations, this article advances understanding by offering a cognitive explanation for breakthroughs. In doing so, the article highlights that creativity and innovation in firms are mentally located in an interpretive schema of the firm's identity, which has important implications in relation to organizing for breakthroughs. The article discusses these implications with particular reference to the use of multi-functional teams and advanced information and communication technologies for facilitating breakthroughs.

Practitioner Points

- Senior executives and managers should take note that it can be advantageous to identify the distinctive values that capture the company's identity and to communicate these to the workforce.
- When everyone in the organization begins to understand the company in terms of the values and identity that imbue it with form and purpose, the stage is set for creative experimentation to develop products that go beyond the existing product-market range.
- If organizing for breakthrough innovations, it is important to know that an understanding of the values and identity that make up the company can enhance the effectiveness of multi-functional teams and of information and communication technologies used for knowledge integration.

Introduction

This article focuses on an intriguing issue that has only lately started to receive systematic attention, as it has become evident that breakthrough innovations need not be introduced only by new entrants (Jiang et al., 2011; Methe et al., 1997). For reasons that are not yet fully clear, it would seem that some established firms are also able to produce breakthroughs. This ability constitutes an anomaly, in that, the received view has tended to associate established firms with rigidities and inertia, and not with breakthroughs. In particular, established firms, on account of the legacy of their experiences and the path-dependencies connected with them, have been theorized to become entrapped in mindsets, behaviors, and routines that consign them to paths of local search and incremental refinements of ever-declining value (cf. Henderson and Clark, 1990; Levinthal and March, 1993; Nelson and Winter, 1982; Tripsas and Gavetti, 2000). To resolve the discrepancy between observation and theory, scholars have ascribed breakthroughs by established firms to an ability to engage in nonlocal search and to effectively integrate dispersed knowledge in the organization (Ahuja and Lampert, 2001; Jiang et al., 2011).

While nonlocal search and integration of knowledge are no doubt essential for breakthroughs, models that focus on these factors do not address the basic anomaly of how established firms can in the first place avoid the mindsets, behaviors, and routines that are supposed to incline them to local search and inertia. The current article examines this unresolved issue using an identity lens. Drawing particularly on the organizational identity literature (Albert and Whetten, 1985), it introduces the concept of managerial identity-dissemination discourse (MIDD) to augment the theoretical apparatus of nonlocal search and knowledge recombination (Ahuja and Lampert, 2001; Galunic and Rodan, 1998) for explaining why some industry incumbents show more aptitude for breakthroughs than others. MIDD is defined in the article as the process by which a company's

managers use sense-giving rhetoric centering on the company's identity-embodying values to foster a common understanding of the company's essence (cf. Czarniawska, 1997; Fiol, 2002; Ravasi and Schultz, 2006; Sveningsson and Alvesson, 2003).

The article suggests that by providing organization members an interpretive framework for understanding the firm in terms of identity-embodying values rather than in terms of the company's historical product-market scope, MIDD can play a key role in promoting a disposition to pursue breakthroughs. It is argued that a values-centered interpretive framework is important for breakthroughs because of its influence on knowledge search and recombination. In particular, MIDD is argued to create a referential schema for organization members that makes them more inclined to experiment with product-market ideas that capture and express the values that define the company's identity, even though those ideas may take the company into completely new territory in a physical or material sense. Put slightly differently, MIDD is submitted to encourage sense-making that primes the workforce for identifying and testing breakthrough ideas that reflect and reinforce the firm's identity, although the pursuit of the ideas may take the company beyond its earlier product-market scope.

The theoretical model presented in the article also takes into account how transformational leadership and traditional structural mechanisms of control and coordination may moderate the effect of MIDD on breakthrough innovations. Whereas more (less) of transformational leadership is posited to strengthen (weaken) the influence of MIDD on disposition to pursue breakthrough innovations, more (less) of centralization and formalization are posited to weaken (strengthen) it. The results of a cross-sectional empirical study, which are reported in the article, provide support

for the model. As cross-sectional data does not permit conclusions to be drawn about causality, the model is supported to the extent that all co-variances of the study's variables are as hypothesized, with the exception of one unexpected finding concerning the moderating effect of formalization. We discuss the study's contributions and its implications for organizing for breakthrough innovations in the final section.

Literature and Hypotheses

Breakthrough Innovation in Established Firms

It has been suggested that breakthrough innovations arise from recombining different streams or pieces of knowledge in novel ways (Schumpeter, 1934; Fleming, 2001; Galunic and Rodan, 1998). Given this premise, research that uses a behavioral theory lens ascribes differences in firms' ability to produce breakthroughs to differences in their propensity for nonlocal search. Engaging in more nonlocal search is said to increase the odds of a breakthrough by expanding a firm's repertoire of knowledge elements (Henderson and Cockburn, 1994; Rosenkopf and Nerkar, 2001), which allows the firm to experiment with a greater number of knowledge recombinations (Ahuja and Lampert, 2001; McGrath, 2001). In contrast, research that employs an administrative or structural lens puts the emphasis on organizational arrangements and mechanisms such as autonomy and reward systems to explain differences in breakthroughs. Structural factors are argued to have an impact on how dispersed technical and market knowledge is shared and synthesized within the firm, thus affecting knowledge recombination and breakthroughs (O'Connor and Rice, 2013; Phene et al., 2006).

Further, as novel product-market ideas are apparently introduced more frequently by new entrants, the relative dearth of breakthroughs by established firms is often attributed to these firms

having built up particular types of knowledge, expertise, and competences. While an established firm's accumulated learning and experience may have served it well in the past, it can give rise to mental models (Leonard-Barton, 1992; Tripsas and Gavetti, 2000), routines (Levinthal and March, 1993; Nelson and Winter, 1982), and structures (O'Connor and Rice, 2013) that inhibit nonlocal search and the exchange and integration of knowledge across the organization. While theoretical analysis can thus explain why established firms fail to produce breakthroughs, it is less insightful in terms of explaining why industry incumbents like Apple and Google are so adept at repeatedly introducing successful path-breaking innovations. Drawing on the organizational identity literature, this article presents a model that is able to address this gap in the theory.

