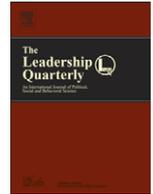


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## Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism

Justin J.P. Jansen <sup>a,\*</sup>, Dusya Vera <sup>b,1</sup>, Mary Crossan <sup>c,2</sup><sup>a</sup> Rotterdam School of Management, Erasmus University, Burg. Oudlaan 15, Room T7-32, 3062 PA Rotterdam, The Netherlands<sup>b</sup> C.T. Bauer College of Business, University of Houston, Houston, TX 77204-6021, USA<sup>c</sup> Richard Ivey School of Business, The University of Western Ontario, London, Ontario, Canada N6A 3K7

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### ABSTRACT

This study advances prior theoretical research by linking transformational and transactional behaviors of strategic leaders to two critical outputs of organizational learning: exploratory and exploitative innovation. Findings indicate that transformational leadership behaviors contribute significantly to adopting generative thinking and pursuing exploratory innovation. Transactional leadership behaviors, on the other hand, facilitate improving and extending existing knowledge and are associated with exploitative innovation. In addition, we argue that environmental dynamism needs to be taken into account to fully understand the effectiveness of strategic leaders. Our study provides new insights that misfits rather than fits between leadership behaviors and innovative outcomes matter in dynamic environments. Hence, we contribute to the debate on the role of strategic leaders in managing exploration and exploitation, not only by examining how specific leadership behaviors impact innovative outcomes, but also by revealing how the impact of leadership is contingent upon dynamic environmental conditions.

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Researchers have argued that sustained organizational performance is rooted in exploiting existing competences and exploring new opportunities (He & Wong, 2004; Gibson & Birkinshaw, 2004). The notion of exploration and exploitation (March, 1991) or exploratory and exploitative innovation (Benner & Tushman, 2003) has increasingly come to dominate theories on organizational learning, technological innovation, and organizational adaptation (e.g., Benner & Tushman, 2003; Holmqvist, 2004; Lee, Lee, & Lee, 2003). Organizations that engage in exploratory innovation pursue new knowledge and develop products and services for emerging customers and markets. Organizations pursuing exploitative innovation, on the other hand, build on existing knowledge resources and extend existing products and services for current markets (Benner & Tushman, 2003; Jansen, Van den Bosch, & Volberda, 2006).

Although the importance of strategic leadership in pursuing exploration and exploitation has often been highlighted (i.e. Tushman & O'Reilly, 1996; Smith & Tushman, 2005), the specific means through which leaders influence organizational learning and innovation are still under-developed (Berson, Nemanich, Waldman, Galvin, & Keller, 2006). We contribute to this emergent dialogue in two ways. First, there is little systematic evidence of how transformational and transactional leadership (Bass, 1985, 1998) affect exploratory and exploitative innovation at the organizational level (Berson et al., 2006). Though studies are beginning to come to light (i.e. Waldman, Siegel, & Javidan, 2006), Yukl (1999) evaluated the conceptual weaknesses of transformational and charismatic leadership theories and noted that insufficient attention has been given to organizational processes. Similarly, although previous research has asserted that leadership may differentially affect both types of learning (e.g. Vera & Crossan, 2004), empirical studies examining such relationships

\* Corresponding author. Tel.: +31 10 408 97 82.

E-mail addresses: [jjansen@rsm.nl](mailto:jjansen@rsm.nl) (J.J.P. Jansen), [dvera@uh.edu](mailto:dvera@uh.edu) (D. Vera), [mcrossan@ivey.uwo.ca](mailto:mcrossan@ivey.uwo.ca) (M. Crossan).<sup>1</sup> Tel.: +1 713 743 4677.<sup>2</sup> Tel.: +1 519 661 3217.

are sparse. While some evidence exists at the individual- and team-level of analysis (e.g. Pirola-Merlo, Härtel, Mann, & Hirst, 2002), the impact of strategic leadership on organizational learning and innovation is still unclear (Hambrick and Mason, 1984). Moreover, prior research has tended to focus on the more creative processes of exploration and radical innovation, thereby ignoring exploitation and incremental innovation and underestimating the organizational challenge of replicating and refining learning, and making existing knowledge sources accessible and applicable (Berson et al., 2006; Hannah and Lester, 2009–this issue). By addressing these gaps, this study provides new theoretical and empirical insights linking strategic leadership to exploratory and exploitative innovation at the firm level.

Second, we consider the potential moderating effect of environmental dynamism on the effectiveness of leadership behaviors in relation to organizational learning and innovation. Ensley, Pearce, & Hmieleski (2006) found that the effectiveness of transformational and transactional behaviors on new venture performance varies with levels of environmental dynamism. In addition, Waldman, Ramirez, House, & Puraman (2001) showed how the impact of transactional and charismatic leadership on firm performance is contingent upon perceived environmental uncertainty and volatility. Less well documented is the contingency perspective we propose, which underscores the effectiveness of transformational and transactional leadership to pursuing exploratory and exploitative innovation under different contextual conditions.

Drawing from theories of leadership, organizational learning and innovation, this study finds that different leadership behaviors are necessary to support exploratory and exploitative innovation and that *misfits* rather than *fits* between leadership style and innovative outcomes matter in dynamic environments. Through this richer explanation and empirical assessment, we contribute to greater clarity of how strategic leaders may contribute to successfully developing exploratory and exploitative innovation. In the next section, we present the literature review and hypotheses. After describing our research method, we present the empirical findings using data from 305 senior team members and 89 executive directors at autonomous branches of a financial services firm. We conclude with a discussion of the results, implications, and issues for future research.

## 1. Strategic leadership and organizational learning

Research on strategic leadership focuses on executives who have overall responsibility for an organization (Hambrick & Mason, 1984), based on the principle that “ultimately, they account for what happens to the organization” (Hambrick, 1989, p.5). In its origins transformational leadership was primarily focused on the micro-level relationship between leaders and their immediate followers. It is relatively recently that Bass's (1985, 1998) framework of transformational and transactional leadership (T/T leadership) behaviors has been used to describe top executives (e.g., Elenkov, Judge, & Wright, 2005; Ensley, Hmieleski, & Pearce, 2006; Jung, Chow, & Wu, 2003; Waldman et al., 2006; Zhu, Chew, & Spangler, 2005) and extended to address organizational-level variables such as structure, culture, learning, and innovation (e.g., Elenkov et al., 2005; Pawar & Eastman, 1997; Vera & Crossan, 2004).

Transformational leadership embodies four dimensions: intellectual stimulation, individualized consideration, idealized influence, and inspirational motivation (Avolio, Bass, & Jung, 1999). Intellectual stimulation is defined as the degree to which leaders stimulate their followers' effort to be innovative and creative by questioning assumptions, reframing problems, and approaching old situations in new ways (Bass, Avolio, Jung, & Berson, 2003). Individualized consideration captures the degree to which leaders pay attention to each individual's need for achievement and growth by acting as a coach or mentor. Idealized influence represents the degree to which leaders are admired, respected, and trusted. This dimension includes charismatic behavior that causes followers to identify with the leader. Inspirational motivation is defined as the degree to which leaders articulate an appealing vision and behave in ways that motivate those around them by providing meaning and challenge to their followers' work (Bass et al., 2003). In the case of transactional leadership, it embodies two behaviors: contingent reward and active management by exception. Through contingent reward, transactional leadership clarifies to followers what the follower needs to do to be rewarded for the effort. Through active management by exception, leaders monitor the followers' performance and take remedial actions when needed (Avolio et al., 1999).

In their theoretical work, Vera & Crossan (2004) linked the T/T leadership style of top managers to the learning elements incorporated in the 4I framework of organizational learning proposed by Crossan, Lane, & White (1999). The 4I framework consists of four learning processes (intuiting, interpreting, integrating and institutionalizing) across three levels (individual, group and organization). Mintzberg, Ahlstrand, & Lampel (1998, p. 212) summarize the learning processes embedded in the 4I framework as follows:

*Intuiting* is a subconscious process that occurs at the level of the individual. It is the start of learning and must happen in a single mind. *Interpreting* then picks up on the conscious elements of this individual learning and shares it at the group level. *Integrating* follows to change collective understanding at the group level and bridges to the level of the whole organization. Finally, *institutionalizing* incorporates that learning across the organization by imbedding it in its systems, structures, routines, and practices.

The 4I framework also distinguishes between the stocks of learning at each level (individual, group and organization) and the flows of learning between levels (feed-forward from individuals and groups to the organization; feedback from the organization to groups and individuals) (Bontis, Crossan, & Hulland, 2002). The two learning flows highlight the tension between exploration and exploitation (Crossan & Berdrow, 2003), where exploration involves search, variation, risk taking, and experimentation and exploitation includes refinement, selection, efficiency, and execution (March, 1991).

Vera & Crossan's (2004) fundamental premise was that different leadership behaviors support different aspects of organizational learning. They proposed that transformational leadership would foster both feed-forward and feedback learning that challenged the current institutionalized learning, whereas transactional leadership would foster feed-forward and feedback learning that

<b>Feed-forward flow of learning</b>	Challenging institutionalized learning through processes moving from individuals to the group and the organization  e.g., new idea for new product originated in the front line	Reinforcing institutionalized learning through processes moving from individuals to the group and the organization  e.g., entrepreneur translating current ways of doing things into routines for the first time
	Challenging institutionalized learning through processes moving from the organization to groups and individuals  e.g., a top management team unilaterally implementing changes in strategy	Reinforcing institutionalized learning through processes moving from the organization to groups and individuals  e.g., capturing current ways of doing things in information systems
<b>Feedback flow of learning</b>	<b>Exploration</b>	<b>Exploitation</b>

Fig. 1. Relationships among learning processes.

reinforced the current institutionalized learning. In their conceptualization, Vera & Crossan (2004) did not, however, explicitly connect T/T leadership behaviors to learning outcomes such as exploratory and exploitative innovation (Benner & Tushman, 2003; March, 1991). Although it is tempting to equate exploration with the feed-forward learning processes and exploitation with feedback processes, Vera & Crossan (2004) point out that both the feed-forward and the feedback learning flows include cases in which current learning is challenged and cases in which current learning is institutionalized. For example, as illustrated in Fig. 1, when entrepreneurial firms put routines into place for the first time, the feed-forward processes of learning (moving from intuiting, interpreting, integrating to institutionalizing) reinforces current learning and current ways of doing things and as such will be more consistent with exploitation. In contrast, a top management team who “learns” that the organization needs a radical change and unilaterally institutionalizes that learning in the form of new structures, reward systems, and strategies will indeed impact the feedback flow of learning through radical changes usually associated with exploration.

## 2. Hypotheses

We build on March (1991) logic to argue that both exploratory and exploitative innovation involve organizational learning. Exploratory innovations require new knowledge or departure from existing knowledge sources and involve the “experimentation with new alternatives [that produce] returns [that] are uncertain, distant, and often negative” (March, 1991, p. 85). They offer new designs, create new markets, and develop new channels of distribution (Abernathy & Clark, 1985; Jansen et al., 2006). Exploitative innovations broaden existing knowledge and skills and are associated with the “refinement and extension of existing competences, technologies, and paradigms [that produce] returns [that] are positive, proximate, and predictable” (March, 1991, p. 85). They improve established designs, expand existing products and services, and increase the efficiency of existing distribution channels (Abernathy & Clark, 1985; Jansen et al., 2006). Consistent with prior discussion about the multi-level processes of organizational learning, we link leadership behavior and organizational learning to innovation by proposing that feed-forward and feedback flows of learning that challenge institutionalized learning will lead to exploratory innovation, whereas feed-forward and feedback flows of learning that reinforce institutionalized learning will lead to exploitative innovation. In order to support exploration and exploitation innovation strategic leaders need to manage a rich combination of multi-level learning processes.

The basic assumption of our conceptual model in Fig. 2 is that top managers can support exploratory and exploitative innovations by displaying behavioral repertoires that foster consistency, stability, and control, as well as passion, risk-taking, and creativity (Denison, Hooijberg, & Quinn, 1995; Gibson & Birkinshaw, 2004; Vera & Crossan, 2004). That is, strategic leaders with the ability to engage in transformational or transactional behaviors, depending on the specific innovation needs, are able to shape individual behaviors in two ways. First, top managers exercise leadership directly through interpersonal interactions with immediate reports, who are likely to be members of the top management team (close leadership). Examples of this close leadership are CEOs promoting innovation by encouraging a strong sense of team identity, facilitating positive interpersonal relationships among executives, and promoting helping behaviors among managers (Pirola-Merlo et al., 2002). Second, top managers exercise leadership over organizational members at any level of the firm indirectly through cascading effects via middle