Organizational Identity and Managerial Identity-Dissemination Discourse (MIDD)

Management and organization scholars have paid considerable attention to identity as a root socio-psychological construct (Ashforth and Mael, 1989; Tajfel and Turner, 1985), which can explain a wide spectrum of business-related behaviors ranging from competitive strategy (Livengood and Reger, 2010) to customer purchase decisions (Chernev et al., 2011). The literature suggests that the identity of an organization resides in its central, distinctive, and possibly enduring values (cf. Albert and Whetten 1985; Corley and Gioia, 2004; Gioia et al., 2000; Scott and Lane, 2000). These values, which project the essence of the organization, can influence strategic choices concerning the organization's core operations and the competences that are championed, developed, and applied by those within it (Glynn, 2000; Pandza, 2011). Further, organization members' oneness on the identity-embodying values of their company captures the notion of organizational identity – a normative ideal, which has been championed by scholars because unity on what constitutes the essence of the company can facilitate coordination of activity in the organization (cf. Albert and Whetten, 1985; Ashforth et al., 2011).

In reality, a state of complete oneness is unlikely because of socio-psychological (Ashforth and Mael, 1989; Glynn, 2000) and political dynamics (Humphreys and Brown, 2002; Rodrigues and Child, 2008), which tend to create differences in what organization members see as their company's identity. In particular, the varied interests and goals, functional specializations, and knowledge bases and skill-sets that are commonplace in complex modern organizations can foster different interpretations of a company's essence (cf. Glynn, 2000; Sveningsson and Alvesson, 2003; Rodrigues and Child, 2008). In such circumstances, managerial identity-dissemination discourse (MIDD) offers a means by which a company's leadership can stave off the emergence of competing interpretations (Bouchikhi et al., 1998; Kreutzer and Jäger, 2011; Pratt and Corley, 2007). To forge oneness, MIDD can exploit the power of rhetoric to offer a compelling image of what a particular organization represents (cf. Pondy et al., 1986; Fiol, 2002). Formally, MIDD may be defined as the managerial process of using sense-giving rhetoric centering on the company's identity-embodying values to foster a common understanding of the company's essence.

By keeping divergent views at bay, MIDD can potentially contribute to progress in the direction of the normative ideal of organizational identity. Moreover, MIDD can help a company stay in tune with its context, and thus preserve its legitimacy (cf. Ravasi and Schultz, 2006). As the external world inevitably changes, company well-being and survival make it vital that internal perceptions of the company's essence do not become detached from the evolving expectations of external stakeholders (Hsu and Hannan, 2005; Ravasi and Philips, 2011). A mismatch between the two can be fateful, because external stakeholders have the power to withhold both material and symbolic resources vital for a company (Hsu and Hannan, 2005; Scott and Lane, 2000). MIDD can prevent the emergence of a mismatch by affording the managerial hierarchy a vehicle and momentum for the timely adaptation of internal rhetoric regarding the company's essence so that

it resonates with environmental exigencies and discourse (see also Corley and Gioia, 2004). In illustration of this, in the wake of increasing public interest in and demand for corporate social responsibility, Unilever has been swift to re-frame its identity rhetoric to emphasize "sustainable living" as a core value of the company – a value which currently enjoys social legitimacy.

Furthermore, MIDD can be critical for keeping in check a mindset in which people rely on a company's directly observable product-market scope to make sense of the company. As compared to an understanding of the company in terms of the values that define its identity, an understanding of the company in terms of its product-market scope may be restrictive in the sense that it discounts the company's potentiality vis-à-vis product-market combinations that could be. Product-market centered interpretations of companies seem to be common (see e.g., Hsu and Hannan, 2005; Tripsas, 2009), arguably because in the absence of MIDD a company's visible operations provide a ready and tangible anchor for framing and sense-making. Should a product-market centered interpretation become dated though, due perhaps to technological change that ushers in a superior product to satisfy a particular market need, it is quite difficult to get people to unlearn their product-market based understanding of the company (cf. Fiol, 2002; Tripsas, 2009). Summing up the above discussion, MIDD can apparently play a vital role in companies. We consider below its significance for breakthrough innovations.

MIDD and Breakthrough Innovations

Because MIDD provides an interpretive framework to view a company in terms of its identity-embodying values, it can be expected to affect the disposition to produce breakthrough innovations in two ways. First, dialogue and rhetoric centered on the values that constitute the company can spur creative thinking and nonlocal search down product-market paths that have ties to the

company's identity, but are otherwise unrelated to the company's current business operations. MIDD, in particular, can stir the imagination to inspire nonlocal search that finds anchor, support, and motive in the company's identity, even though the implication may be groundbreaking in terms of departure from the company's existing physical scope and the expertise and competences that underpin it. That is, MIDD can be expected to promote the disposition to produce breakthroughs by portraying the firm as a set of values round which it can be constantly rediscovered and reconstituted in new ways. Without MIDD and a values-based interpretation of the firm it imparts, it is likely that organization members would come to understand the company in terms of its visible product-market scope. This last should make local search and the reinforcement of present product-market positions and competences more likely than the pursuit of breakthroughs that have no connection with the company's observable business operations. It is worth noting here that interpretations of firms based on their past products and experiences have long been observed to deter nonlocal search and new learning (Levinthal and March, 1993; Leonard-Barton, 1992).

MIDD should also be of importance in a second way, by working as a coordinating or synchronizing force. As MIDD is used to convey a values-based sense of the company's essence to organization members, it becomes less likely that varied understandings of the firm would foster disparate paths of knowledge search in the firm. This coordinating influence should also extend to the sharing and assimilation of dispersed specialized knowledge in the organization. For instance, research on team dynamics shows that a shared sense of identity and values can foster trust and cooperation, thus allowing knowledge to be exchanged and synthesized across organizational boundaries (Hinds and Mortensen, 2005; Vaara et al., 2012). In this regard, because the difficulties of bringing together dispersed knowledge in an organization (cf. Carlile, 2004; Leonardi, 2011)

can impede the recombination of knowledge elements into novel solutions, MIDD should promote the disposition to produce breakthroughs by facilitating integration of knowledge. This line of reasoning echoes research that emphasizes the value of interpretive frames for the coordination of team members working on the designing of novel artifacts (Seidel and O'Mahony, 2014). Shared frames or schemas are suggested to be especially helpful in settings in which it is difficult to specify the end goal in advance (Dougherty, 2001; Okhuysen and Bechky, 2009). To construct shared frames that enable harmonized collective action, managerial rhetoric and storytelling are viewed as crucial (Bartel and Garud, 2009; Leonardi, 2011).