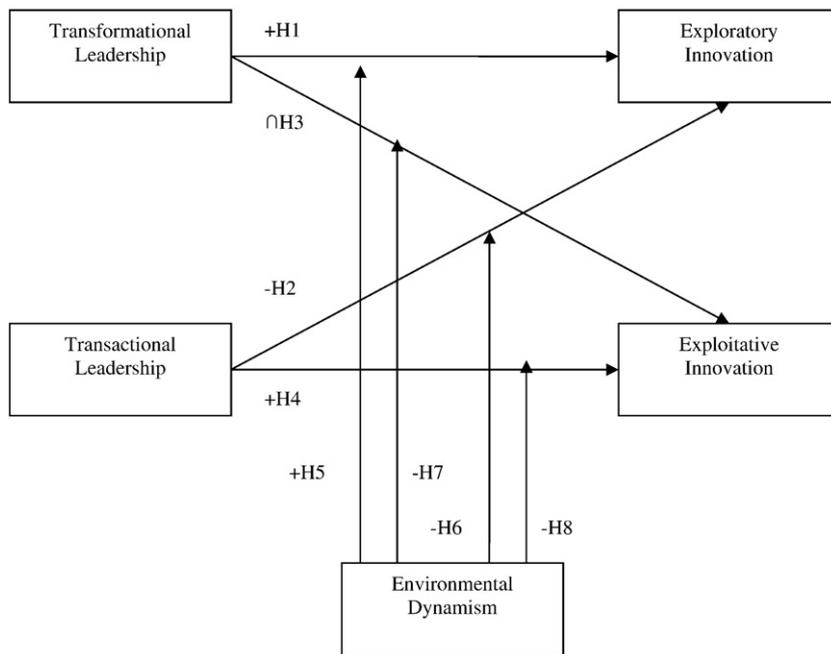


Fig. 2. Theoretical model.

and lower management's attributions of strategic leaders (distant leadership) (Bass, Waldman, Avolio, & Bebb, 1987; Waldman & Yammarino, 1999). In addition, top managers shape individual behavior through the systems and procedures they put into place (Jung et al., 2003).

### 2.1. Leadership for exploratory innovation

Exploratory innovations challenge institutionalized learning and are "intended to respond to, as well as drive, latent environmental trends by creating innovative technologies and new markets" (Lubatkin, Simsek, Ling, & Viega, 2006, p. 6). They result from activities focused on search, variation, flexibility, experimentation, and risk-taking (March, 1991).

Transformational leadership that challenges assumptions, takes risks, and inspires others, is ideally suited to exploratory innovations. Leaders with transformational behaviors promote exploratory innovation through feedback flows of learning because they are often effective communicators who can mobilize commitment to realize the potential of radical innovation (Vera & Crossan, 2004). Through idealized influence and inspirational motivation, transformational leadership provides ideological explanations that link individuals' identities to the collective identity. Transformational behaviors serve to engage individuals' self-concepts in the interest of the firm's mission (Jung et al., 2003; Shamir, House, & Arthur, 1993), and increase followers' intrinsic motivation to engage in exploratory innovation. These leaders support exploratory innovation through feed-forward flows of learning when they motivate organizational members to share their intuitive insights, question assumptions, be inquisitive, and come up with creative observations (Bass, 1998). By providing intellectual stimulation, transformational leadership encourages individuals to think "out of the box," look at problems from different angles, and adopt generative and exploratory thinking processes (Sosik, Avolio, & Kahai, 1997). Furthermore, by promoting and exhibiting these behaviors these leaders serve as role models and help cascade these behaviors to lower levels of management (Waldman & Yammarino, 1999). Leaders with transformational behaviors are also champions for innovation (Howell & Higgins, 1990), who recognize innovation ideas, identify with them as their own, and build energy for exploratory innovations throughout the organization. Hence,

**Hypothesis 1.** Transformational leadership behaviors will have a positive relationship with exploratory innovation.

In the case of transactional leadership behaviors, we expect that the leaders' focus on maintaining the status quo would be limiting and discouraging for organizational members when trying to initiate exploratory efforts for growth opportunities that depart from existing capabilities. Organizational members' interaction with these leaders is based on exchanges whereby individuals are explicitly rewarded and recognized for accomplishing agreed-upon objectives. In addition, leaders with transactional behaviors monitor individual and team performance to anticipate mistakes and take corrective action when needed (Howell & Avolio, 1993). This type of exchange relationship provides a context that is detrimental to learning processes underlying

exploratory innovation. Exploratory innovation is largely unpredictable and requires flexibility, opportunism, and adaptability (Caldwell & O'Reilly, 2003). Establishing rewards for short-term goals, however, inhibits creative debate, diversity of opinions, and experimentation. For example, exchange relationships based on performance pay can motivate individuals to focus on the achievement of specific objectives to the detriment of innovative and creative outcomes likely to promote longer-term performance (Shipton, Fay, West, Patterson, & Birdi, 2005). Furthermore, a focus on preventing mistakes may be counterproductive to the creation of an environment that team members perceive as interpersonally non-threatening and tolerant of, or even supportive of, taking risks and trying new approaches. Hence,

**Hypothesis 2.** Transactional leadership behaviors will have a negative relationship with exploratory innovation.

## 2.2. Leadership for exploitative innovation

Exploitative innovations reinforce current institutionalized learning and are intended to “respond to current environmental conditions by adapting existing technologies and further meeting the needs of existing customers” (Lubatkin et al., 2006, p. 6). They result from activities focused on refinement, production, efficiency, and execution. Repetition, replication, and incremental improvements in established practices and products result in both increased efficiency and proficiency in those activities (March, 1991).

While transformational leadership is particularly suited for exploratory innovation, it also plays a key role in the development of exploitative innovation. Leaders who do not exhibit transformational behaviors would be associated with a lack of motivation of organizational members throughout the organization to take initiative and pursue incremental innovations. A certain level of transformational leadership is therefore needed to promote incremental change captured in exploitative innovation because incremental innovations are most often introduced at middle or lower levels of management where there is more direct contact with customers and managers receive the feedback on a daily basis. In contrast, radical innovations are typically initiated and developed in units created for this purpose, such as new product development, R&D, and new ventures (Damanpour, 1991). Damanpour (1991) provides evidence of a stronger correlation between managerial attitude toward change and incremental innovation than between managerial attitude toward change and radical innovation. Leaders with moderate levels of transformational leadership provide the distant leadership that communicates to organizational members the need to refine current capabilities in existing domains and apply current knowledge. They facilitate the emergence of social networks that effectively combine and diffuse existing knowledge sources among organizational members (Hanna & Lester, 2009–this issue).

Although transformational leadership may facilitate the emergence of ideas for improvement, leaders exhibiting high levels of transformational behaviors would not be associated with efficiency and incremental improvements, but with facilitating radical new ideas. We expect, therefore, that high levels of transformational leadership with a focus on change would be dysfunctional and distracting when the goal is to exploit existing customer bases and technologies, and increase reliability. A moderate degree of top-level transformational leadership and directives to improve quality or cut costs is most effective to energize middle- and lower-level managers so that they design improved systems, carry them out, and redirect their staff's activities accordingly (Kanter, 2004). Hence,

**Hypothesis 3.** Transformational leadership behaviors will have an inverted-U relationship with exploitative innovation.

While incremental innovations are supported by some degree of visioning and championing from the part of the strategic leader, they are fundamentally associated with the contingent reward and management by exception behaviors of transactional leadership (e.g., establishing goals, expectations, standards, and rewards, and monitoring deviation from standards) guiding employees to think of refinements from existing products. Transactional leadership promotes exploitative innovation through feedback flows of learning by motivating organizational members to use and take advantage of existing learning stored in the firm's culture, structure, strategy, procedures, and systems (Vera & Crossan, 2004; Waldman et al., 2001). These leaders exercise a maintenance role; and reinforce existing strategies, focus on increasing efficiency in current practices, and communicate the benefits of incremental refinements to existing innovation trajectories. For the sake of efficiency and consistency, transactional leadership fosters rule-based ways of doing things (Bass, 1998), implementing routines that take advantage of past experiences when refreshing and refining existing innovations.

Transactional behaviors support exploitative innovation through feed-forward flows of learning when leaders reward individuals and groups for coming up with new ways to exploit current products, services, and markets and gain economies of scale and scope. Contingent reward and active management by exception behaviors provide the focus and discipline individuals need to concentrate on efficiency and to become consistently better at performing current routines. Incremental innovations do not require a context of risk-taking and tolerance for mistakes. In contrast, process management systems such as total quality management, six sigma, and ISO 9000 inform incremental learning (Benner & Tushman, 2003). These techniques focus on improving an organization's efficiency through high-level coordination of an organization's activities in a rationalized system of end-to-end processes. Contingent reward behaviors and active management by exception provide the focus for individuals to see improvements as controlled experiments that involve repetition and measurement prior to making small, testable changes (Benner & Tushman, 2003). Hence,

**Hypothesis 4.** Transactional leadership behaviors will have a positive relationship with exploitative innovation.

## 2.3. Moderating role of environmental dynamism

The role of the external environment on innovation and performance has been widely studied and acknowledged (e.g., Garg, Walters, & Priem, 2003; Khan & Manopichetwattana, 1989; Levinthal & March, 1993). Environmental dynamism describes the rate

of change and the unpredictability of change in a firm's external environment (Dess & Beard, 1984). Dynamic environments are characterized by changes in technologies, variations in customer preferences, and fluctuations in product demand or supply of materials (Jansen et al., 2006). Next, we provide arguments for how higher levels of environmental dynamism amplify the hypothesized relationships between T/T leadership and exploratory/exploitative innovation.

#### 2.4. Leadership, exploratory innovation and environmental dynamism

Environmental dynamism increases uncertainty and leads to organizational contexts characterized by stress, anxiety and risk (Waldman et al., 2001). Organizational members facing changing external conditions are more receptive to leader's behavior and style (Conger, 1999; Vera & Crossan, 2004), in particular to transformational and charismatic behaviors (House, Spangler, & Woycke, 1991; Pawar & Eastman, 1997; Waldman et al., 2001). In fact, Osborn, Hunt, & Jauch (2002) argue that transformational leadership will be most effective during crisis because traumatic situations activate the emotional centers of the brain—areas which are influenced by the vision and dreams that transformational behaviors inspire in individuals and teams. Leaders with transformational behaviors are also better able to recognize emotion accurately in others (Rubin, Munz, & Bommer, 2005); this ability is very helpful when organizational members experience change and anxiety. Transformational leadership encourages a strong sense of collective identity, facilitates positive interpersonal relationships, and helps create an affective climate in teams and minimize the impact of negative events (Pirola-Merlo et al., 2002). Leaders encourage individuals to view the changing environment as a source of opportunity. In this sense, turbulent environments allow transformational leadership greater latitude for discretion because leaders generate a collective feeling that radical change and exploratory innovations are necessary to deal with external changes.

In contrast, in stable environments individuals may perceive transformational leadership with its focus on challenging assumptions as distracting and superfluous. For example, Yukl (2002) mentions that transformational leadership implies a need for changes in the firm's strategy and culture, which may not be appropriate, and Harrison (1987) suggests that organizational members can be transformed to such a high level of emotional involvement that they can burn out. We expect individuals to be less receptive to transformational leadership in stable environments and less willing to follow its emphasis on radical innovation (House et al., 1991). As Ensley et al. (2006, p. 259) describe, "The same unconventional brilliance that saves the day during a crisis is likely to be interpreted as 'simply wacky' in a stable environment." Accordingly, we propose that environmental dynamism amplifies the positive relationship between transformational leadership and exploratory innovation.

**Hypothesis 5.** Transformational leadership will be highly related to exploratory innovation when the organization's environment is perceived as dynamic; conversely transformational leadership will be minimally related to exploratory innovation when the organization's environment is perceived as stable.

We also anticipate environmental dynamism to amplify the negative effect of transactional leadership on generating exploratory innovation. Transactional leadership will be limiting when the goal is to respond to changing environmental conditions with radical innovation because these leaders tend to be less engaging, choosing to monitor exchange relationships and maintaining the status quo rather than leading change (De Hoogh, Den Hartog, & Koopman, 2005). Organizational members are less likely to be receptive to leaders' transactional behavior when they are confronted with uncertain and changing technological developments or market demands. Hence,

**Hypothesis 6.** Transactional leadership behaviors will be negatively related to exploratory innovation when the organization's environment is perceived as dynamic; transactional leadership behaviors will be minimally related to exploratory innovation when the organization's environment is perceived as stable.

##### 2.4.1. Leadership, exploitative innovation and environmental dynamism

We also propose that environmental dynamism will moderate the effect of transformational and transactional leadership behaviors on pursuing exploitative innovation. We argued in hypothesis three that the overall relationship between transformational and exploitative innovation was curvilinear. The question remains, however, how does this relationship differ when the rate of change in the environment varies?

In dynamic environments, several forces interact at the same time. External conditions allow transformational leaders more latitude for discretion as they provide organizational members psychological comfort by reducing stress and anxiety (Waldman et al., 2001). Accordingly, transformational leadership behaviors are more influential in dynamic environments and may encourage middle and lower level managers to generate more ideas for incremental improvements. Dynamic environments also generate a collective feeling that something must be done to deal with external problems (Waldman & Yammarino, 1999). Thus, high levels of transformational leadership behaviors in dynamic environments will increasingly favor radical change and be detrimental to implementing exploitative innovation. Under highly uncertain and dynamic external conditions, employees at all levels will follow transformational leadership's natural orientation toward adaptation and change, thereby questioning existing products and services, and generating radical changes.