Our overall argument is nicely illustrated by Apple Inc., a company whose essence is not portrayed and seen as a specific product – say, the Mac laptop. Rather, MIDD frames Apple as a developer of great products that bring progress to the world (Lashinsky, 2009). This framing has underpinned nonlocal search at Apple, and has enabled the company to cross-pollinate and recombine knowledge in new ways, without being constrained and confined by the logic of existing product-market combinations. The resulting breakthroughs have taken Apple well beyond its earlier product-market scope. Consider also the crisis faced by Swiss watchmakers in the 1970s and 1980s after the arrival of quartz technology and competition from mass-produced Japanese and U.S. watches. Hundreds of Swiss watchmakers, who saw themselves as producers of hand-made mechanical watches, lost market share and exited the industry. Swatch, however, made a hugely successful breakthrough on the back of managerial discourse in which the quality-imbuing values of "tradition" and "craftsmanship" – rather than hand-made watches – were emphasized as representing the essence of Swiss watchmaking (Deshpande, 2015; Donzé, 2012). This values-based framing was central to Swatch's embracing of quartz technology and, indeed, to the

construction of an expanded identity that fused the values of tradition and artisanship with contemporary fashion and lifestyle trends. This facilitated the introduction of a very successful watch that was in tune with the times (cf. Raffaelli, 2013)[1]. Tying together the foregoing discussion, we hypothesize that:

> H1: There is a positive relationship between managerial identity-dissemination discourse (MIDD*) in a company and the company's* disposition to produce breakthrough innovations.

The Moderating Effects of Leadership and Structural Factors

A CEO's leadership style and organization structure are contextual factors that could affect the relationship between MIDD and the firm's disposition to produce breakthrough innovations (cf. O'Connor et al., 2014). In particular, we expect that transformational leadership, which has long been noted for its positive effect on employee morale and motivation (Bass, 1985; Tichy and Devanna, 1986) and has been found to stimulate creativity (Shin and Zhou, 2003) and innovative behavior (Pieterse et al., 2010), will moderate MIDD's impact positively. Transformational leadership is described as a style of leading that consists of four key attributes: charisma, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985). We expect these attributes to reinforce the effect of MIDD because they can influence organization members' motivation to translate a values-based interpretation of the company into breakthroughs.

The breakthrough-innovation path – from an initial understanding of the firm's potential, as suggested by MIDD, through to the realization of novel product-market solutions – entails substantial experimentation and the investment of considerable time and financial resources; it also

involves risk and uncertainty (cf. Levinthal and March, 1993; Troilo et al., 2014). The cognitive and emotional demands of such activity can lead to stress and anxiety for individual employees, and for the organization as a whole. Under such conditions, transformational leadership can play a pivotal role in reinforcing the effect of MIDD by helping people to negotiate the various trials, tribulations, and frustrations involved in efforts to develop breakthroughs. In this respect, the charisma and inspirational motivation aspects of transformational leadership should be especially relevant, because they can energize employees, and encourage them to persevere and perform beyond expectations (Bass, 1985; Hill et al., 2012) as they pursue possible breakthroughs.

In addition, the intellectual stimulation and the individualized consideration dimensions of transformational leadership should also augment the effect of MIDD. By actively encouraging a spirit of discovery that questions the taken-for-granted, they can create a climate in which people feel safe psychologically to engage in MIDD-inspired experimentation, without fear of criticism or reprimands for doing so (cf. Bass and Avolio, 1994; Hater and Bass, 1988). As people's fear of risk-taking declines, a MIDD-inspired search for breakthroughs should gather pace (cf. Azoulay et al., 2011; Shin and Zhou, 2003). Moreover, because intellectual stimulation and individualized consideration enhance employees' ability and competences through the provision of information, learning, resources, and discretionary latitude (Avolio et al., Jung, 1999; Bass, 1985), this should strengthen MIDD's effect by boosting the confidence and self-efficacy of employees (cf. Avolio and Gibbons, 1988). In view of the preceding points, we hypothesize that:

H2: The positive relationship between MIDD and *the company's* disposition to produce breakthrough innovations should be stronger when there is a greater degree of transformational leadership in the company.

With respect to organization structure, which may be viewed as the pattern of internal relationships relating to coordination and control, a staple view in organization theory is that while efficiency increases with more organization structure, creativity and innovation suffer (Thompson, 1967; Volberda, 1996). Discussions of organization structure have often centered on centralization and formalization, structural elements that have important implications for innovation (Aiken and Hage, 1971; Burns and Stalker, 1961). While centralization refers to the concentration of authority, power, and decision-making in a company, formalization concerns the degree to which rules define roles, goals, procedures and relationships (Aiken and Hage, 1968; Baum and Wally, 2003). Building on earlier research, we suggest that greater centralization and formalization will moderate negatively, i.e., weaken, the effect of MIDD on the firm's disposition to produce breakthroughs.

More centralization narrows the channels for information flow by putting emphasis on the vertical reporting of information to enable top-down decision-making (Aiken and Hage, 1968; Cardinal, 2001); relatedly, it reduces employee autonomy (Atuahene-Gima, 2003; Bresman and Zellmer-Bruhn, 2013). An emphasis on vertical communication and a lower degree of autonomy are likely to dilute MIDD's effect by reducing the room, drive and motivation people have to engage in nonlocal search. This argument echoes research on organizational design that has proposed the setting up of decentralized units with autonomy to stimulate nonlocal search (e.g., Siggelkow and Levinthal, 2003; Tushman and O'Reilly, 1996). Further, because more centralization reduces the horizontal flow of information across organizational boundaries (Clark and Fujimoto, 1991; Garicano and Wu, 2012), it can impede the transfer and sharing of diffused specialized knowledge in a firm (Carlile, 2004; Kogut and Zander, 1992), thus rendering MIDD less effective with regard to the recombining of dispersed knowledge elements into breakthroughs.

More formalization is also likely to weaken MIDD's effect. As formalization increases, rules and standards distilled from experience become the principal templates for action (e.g., Levinthal and March, 1993); these can counteract MIDD's influence by discouraging search for novel solutions in response to new experiences (e.g., Benner and Tushman, 2003). For one thing, experience-based templates restrict the autonomy of employees and reduce their level of accountability and responsibility (Burns and Stalker, 1961; Mintzberg, 1979). This can diminish MIDD's affect by reducing incentive for nonlocal search and creative experimentation (cf. Amabile et al., 1996; Zmud, 1982). In addition, fear of incurring sanctions if one deviates from prescribed rules and norms may work against employees' sense of psychological safety (e.g., Edmondson, 1999), thus deterring nonlocal search. Furthermore, although a greater degree of formalization can strengthen borders and units that buffer specialists from information overload and external interferences (Galbraith, 1977), it can also hinder knowledge flows across organizational boundaries (cf. Levinthal and March, 1993), thus attenuating the effect of MIDD on knowledge integration and breakthroughs. Concluding the above discussion, we posit that:

H3: The positive relationship between MIDD and *the company's* disposition to produce breakthrough innovations should be weaker when the company has a more centralized organization structure.