We expect the curvilinear relationship between transformational leadership and exploitative innovation to be representative of stable contexts. However, as environments become more dynamic, we anticipate that the relationship between transformational leadership and exploitative innovation will tend to become more linear and negative. Rapidly changing environments demand adaptation that will put pressure on leaders exhibiting transformational behaviors to motivate organizational members to pursue

exploratory rather than exploitative innovation. Accordingly, we argue that environmental dynamism will moderate the inverted U-shaped relationship between transformational leadership and exploitative innovation.

**Hypothesis 7.** Environmental dynamism will moderate the inverted U-shaped relationship between transformational leadership behaviors and exploitative innovation in such a way that in dynamic environments more transformational leadership behaviors will be associated with less exploitative innovation than less transformational leadership behaviors, while in stable environments, more transformational leadership will be associated with more exploitative innovation than less transformational leadership.

Although prior research has primarily emphasized the effectiveness of transformational leadership in dynamic environments (e.g. Waldman et al., 2001), previous studies have also argued for the appropriateness of transactional leadership under stable environmental conditions (i.e. De Hoogh et al., 2005). Stable environments are characterized by certainty, predictable and routine situations, and low levels of anxiety (Vera & Crossan, 2004). Organizational members perceive little ambiguity under such conditions and consider transactional leadership behaviors appropriate for implementing incremental changes to existing products and services. In environments that are characterized with low levels of change and uncertainty, transactional leaders are effective in clarifying expectations and procedures, and emphasizing the need for exploitative innovation and its associated rewards. Transactional behaviors can be used to leverage existing knowledge and send signals that enable continuous improvements to products and services under stable environmental conditions (Ensley et al., 2006). Conversely, in highly-dynamic environments, organizational members will perceive transactional leadership's emphasis on maintenance functions and on pursuing incremental innovations as unfitting with the need to adapt to rapidly-changing conditions. Hence,

**Hypothesis 8.** Transactional leadership behaviors will be minimally related to exploitative innovation when the organization's environment is perceived as dynamic; transactional leadership behaviors will be highly related to exploitative innovation when the organization's environment is perceived as stable.

### 3. Methods

#### 3.1. Setting and data collection

The empirical research was conducted at autonomous branches of a large European financial services firm with a broad range of financial services provided in various countries. The firm has more than \$350 billion in assets and ranks among the top 30 on the Fortune Global 500 in terms of total revenue in the banking industry. These branches are geographically distinct (not more than one branch within each city), autonomous decision entities with their own board of directors. Each branch has its own senior management team with budget responsibilities regarding several aspects of their operations such as pursuing exploratory and exploitative innovation. Branches provide a wide range of products and services for clients in their designated region that cover asset management, mortgages, loans and savings, insurance, leasing, equity participation, corporate banking, and investment banking. Moreover, they operate in markets with varying levels of dynamism and competitiveness—a condition required to observe branches pursuing different innovations (Han, Kim, & Srivastava, 1998).

To deal with potential problems associated with single-informant bias and common method bias, we separated the measurement of the independent and dependent variables and collected data through multiple respondents. The first “executive director” survey was designed for the executive director and a second senior team member of each branch and included items on a branch's exploratory innovation, exploitative innovation, and environmental dynamism. The second “senior team” survey was designed for the remaining senior team members in each branch and included items on the executive director's transformational and transactional leadership behaviors. We sent survey packages, each containing copies of the executive director questionnaire and copies of questionnaires for senior team members to 211 branches in one country. To ensure confidentiality, we agreed not to reveal the names of the respondents and requested that the questionnaire be returned directly to the research team.

We received a total of 89 questionnaires from executive-directors, corresponding with a 42% response rate. From these 89 branches, we received 305 “senior team” questionnaires (34% response rate). The number of senior team members who responded ranged from 2 to 8 with a mean of 3.43 members per branch. The executive directors had an average company tenure of 8.10 years (s.d.=7.26). The average company tenure of the senior team members was 5.88 years (s.d.=5.61). The mean size of the branches was 128.74 (s.d.=68.29) full-time employees. *T*-tests examining differences between respondents and non-respondents for our final sample showed no significant differences based on a branch's number of full-time employees, total assets, and prior performance. We also compared early and late respondents in terms of demographic characteristics and model variables. These comparisons did not reveal any significant differences ( $p < .05$ ), indicating that non-response bias was not a problem in this study.

#### 3.2. Measurement and validation of constructs

We used existing multi-item scales (see Appendix A) and verified them through various analyses as described in the following section.

##### 3.2.1. Exploratory innovation, exploitative innovation, and environmental dynamism

Executive-directors provided information concerning their branch's level of exploratory and exploitative innovation as well as environmental dynamism. The items for these three scales were measured on a seven-point scale, anchored by 1=strongly

disagree and 7 = strongly agree. The measure for *exploratory innovation* was adapted from Jansen et al. (2006). The six-item scale for exploratory innovation ( $\alpha = .91$ ) captured the extent to which branches depart from existing knowledge and pursue radical innovations for emerging customers or markets. In the context of financial services, exploratory innovation has been associated with developing fundamentally new loan structures and contingent contracts (Uzzi & Lancaster, 2003). A six-item scale ( $\alpha = .88$ ) measured firm-level *exploitative innovation* (Jansen et al., 2006) and captured the extent to which branches build upon existing knowledge and pursue incremental innovations that meet the needs of existing customers (Abernathy & Clark, 1985; Benner & Tushman, 2003; Smith & Tushman, 2005). Prior research on financial services has related exploitative innovation to aggressive lending, shopping the market and increasing efficiency (Uzzi & Lancaster, 2003). Exploratory factor analysis clearly replicated the intended 2-factor structure with each item loading clearly on their intended factor (all factor loadings were above .74 with cross-loadings below .25) and all factors having eigenvalues greater than one. Based on previous research, a five-item measure was included that captured *environmental dynamism* (cf., Dill, 1958). The scale ( $\alpha = .91$ ) tapped into the rate of change and the instability of the external environment.

To examine reliability issues associated with the executive-director data, we collected responses from a second senior team member in each responding branch. Of the 89 branches that participated, we received 40 responses from the second senior team member located in branches that were comparable in size, age, and prior performance to our full sample. We calculated an inter-rater agreement score ( $r_{wg}$ ) between the scores of the executive director and the second senior team member for exploratory innovation, exploitative innovation, and environmental dynamism (James, Demaree, & Wolf, 1993). The median [average] inter-rater agreements were .82 [.80] for exploratory innovation, .89 [.88] for exploitative innovation, and .78 [.77] for environmental dynamism, suggesting adequate agreement.