H4: The positive relationship between MIDD and *the company's* disposition to produce breakthrough innovations should be weaker when the company has a more formalized organization structure.

Methods

Sample and Data Collection

The sample for hypotheses testing was drawn from firms registered with the Dutch Chamber of Commerce. The final sample frame included 10,000 companies, after the collection of data from small firms (i.e., firms with fewer than twenty employees) had been ruled out. Because industry newcomers or start-ups usually commence operations with only a few employees, excluding small firms from the sample was consistent with the interest in established firms in this study. For the data collection, the key informant approach was relied on. While the approach is well established in the social sciences, it does have a limitation in that data from a single person may contain spurious correlations because of individual bias in responding to questions and items. In view of this, several steps were taken when designing and administering the survey and when analyzing the data to rule out possibility of bias. CEOs were targeted as the key informants because they are said to be the most qualified to respond to questions concerning organization-level variables such as identity, leadership and structure.

The overall design of the questionnaire was in keeping with recommended principles. Also, the guidelines suggested for mail surveys were followed closely. If there was no response within two weeks of mailing the survey in March 2013, first a reminder was sent and then the targeted respondents were telephoned to solicit participation. In all, 503 usable responses were received for a 5% response rate, which is in line with response rates in the Netherlands for comparable surveys. Non-response bias was controlled for by looking at the size and industry affiliation of respondents and non-respondents. The two groups did not differ significantly. Early and late respondents were also compared to see if they differed from one another in terms of the study's variables. Again, no

significant differences were noted. The study's sample would thus appear to represent the population well. Further, to test for common method bias, Harman's one-factor test (Podsakoff and Organ, 1986) was used. As three factors with an eigenvalue of more than unity were necessary to account for the variance in the data, the data did not seem to suffer from common method bias.

In addition to the above, the sample of 503 firms included four that were too young to be regarded as industry incumbents. As part of a follow-up survey in January 2016, which is discussed in detail in the Supplementary Analysis section later in the article, respondents were asked after what period a company in their industry could be seen as an established firm. The response options were three years, five years, and ten or more years after entering the industry. The responses allowed the computation of an average period for all industries after which a firm in an industry could be considered as an established incumbent. These averages were compared with the ages of the 503 firms in the sample. The comparison revealed four that were younger than the average age indicated by industry insiders as the cut-off for viewing a firm as an industry incumbent. These four firms were excluded from the sample. Accordingly, the analysis and results reported in the article are based on a final sample of 499 firms.

Measurement of Variables

All the multi-item instruments used to operationalize the study's independent, dependent, and control variables consisted of Likert-type items with a seven-point response format; all were anchored at "strongly disagree" and "strongly agree".

Managerial Identity-Dissemination Discourse (MIDD). To record difference in MIDD across firms, a three-item instrument was relied on that tapped into the construct domain from slightly

different angles (Nunnally and Bernstein, 1994). In line with the conceptual definition of MIDD, the focal point of the items was an emphasis on sense-giving rhetoric and the creation of a sense of oneness regarding identity-embodying values: (i) managerial discourse with employees often refers to the company's principal values; (ii) managers discuss routinely the business implications of our company's essential values; and (iii) people's thinking in our firm converges when it comes to the company's core values. Cronbach's reliability coefficient for the instrument was 0.80. Efforts to ascertain the instrument's content validity are reported in the Supplementary Analysis section. Further, to establish the discriminant validity of the instrument, five separate two-factor models were estimated – each of the five models included the MIDD-instrument items and the items for measuring one of the study's five other multi-item constructs.

Each two-factor model was estimated twice – first, by constraining the correlation between the constructs (the phi coefficient) to unity, and then by freeing this parameter. Attesting to the discriminant validity of the instrument, a difference test of chi-square values of the two models indicated that the chi-square value of the unconstrained model was significantly ($p < 0.01$) better in all cases. As an additional check on discriminant validity, with respect to all factor pairs in the five two-factor unconstrained models, the shared variance of the two factors was smaller than the average variance extracted for either factor (Hair et al., 2006). In relation to convergent validity, one must establish that a focal instrument relates to measures of other constructs as expected (e.g., Hornsby et al., 2013). In this regard, inspection of the inter-factor correlation coefficient obtained by estimating a two-factor unconstrained model containing items for the MIDD instrument and the items for measuring disposition to produce breakthroughs indicated that the coefficient was positive and significant ($r = 0.23$; $p < 0.01$) as may be expected. As an additional check, the

disattenuated bivariate correlation between MIDD and disposition to produce breakthroughs was also positive and significant ($r = 0.56$; $p < 0.01$). Disattenuated correlation coefficients, which are estimated using the reliability coefficients of instruments, are corrected for measurement error.

Transformational Leadership. A five-item instrument was employed to measure the difference in transformational leadership across firms. The use of these five items in the highly regarded Multifactor Leadership Questionnaire (Avolio et al., 1999; Bass and Avolio, 1997) and other work (e.g., Piccolo and Colquitt, 2006; Hammedi et al., 2013) attests to their validity for tapping into the construct domain. The items centered on the leader's actions to: (i) engage people with a clear vision; (ii) stimulate people to tackle old problems in new ways; (iii) encourage people to see environmental changes as opportunities; (iv) prioritize the interests of employees; and (v) praise employees for their work. In line with earlier research, the items were formulated and anchored to fit the study's context of data collection from single informants and the desire to use a consistent response format throughout the survey (Piccolo and Colquitt, 2006; Hammedi et al., 2013). Cronbach's reliability coefficient for the five-item scale was 0.73.

Centralization. Based on the classic work of Hage and Aiken (1967), a three-item instrument was used to measure the extent of centralization: (i) there is little that can be done without top-down approval; (ii) employees must seek the consent of their manager before taking action; and (iii) most decisions must have official sanction. Cronbach's reliability coefficient was 0.83.

Formalization. Based again on the research of Hage and Aiken (1967), three-items were used to assess the extent of formalization: (i) the rules of our organization cannot be broken; (ii)

deviations from standard practices are not accepted in our company; and (iii) people introducing unfruitful work suggestions are penalized. Cronbach's reliability coefficient was 0.70.

Breakthrough Innovations. To measure a firm's disposition to produce breakthrough innovations, a three-item instrument was used: (i) we are involved with products/services that are completely novel; (ii) our company is zealous about innovative offerings; and (iii) we are focused on new product-market combinations. Cronbach's reliability coefficient was 0.74. In addition, as part of a follow-up survey in January 2016, data was also collected on actual breakthroughs from a sub-sample of the original sample. This data allowed ancillary analysis to examine the time-lagged effect of MIDD on actual breakthroughs mediated by the disposition to produce breakthroughs. The analysis and results are reported in the Supplementary Analysis section.

Control Variables. The effects of several variables connected to firms' external and internal context were controlled. First, environmental dynamism was controlled for because this could affect the variation observed in the disposition to produce breakthroughs. A three-item instrument was used that captures the degree of change in the environment (Dess and Beard, 1984): (i) changes in our market are very intense; (ii) customers in our market frequently ask for new products/services; and (iii) in a year, nothing has changed in our market (reverse scored). Cronbach's alpha was 0.74. A possible industry effect was also controlled for by including dummy variables to account for the fourteen industries in the sample. Also, the effects of firm size (in terms of the number of full-time employees) and firm age (in terms of the number of years since a company's founding) were controlled for. Moreover, potential effects of firms' R&D investments and investments in employee training were controlled for. Lastly, because the sample included

subsidiary firms whose parents were headquartered in fifteen different countries, fourteen dummy variables were included to control for the effect of the parent company's home country on the disposition to produce breakthroughs.

Analysis and Results

Table 1 shows the descriptive statistics and pairwise correlations. An inspection of the summary statistics indicates there is considerable variation in the variables, which bodes well for testing the theoretical predictions. Table 2 shows the results of the regression analyses for the three models that were estimated. While Model 1 is the baseline model, which includes only the environmental and firm-level control variables, Model 2 contains the controls as well as the main effects, and Model 3 is the full model incorporating the main and interaction effects. To guard against multicollinearity, the variance inflation factor (VIF) scores were inspected. These were well below the recommended norm of 10. As the effect of control variables on the dependent variable does not change appreciably between Models 1 and 2, we focus our attention on the latter model.

In line with what one would expect, both R&D investments and environmental dynamism have a significant positive relationship with disposition to produce breakthroughs. Contrary to intuition, though, training investments have a significant negative relationship. It is also notable that firm size and age show no significant relationship with disposition to produce breakthroughs, indicating that, in this study's sample, arguments regarding the inertia of larger and older firms do not find support. Model 2 also indicates that while transformational leadership has a significant positive relationship with the dependent variable, centralization and formalization do not. Most importantly for this study, supporting Hypothesis 1, a significant positive relationship can be observed between MIDD and the disposition to produce breakthroughs ($\beta = 0.11$; $p < 0.01$).

------PLACE TABLE 1 AND TABLE 2 ABOUT HERE ------

As regards moderation effects, Model 3 indicates that the coefficient of the interaction term for MIDD and transformational leadership is positive and significant ($\beta = 0.08$, $p < 0.01$). This result supports Hypothesis 2. Further, in support of Hypothesis 3, the coefficient of the interaction term for MIDD and centralization is negative and significant ($\beta = -0.08$, $p < 0.05$). The relationship between MIDD and disposition to produce breakthroughs indeed appears to weaken with a more centralized structure. Lastly, the interaction term for MIDD and formalization is positive and significant ($\beta = 0.13$, $p < 0.05$). As Hypothesis 4 had forecasted a negative moderation, this hypothesis is not supported. We reflect on this in the concluding discussion. Figures 1, 2, and 3 depict the three moderation effects. The graphs are based on unstandardized regression coefficients, and low and high levels of the variables are represented by values one standard deviation (s.d.) below the mean and above the mean respectively (Aiken and West, 1991). As an illustration of the magnitude of the effects, a one s.d. increase in MIDD leads to an increase of 0.13 in the dependent variable, which amounts to about one-sixth of the dependent variable's s.d. The effect becomes as large as one-fourth when transformational leadership is at a high value of one s.d. above the mean, and it becomes almost one-third when formalization is one s.d. above the mean. Conversely, the effect just about vanishes when centralization is one s.d. above the mean.

------PLACE FIGURES 1, 2, & 3 ABOUT HERE ------

Supplementary Analysis

In January 2016, additional data was gathered through a follow-up survey among those who had participated in the initial survey. The new data collection was undertaken with a view to validating

further the measurement instrument for MIDD and to examining the time-lagged effect of MIDD on actual breakthroughs. For this survey, a cover letter and a short one-page questionnaire was e-mailed to targeted respondents, and a reminder was sent one week after the initial e-mailing. In all, 88 completed surveys were received, implying a 17% response rate. A comparison of the responding and non-responding firms did not show any significant difference in relation to the study's variables. The analysis of this data and a discussion of the findings follows.

Validation of the MIDD Instrument

To verify the MIDD instrument's validity, responses were solicited to allow the estimation of a content validation index (CVI). The CVI has been used in fields as diverse as health (Polit et al., 2007) and management sciences (Sirén et al., 2012) to ascertain whether items supposed to measure a construct do in fact correspond with the construct's definition. CVI is estimated by asking experts to assess the fit of an item on a four-point scale, where 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. The fit scores can be used to calculate an item CVI by adding up all scores at levels 3 and 4 of the scale and dividing the sum by the number of experts. In the survey, we asked respondents to use the four-point scale described above to rate the relevance of each item in the MIDD instrument for measuring MIDD. These ratings led to CVI estimates of 0.82, 0.83, and 0.83 for the items, with an average of 0.83 for the three items together. Because the CVI estimates are above the recommended threshold of 0.80, the items can be considered suitable for operationalizing MIDD.

MIDD and Breakthrough Innovations

Respondents were also asked to indicate how many breakthrough innovations had been introduced in the two-year period following the year of initial data collection. With an eye to measurement

validity and reliability, the following definition of breakthrough innovations was included in the follow-up survey: “Breakthrough innovations are novel products that either serve a market need that was not being served previously by the company, or serve a market need better with a solution fundamentally different from the firm’s earlier products. Please note that we regard improvements in existing products, which serve to improve their functionality and market value, as incremental innovations and not as breakthrough innovations”. In order to crosscheck the quantitative data obtained through the follow-up survey, post-survey interviews were carried out with fifteen of the respondents. Interviewees were asked to identify the specific breakthrough innovations their company had introduced and to clarify why these could be viewed as breakthroughs for their company. In all cases, the qualitative information from interviewees substantiated the quantitative tally of breakthrough innovations[2].