### 3.2.2. Transformational and transactional leadership

The data for transformational and transactional leadership behaviors of the executive director were collected through multiple senior team members per branch. Each senior team member rated the items on leadership behaviors for his or her executive director on a 5-point scale with 1 = 'strongly disagree' and 5 = 'strongly agree'. *Transformational leadership* was assessed by senior team members' response to twenty items of the Multifactor Leadership Questionnaire (Bass & Avolio, 1995). The four dimensions of transformational leadership consist of four items for intellectual stimulation, inspirational motivation, individualized consideration, and eight items for idealized influence. *Transactional leadership* style was measured with seven items from the Multifactor Leadership Questionnaire (Bass & Avolio, 1995). Following previous practice (e.g., Ensley et al., 2006; Epitropaki & Martin, 2005; Lowe, Kroeck, & Sivasubramaniam, 1996; Waldman et al., 2001) we used the scales of contingent reward behavior (four items) and active management by exception behavior to measure transactional leadership (three items). We averaged the items to create composite indexes for transformational ( $\alpha = .96$ ) and transactional leadership ( $\alpha = .82$ ).

To empirically justify using data from the "senior team" survey that assesses senior team characteristics and transformational leadership, we conducted several analyses to demonstrate within-team agreement and between-team differences for transformational and transactional leadership. We calculated an inter-rater agreement score ( $r_{wg}$ ) for each variable (James et al., 1993). Median [average] inter-rater agreement was .83 [.81] for transformational leadership and .77 [.76] for transactional leadership, which were well above the cut-off value of .70. Third, intraclass correlations were generated using one-way analysis of variance. An indication of convergence within firms is an ICC(1) value greater than zero with a corresponding ANOVA *F*-statistic that is statistically significant (Kenny & La Voie, 1985). The ICC(1) values for the leadership variables were .32 and .26 with significant *F*-statistics, indicating that the means for the ratings for each variable accurately represent team scores. Hence, these results provide justification for the aggregation of the respective leadership variables.

### 3.2.3. Control variables

We controlled for possible alternative explanations by including relevant control variables. As larger branches may have more resources to facilitative innovation yet may lack the flexibility to pursue exploratory activities (Ahuja & Lampert, 2001), we included the natural logarithm of the number of full-time employees within branches to account for *branch size*. Branches with a strong history of high performance are likely to invest in innovation. Hence, we included *branch prior performance* measurements.

**Table 1**  
Means, standard deviations, and correlations<sup>a</sup>

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Exploratory innovation	3.75	1.27	(.91)								
(2) Exploitative innovation	5.57	0.77	.28	(.88)							
(3) Transformational leadership	3.60	0.54	.24	.16	(.96)						
(4) Transactional leadership	3.76	0.94	-.27	.30	.21	(.82)					
(5) Environmental dynamism	4.14	1.40	.39	.29	-.02	-.05	(.91)				
(6) Branch size <sup>b</sup>	2.07	0.17	.13	.18	.01	-.03	.24	–			
(7) Branch prior performance	102.54	27.85	.01	.07	-.15	-.02	.10	-.15	–		
(8) Senior team size	8.43	1.30	.09	.00	-.09	-.12	.06	.35	-.06	–	
(9) CEO tenure	8.10	7.26	.19	-.00	-.02	.10	-.04	-.20	.12	-.07	–

<sup>a</sup>  $n = 89$ . Numbers in parentheses on the diagonal are Cronbach's alphas of the composite scales. All correlations above |.20| are significant at  $p < .05$ .

<sup>b</sup> log.

**Table 2**Results of hierarchical regression analyses: Effects of transformational and transactional leadership on exploratory and exploitative innovation<sup>a</sup>

	Exploratory innovation				Exploitative innovation			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
<i>Control variables</i>								
Branch size	0.16	0.16	0.06	0.04	0.23 <sup>†</sup>	0.21 <sup>†</sup>	0.14	0.14
Branch prior performance	0.01	0.05	0.00	-0.04	0.09	0.12	0.09	0.06
Senior team size	0.05	0.04	0.06	0.07	-0.07	-0.01	-0.00	0.02
CEO tenure	0.22*	0.25*	0.25**	0.28**	0.03	-0.01	-0.01	0.02
<i>Leadership style</i>								
Transformational leadership		0.33**	0.33**	0.31**		0.08	0.09	0.03
Transformational leadership squared						-0.12	-0.09	-0.04
Transactional leadership		-0.36**	-0.34***	-0.27**		0.31**	0.32**	0.36**
<i>Moderator variable</i>								
Environmental dynamism			0.37***	0.38***			0.25*	0.19
<i>Interaction effects</i>								
Transformational leadership*Environmental dynamism				-0.04				-0.22*
Transformational leadership squared*Environmental dynamism								0.12
Transactional leadership*Environmental dynamism				-0.21*				-0.04
R <sup>2</sup>	.06	.25**	.37***	.42**	.05	.16*	.22**	.29**
ΔR <sup>2</sup>		.18***	.12***	.05 <sup>†</sup>		.11***	.06*	.07 <sup>†</sup>

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

<sup>a</sup>  $n = 89$ . Standardized regression coefficients are reported.

Following Tsai (2001), we used a branch's profitability-achieved rate, which is a branch's return on investment divided by its target return. The past performance measurements as well as the achieved rates for the branches in this study were ascertained for the time period 2000–2003 through internal corporate records. Senior team size could affect the heterogeneity of senior teams, and accordingly, impact the achievement of exploratory and exploitative activities. Following previous studies, we measured *senior team size* through the number of senior executives who are responsible for strategy formulation and implementation (e.g., Siegel & Hambrick, 2005). An executive director's *tenure* was included as prior studies have suggested that the tenure of a CEO may be related to team effectiveness and organizational outcomes (Haleblian & Finkelstein, 1993; Wu, Levitas, & Priem, 2005).

#### 4. Analysis and results

Table 1 presents descriptive statistics and correlations for the study variables. Consistent with the notion that organizations tend to prefer exploitation over exploration (e.g. March, 1991), the mean value for the branches' exploitative innovation is significantly higher ( $p < .01$ ) than for exploratory innovation (5.57 vs. 3.75). Table 2 presents the results of the regression analyses for exploratory and exploitative innovation. Prior to the creation of the squared term for transformational leadership as well as the interaction terms, we mean centered the independent variables (Aiken & West, 1991). The baseline models 1 and 5 contain the control variables. Models 2 and 6 introduce effects of transformational and transactional leadership behaviors and models 3 and 7

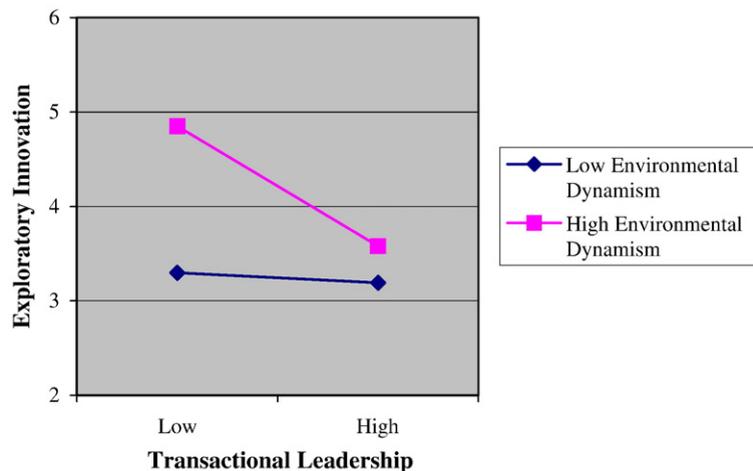


Fig. 3. The moderating effect of environmental dynamism on transactional leadership and exploratory innovation.