In line with theoretical intuition, and supporting the results of the cross-sectional analysis reported above, there was a significant positive correlation between the disposition to produce breakthroughs and the number of actual breakthroughs ($r = 0.36$, $p < 0.01$). Moreover, a significant positive correlation was observed between MIDD and the number of actual breakthroughs ($r = 0.22$, $p < 0.05$), hinting at a possible causal effect of the former on the latter. To examine these relationships further, a moderated mediation analysis was conducted, which is gaining traction as a sophisticated technique for modeling an explanatory variable’s (e.g., MIDD) indirect effect on a dependent variable (e.g., actual breakthroughs) through a mediating variable (e.g., disposition to produce breakthroughs), when the effect of the explanatory variable on the mediating variable is moderated by other variables (e.g., transformational leadership and structure). Effectively, in order to examine MIDD’s longitudinal effect, the model theorized and analyzed above was expanded by

specifying disposition to produce breakthroughs as a mediating variable and actual breakthroughs as the dependent variable.

The procedure suggested by Preacher and Hayes (2004) was followed for the moderated mediation analysis. In particular, the MODMED SPSS macro was used for model estimation. Based on 5,000 bootstrap samples and 95% confidence intervals that were bias-corrected, the estimation results showed a significant indirect effect of MIDD on actual breakthroughs via the disposition to produce breakthroughs: effect size = 0.05; s.e. = 0.03; 95% confidence interval = 0.009 – 0.134. Thus, in addition to the theory-consistent association found in cross-sectional data between MIDD and the disposition to produce breakthroughs, it would appear that MIDD, via disposition, also has effect on actual breakthroughs over time. This finding provides support for the theoretical model presented in this article, underscoring the relevance of MIDD for breakthrough innovations.

Discussion

Breakthrough innovation by established firms is an intriguing phenomenon – one which seems harder to explain than to argue away from different theoretical angles. Research on the topic has often assigned differences in incumbents' disposition and ability to produce breakthroughs to differences in their propensity for nonlocal search and their capabilities for intra-firm knowledge integration (e.g., Ahuja and Lampert, 2001; Carnabuci and Operti, 2013). In a departure from previous inquiries, this article proposes a new theoretical model that centers on the idea of managerial identity-dissemination discourse (MIDD). The model suggests that by framing a company in terms of identity-embodying values, MIDD deters an understanding of the firm in terms of and limited to the firm's visible product-market scope. Instead, MIDD allows the firm to

be viewed as an idea that can be expressed in different ways through novel product-market combinations. MIDD thus sparks and synchronizes creativity and knowledge exchange, the upshot of which is a greater disposition to look for and explore opportunities that take the firm beyond its earlier product-market scope.

In addition, the model suggests that MIDD's effect should be moderated by leadership style and organization structure, situational factors that have a bearing on the room, motivation and incentive that people have for nonlocal search and for knowledge exchange across organizational boundaries. Cross-sectional data provides support for the model. As predicted, a positive relationship was observed between MIDD and the disposition to produce breakthroughs. Also, transformational leadership was found to strengthen the effect of MIDD, whereas centralization was found to weaken it. Contrary to what was expected, however, formalization appeared to strengthen the effect of MIDD. This finding suggests that identity discourse is translated more easily into breakthroughs when there is a formalized administrative infrastructure, which may play a helpful role by throwing into sharp relief both the goals of the company and the roles and responsibilities of those entrusted with pursuing them. Besides, by buffering differentiated units from excessive external information and interventions, formalization may reduce uncertainty and afford a safe space for experimentation, plausibly boosting MIDD's effect. Moreover, by enabling the integration of discrete specialized units, formalization may reinforce MIDD's effect through improved knowledge exchange within the organization.

Theoretical Implications

This article makes a fundamental contribution to understanding of why breakthrough innovations are possible in established firms despite the firms' experiential baggage, and why some incumbent

firms are better at such innovation than others. In making this contribution, the article shifts scholarly attention to the realm of a cognitive explanation, while complementing the focus of earlier research on behavioral (e.g., Ahuja and Lampert, 2001) and structural (e.g., O'Connor and Rice, 2001) explanations. While nonlocal search and learning, as well as structural arrangements, are surely vital for a firm to gain new knowledge and to recombine knowledge elements into novel solutions, this research brings out the deeper, coordinating role of interpretive frameworks with which organization members make sense of their company. The interpretation of a company conveyed through MIDD, in which the entity is presented to its members as a set of distinctive identity-embodying values, can motivate and coordinate both nonlocal search and knowledge recombination by sparking people's creative imagination – by revealing the firm as an idea that can take fresh forms, and not simply a product-market combination that could be refined.

MIDD as the catalyst for breakthroughs is a thesis that makes the power of discourse conspicuous – discourse enables the reconstitution of a firm by rendering cognitive, behavioral, and structural elements derived from experience a less potent inertial-mix. While a sizeable literature on identity formation at the level of organizations (e.g., Clegg, Rhodes, and Kornberger, 2007), groups of organizations (e.g., Wry, Lounsbury, and Glynn, 2011), and market categories (e.g., Khaire and Wadhwani, 2010) underlines the importance of discourse for building of meaning, legitimacy, and value, this study's analysis of managerial discourse as providing a spur for novel product-market solutions is new. Further, while research is also emerging on how discourse and related rhetorical devices such as metaphors and narratives build mental frames that enable coordination of those involved in innovation projects (e.g., Seidel and O'Mahony, 2014), this work has not explored the value of identity-centered discourse at the organizational level. In

this regard, insight into MIDD as the orchestrating force behind breakthroughs and, by extension, path-breaking adaptive change, extends the range of organizational phenomena that a discourse lens can help understand.

Furthermore, the conceptualization of MIDD as sense-giving narrative, which interpretively constitutes a firm to promote internal coherency and coordination, and which allows for the firm's reconstitution – as stakeholder expectations evolve – through a reframing of its identity, buttresses and expands the view that narratives can balance conflicting forces for change and consistency (Bartel and Garud, 2009). Overall, the article advances understanding of organizing for breakthrough innovations. In relation to the Special Issue's call for investigating whether and under what conditions the guiding principles that have proven successful in the organization of science as an enterprise could be transposed to the corporate world, the article offers valuable insights. It highlights that the organization of scientific research in institutions such as universities, medical schools, and research centers (Stephan, 2012; Whitley, 2000) differs in important ways from R&D and innovation in business enterprises: whereas teams of scientists working on projects usually have considerable latitude in defining goals and following lines of inquiry that extend and leverage scientific knowledge, innovative endeavor in companies is very much mentally channeled and bounded by people's understanding of their firm's identity. Unlike scientific projects, therefore, creativity and innovation in firms are mentally located in an interpretive schema of the firm's essence (cf. Kogut and Zander 1996). This has implications for whether the organizing principles that have worked in the case of science would work similarly in the corporate realm.

Practical Implications

Against the backdrop of the above discussion, consider the record of major scientific discoveries

by well-funded multi-disciplinary teams of scientists with decisional autonomy (Stephan, 2012). This article indicates that, in a corporate context, the basic tenet of having multi-disciplinary teams made up of specialists from different functions is likely to yield dividend when it is reinforced with managerial sense-giving that frames the firm as a bundle of identity-embodying values. In particular, MIDD can engender space and autonomy for multi-disciplinary teams to pursue novel product-market avenues because it underscores the firm's amorphous identity or essence as the reference point for delineating the firm's scope. In the absence of MIDD, when a multi-functional team's sense of the core purpose and activity of the firm is derived from and constituted by its tangible product-market scope, incremental advances are more likely than path-breaking innovations. In addition to multi-functional teams, the effective coordination of knowledge from people in different technical and customer-facing domains and in different geographical locations can influence innovation in firms. While the use of advanced information and communication technologies (ICT) has aided knowledge coordination greatly in the context of scientific projects, ICT investments should bear more fruit in companies when they occur alongside an emphasis on MIDD – for in a corporate context, the difficulties of coordinating dispersed knowledge may not be resolved by using ICT-enabled information storage and retrieval alone.

Despite sophisticated ICT, interpretive and political barriers in companies can impede communication and cooperation, and thus knowledge assimilation (Carlile, 2004). MIDD's provision of an identity schema to the collective can be invaluable in this regard because of its motivational effect. It fuels trust and cooperation because of shared identification with the schema. It also affords essential common-ground understanding of the firm's quintessence, which can render ICT more effective by giving people a framework for guiding the identification, storing,

and sharing of relevant ideas and information, and assessment of each other's specialized knowledge (cf. Carlile, 2004; Cramton, 2001). One message to come from this study then is that in organizing for breakthroughs innovations, the use of advanced ICT may be especially valuable if there is also a focus on spreading a values-centered understanding of the firm. More broadly, the study hints that, in companies, the effectiveness of human-resource practices that have worked in the case of science may depend on MIDD. For example, the socialization of personnel should have greater effect if interpersonal exchange takes place against the backdrop of a shared interpretation of the firm that enables knowledge-sharing and integration. Further, inasmuch as a shared perspective enhances intrinsic motivation, MIDD can incentivize creative experimentation and knowledge transfer (see also Osterloh and Frey, 2000) to facilitate the realization of breakthroughs.

Following on from the points above, for practitioners who are interested in how to organize for breakthrough innovations, this article suggests that it is important to recognize the benefits of discourse related to the values that embody the company's identity. Such discourse can impart to the workforce a deeper sense of the company – one which reveals the company to be more than just a combination of specific products and markets. A collective interpretation of the company as a nexus of distinctive values can prod the mind to envision novel products and services that would express the company's essence, and it can fuel exchange and recombination of knowledge, thus setting the stage for breakthroughs that redefine the firm's product-market domain. Additionally, articulating the company's essence in terms of values should create an opportunity for managerial reflection and dialogue regarding values that enjoy social legitimacy. This can be important for the framing of the company and its reconstitution in a fluid world in which stakeholder expectations are also constantly in flux. In an interesting parallel to the view that successful entrepreneurs are

masters of discourse and storytelling (Smith and Anderson, 2004), the present research suggests that breakthroughs in established firms may reflect a managerial cadre masterful at identity-centered discourse.

Limitations and Opportunities for Future Research

This study is subject to the limitations of cross-sectional research design. In particular, because the results are based on contemporaneous measurement of variables, they need to be interpreted with caution. As MIDD's effect can be expected to emerge after an interval, it would be good to verify the current findings using longitudinal data. It needs to be added, though, that supplementary analysis using data on actual breakthroughs provides ground for optimism regarding the theoretical model presented in the article. A time-lagged effect of MIDD on breakthrough innovations, which was mediated by the disposition to produce breakthrough innovations, was observed. While this result validates what theory would suggest, because time-lagged data for only a sub-sample of the respondent set was available, conclusive evidence must await future research. Thus, follow-up research which can show a time-lagged effect using other samples would be of great value. Such research could extend the model presented here and make additional contributions by studying MIDD's effect on variables such as the speed of producing breakthroughs – from idea to launch – and the commercial success of breakthroughs.

In relation to the reliance on the key-informant approach for data collection, measuring variables using data from multiple informants could have provided additional insights and confidence. Future researchers interested in a multiple-informant design would be well advised to carefully identify pools of comparable informants across companies, who are well informed in

relation to the study's variables. A further shortcoming of the present study is the use of only five items to operationalize transformational leadership. While a short instrument can be advantageous from the perspective of keeping questionnaire length in check (e.g., Hammedi et al., 2013), 20-item and 45-item instruments have been used in past work (e.g., Dvir et al., 2002) and may be less vulnerable to measurement error. In the light of this, pending further verification using a longer instrument such as the Multifactor Leadership Questionnaire (MLQ) form 5X (Avolio et al. 1999; Bass and Avolio, 1997), the present results regarding transformational leadership are best seen as tentative, rather than definitive.

Another limitation of this study is that while the relationship between MIDD and the disposition to produce breakthroughs was tested, the theoretical logic that was presented for the relationship was not. In the spirit of science as a collective knowledge-building enterprise, future research could take the present work forward by testing a mediation model in which MIDD affects the disposition to produce breakthroughs by stimulating nonlocal search and facilitating knowledge integration. Separately, in examining the moderating effect of organization structure, focus was solely on centralization and formalization. Therefore, an opening exists for studying the influence of other structural elements and mechanisms – for example, professionalization and specialization, loose-tight coupling among units, the nature of informal networks, and the presence of dedicated innovation hubs and teams. More generally, future work could expand the model developed here by investigating the impact of additional variables. While attention was focused on the conditioning influence of agency (in the form of leadership style) and structure (by way of centralization and formalization) in this first examination of the effect of MIDD, many other exciting research possibilities can be envisaged. We hope that this study will encourage further inquiry into a phenomenon of great organizational, economic and social significance.

[1] The argument here has centered on MIDD having an effect because it gives a framework to the workforce to interpret the firm in terms of the values that embody the firm's essence. It is suggested that such a framework, rather than an understanding of the firm as a product-market combination, is more likely to contribute to the disposition to produce breakthroughs by stimulating nonlocal search and facilitating knowledge integration. The article does not delve into the issue of whether there are frames/values that would stimulate breakthroughs more/less. While beyond the scope of this study, the issue is nevertheless an intriguing one. Examining this issue in future work could potentially lead to a more refined understanding of, for example, the relative effect on breakthroughs of identity-dissemination discourse and of specific values that feature in that discourse.