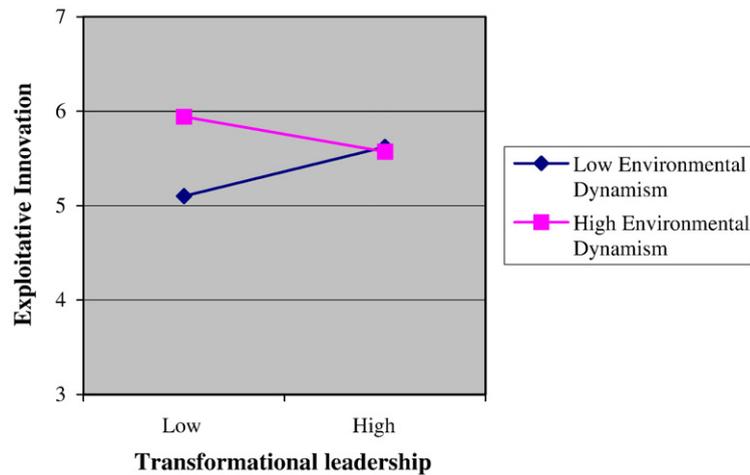


Fig. 4. The moderating effect of environmental dynamism on transformational leadership and exploitative innovation.

introduce the direct effects of our moderator variable, environmental dynamism. Finally, models 4 and 8 examine the potential moderating effects of environmental dynamism. We discuss the results of the final models, i.e. models 4 and 8 in Table 2.

The proposed positive relationship between transformational leadership and exploratory innovation (Hypothesis 1) is supported ( $\beta=0.31, p<.01$ ). Hypothesis 2, which posited a negative association between transactional leadership and a firm's ability to pursue exploratory innovation, is also supported. As shown in model 4, the coefficient for transactional leadership and exploratory innovation is negative and significant ( $\beta=-0.27, p<.01$ ).

In addition to the link between leadership behaviors and exploratory innovation, we argued that strategic leaders may also impact the development of exploitative innovation. Although we posited an inverted U-shaped relationship between transformational leadership behaviors and exploitative innovation, model 8 indicates that both the coefficients for the linear term as well as the squared term for transformational leadership are not significant. Hence, transformational leadership behaviors are not associated with the ability to generate incremental improvements to existing products and services and pursue exploitative innovation. Hypothesis 3 is not supported. Consistent with Hypothesis 4, model 8 shows that transactional leadership behaviors are associated with developing exploitative innovation. As predicted, the coefficient for transactional leadership and exploitative innovation is positive and significant ( $\beta=0.36, p<.01$ ).

With regard to the interaction effect of environmental dynamism, however, our results indicate that this effect was not significant for transformational leadership and exploratory innovation ( $\beta=-0.04, p>.10$ ; Hypothesis 5 not supported). Consistent with Hypothesis 6, the interaction effect between transactional leadership and environmental dynamism is negatively related to exploitative innovation ( $\beta=-0.21, p<.05$ ). To plot this interaction, transactional leadership and environmental dynamism took the values of one standard deviation below (i.e. low level) and above (i.e. high level) their means (i.e., 3.76 and 4.14 respectively). The plot of the interaction is included in Fig. 3 and shows a negative relationship between transactional and exploitative innovation when environmental dynamism is high.

Concerning the moderation effect of environmental dynamism on the inverted U-shaped relationship between transformational leadership and exploitative innovation, model 8 does not provide support for our hypothesis. Rather, the coefficient for the moderation effect between transformational leadership and environmental dynamism was negative and significant ( $\beta=-0.22, p<.05$ ), while the moderation effect between the squared term of transformational leadership and environmental dynamism was positive and not significant ( $\beta=0.12; p>.10$ ). This last observation is consistent with our non-significant finding of the inverted U-shaped relationship between transformational leadership and exploitative innovation. In contrast, model 8 indicates that environmental dynamism moderates a linear relationship between transformational leadership and exploitative innovation. As plotted in Fig. 4, transformational leadership behaviors are negatively related to the development of exploitative innovation in dynamic environments.

Finally, although we posited that environmental dynamism would enhance the relationship between transactional leadership on exploitative innovation, model 8 shows that the coefficient is negative but not significant ( $\beta=-0.04, p>.10$ ). Accordingly, Hypothesis 8 is not supported.

## 5. Discussion

Due to its theoretical importance and practical relevance, research on exploration and exploitation is burgeoning. A nascent stream of studies investigates specific leadership behaviors, and their contingencies, in pursuing seemingly contradictory exploratory and exploitative activities. Conceptual assertions have proposed that pursuing both activities imposes considerable

challenges on senior executives since they require differing leadership behaviors. It appears however that the central tenet of strategic leaders using diverse leadership behaviors in facilitating organizational-level exploratory and exploitative innovation remains unclear.

This study contributes to the fields of strategic leadership, organizational learning, and innovation in three main ways. First, we advance the debate on the role of strategic leaders in pursuing innovation by examining the discretion that leaders may possess over exploratory and exploitative innovations as outcomes of organizational learning processes. While extant research has offered useful insights into the effects of transformational and transactional leadership behaviors on creativity and performance (Mumford, Scott, Gaddis, Strange, 2002; Waldman et al., 2001), little empirical research has examined their influence on learning and innovation (Berson et al., 2006). Even when this link has been considered (Jung et al., 2003; Mumford et al., 2002), the relationship with different types of innovation has not been tested empirically.

We found support for our hypotheses that transformational leadership is associated with exploratory innovation while transactional leadership is associated with exploitative innovation. Thus, transformational behaviors encourage organizational members to challenge institutionalized learning and adopt generative and exploratory thinking processes (Sosik et al., 1997). Transactional behaviors, on the other hand, exercise a maintenance role and support the refinement, improvement and routinization of existing competences, products, and services (Vera & Crossan, 2004). By conceptualizing exploratory and exploitative innovation as outcomes of organizational learning processes, we are able to extend Vera & Crossan's (2004) prior research which proposed a relationship between T/T leadership behaviors and organizational learning. By incorporating innovation outcomes, we are a step closer to ultimately examining the financial performance implications that may be associated with these processes. As well, it addresses the call for more research to examine how leaders impact organizational level processes such as innovation (e.g., Waldman, Javidan, & Varella, 2004; Yukl, 1999).