[2] To illustrate, Tekton (pseudonym), a company in the construction industry, reported two breakthrough innovations. One of these was the launch of a revolutionary new eco-friendly product in the form of a top-layer for asphalt roads, capable of significantly reducing noise levels as well as road aging. Tekton's second breakthrough was the launch of plastic floors for non-public spaces, which because of major differences in technology, manufacturing processes, and markets served, marked a radical departure from its business of asphalt products for public roads. As another example, Agrotis (pseudonym), a farm equipment and management firm, introduced a barn ventilation system to reduce emissions of ammonia and dust. The radical newness of the system's architecture of sophisticated air scrubbers and exhaust channels rendered it a more effective alternative to earlier solutions on the market. Agrotis also developed an improved automated system for identifying livestock. Consistent with the definition supplied to respondents, this was treated as an incremental innovation because the new system was merely an upgraded version of an existing product, not a fundamentally new solution.

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Table 1. Descriptive Statistics and Correlations

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1	Breakthrough innovations (disposition to produce)	.03	.86	-									
2	Firm size	921.31	5087.37	.07	-								
3	Firm age	55.15	49.32	.01	.12**	-							
4	R&D investments	4.62	8.39	.19***	-.03	-.06	-						
5	Training investments	2.10	2.80	.01	-.03	-.10*	.17***	-					
6	Environmental dynamism	-.03	.83	.36***	.04	.04	.12**	.06	-				
7	Formalization	-.05	.78	-.15***	.13**	.05	-.07	-.02	-.19***	-			
8	Centralization	.00	.89	-.11	.16***	.05	-.02	-.05	-.11**	.47***	-		
9	Transformational leadership	.00	.83	.28***	-.02	.05	.08	.00	.22***	-.32***	-.26***	-	
10	Managerial identity-dissemination discourse (MIDD)	.03	.84	.20***	-.01	-.04	.02	.02	.09*	-.18***	-.28***	.38***	-

N = 499. * p < .05: ** p < .01; *** p < .001.

Table 2.

Regression Results for Effect of MIDD on Disposition to Produce Breakthrough Innovations

	Model 1	Model 2	Model 3
Controls			
Constant	.08	.07	.03
Firm size	.00	.00	.00
Firm age	.00	.00	.00
R&D investments	.02***	.02***	.02***
Training investments	-.01**	-.01**	-.01**
Industry dummies	Included in the regression analysis but not reported for ease of reading		
Headquarters' location dummies	Included in the regression analysis but not reported for ease of reading		
Environmental dynamism	.34***	.29***	.29***
Main effect			
Transformational leadership		.16***	.16***
Centralization		-.03	-.03
Formalization		-.03	-.02
MIDD		.11***	.13***
Moderating effects			
MIDD*Transformational leadership			.08**
MIDD*Centralization			-.08*
MIDD*Formalization			.13*
Adjusted R^2	.14	.19	.20
Δ adjusted R^2	-	.05	.01
Δ F	-	37.04***	14.19***

N = 499. * p < .05: ** p < .01; *** p < .001.

Figure 1.

Moderating Effect of Transformational Leadership

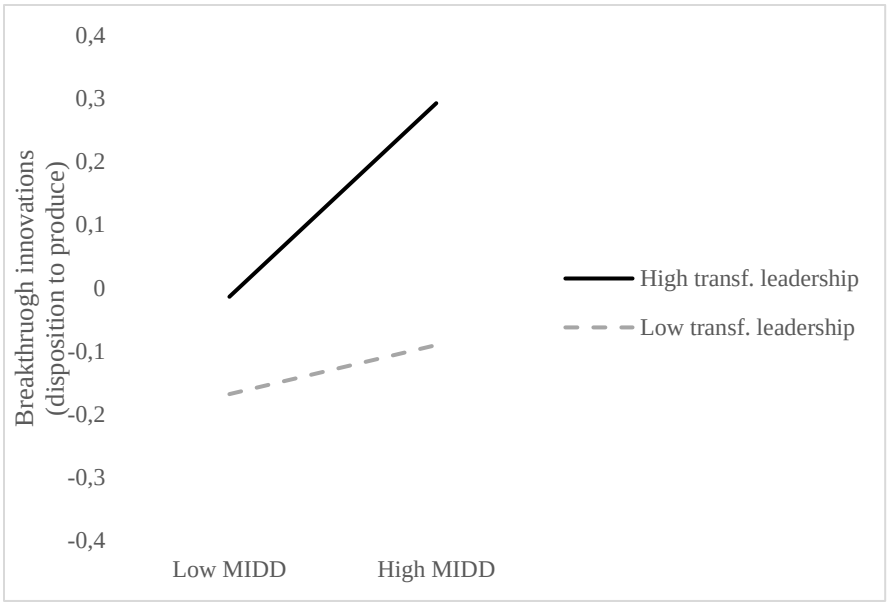

Figure 2.

Moderating Effect of Centralization

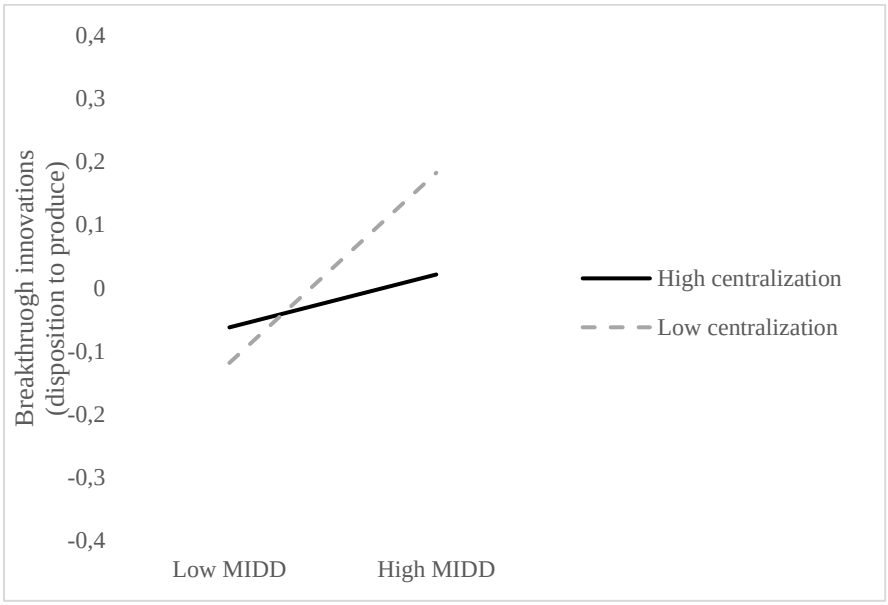

Figure 3.

Moderating Effect of Formalization