Second, we sought to go beyond simply examining the facilitating role of T/T behaviors on innovation outcomes. Hence, our study investigated the positive and negative as well as the linear and curvilinear effects of T/T leadership, thus providing a more complete picture of how strategic leaders impact exploratory and exploitative innovation. The results indicate that T/T behaviors are associated with innovation outcomes in different ways. These findings reinforce prior research on exploration and exploitation, demonstrating that it is critical to be mindful of the outcomes. We found that transactional leadership, which is not suited for learning processes that challenge institutionalized learning, had a negative effect on exploratory innovation.

We also anticipated that moderate levels of transformational leadership would support incremental learning, particularly in middle and lower level managers, and lead to exploitative innovation. Interestingly however, and contrary to our expectations, the curvilinear effect was not significant and our study indicates no relationship between transformational leadership behaviors and exploitative innovation. We argued that moderate levels of transformational leadership would encourage communication, improve the efficiency of knowledge exchange throughout the firm, and increase the likelihood that organizational members will identify learning opportunities for refining and exploiting best practices (Adler & Kwon, 2002). A possible explanation for the lack of a relationship is that transformational behaviors with their emphasis on radical change may not discourage employees from coming up with exploitative innovations, but do not motivate improving the efficiency of existing routines.

Third, prior research has argued that leaders' behavior contributes strongly to organizational outcomes under changing environmental conditions (e.g. Waldman et al., 2001; Wu et al., 2005). Our findings provide substantial support for considering environmental dynamism as an important moderator to further specify the relationship between leadership style and organizational innovation. Specifically, our study revealed that a negative effect of transformational leadership on pursuing exploitative innovation as well as a more negative relationship between transactional leadership and exploratory innovation emerges when we took environmental dynamism into account. However, contrary to our expectations, the rate of change in the environment did not have any effect on the transformational leadership/exploration match and the transactional leadership/exploitation match, which suggests that these relationships are always internally consistent, independent of environmental conditions. In other words, and very interestingly, our study provides strong support for the notion that *misfits* rather than *fits* matter between leadership style and innovative outcomes in changing environments. The coexistence of an internal misfit and external changing conditions may particularly lead to increased ambiguity, stress and crisis situations among organizational members that undermine innovative outcomes considerably. Although previous research has asserted that environmental dynamism allows leaders more latitude for discretion, our study indicates that firms should carefully apply proper leadership styles to pursuing exploratory and exploitative innovation in turbulent environments.

In addition to providing new insights into the detrimental effects of having *misfits* in dynamic environments, our examination of environmental dynamism as a moderating effect also offered new insights about the relationship between transformational leadership and exploitative innovation. As reported above, we found no relationship between these constructs when testing Hypothesis 3. In contrast, results of our moderation test indicate that transformational leadership is negatively associated with exploitative innovation in dynamic environments, and provide the counterintuitive finding that transformational leadership supports the refinement and improvement of existing products, services and markets in stable environments (see Fig. 3). Hence, our study contributes to new insights emphasizing the importance of internal triggers to facilitating incremental innovation in stable environments. Although pursuing exploitative innovation is effective when customers' preferences are hardly changing (Jansen et al., 2006), that is, when customers are not asking for new products and services, the greater push offered by transformational leader is needed even for triggering incremental innovations. Organizational

members, including middle and lower level managers, will continue “business as usual” without considering improvements or refinements to existing products and services unless their leader exhibits transformational behaviors and triggers them to do so.

While this study contributes to research, it also contributes directly to practice. The findings reveal that leadership behaviors have a significant impact on innovation outcomes. Since prior research has established fundamental differences between exploration and exploitation, this study suggests that companies and their leaders need to be more aware of how leaders may be shaping the strategic direction of the company through transformational and transactional behaviors. In addition, the findings suggest this is not a static situation. The level of dynamism in the environment plays a significant role in the relationship between the types of leadership and types of innovation. Prior research has established that individuals can learn to be more transactional and/or transformational. For example, Bass & Riggio (2006) report the effectiveness of transformational leadership training, specifically the “Full Range Leadership Program” workshop of Avolio & Bass (1991), in contexts such as the bank, health, and nonprofit sectors (Bass, 1985, 1998). Consistent with this evidence, this study highlights the importance of leadership development in order to support both exploration and exploitation.

### 5.1. Future research directions

While our research offers insight into the questions posed, it also raises opportunities for future research. For example, future research could incorporate the measures of organizational learning that are implied in this study. In addition, linking leadership and innovation to organization performance would be beneficial. Innovation is often defined in such a way that it presumes positive outcomes (Hansen & Wakonen, 1997) and few studies parse innovation into exploratory and exploitative innovation. While we have examined the differing relationships between leadership behaviors and exploratory and exploitative innovation, we did not explicitly test the coexistence (ambidexterity) of these two innovative outcomes in the branches. Past research has revealed a high correlation between transformational leadership behaviors and contingent reward behaviors indicating that they are likely to exist in the same individuals in different amounts and intensities (Bass, 1998). Mastering both behaviors is consistent with Quinn's (1988) competing values model which argues that executives must develop “behavioral complexity” or the ability to play competing leadership roles simultaneously (Denison et al., 1995). Future research is needed to assess if leaders who combine both T/T behaviors can create the context of discipline, stretch, support and trust proposed by Gibson & Birkinshaw (2004); intuitively, discipline appears to be consistent with transactional behaviors and stretch, support, and trust seem to match transformational behaviors. Interestingly, Nemanich & Vera (2009–this issue) find that transformational leadership influences the achievement of ambidexterity directly or indirectly through establishing a favorable learning culture. Future research explicitly testing the link between transformational and transactional behaviors and ambidexterity is needed.

### 5.2. Limitations and conclusion

Our study presents a first step toward uncovering leadership behaviors for developing exploratory and exploitative innovation, and study limitations suggest the need for additional research. First, our survey research was conducted at multiple autonomous branches of a large financial services firm. Although our focus helped to control for corporate-, industry- and country-specific differences, empirical studies in a wider variety of organizations within non-service industries, however, are necessary to generalize the findings further. Second, although we took great care in separating collection of data on the independent and dependent variables as well as the use of multiple respondents that provide valuable methodological contributions, future longitudinal research is necessary to empirically establish the causal claim of our model. Third, while our study focuses on leadership behaviors as they relate to exploratory and exploitative innovation, additional organizational and top-management characteristics may contribute to exploratory and exploitative innovation. Future research may therefore include additional antecedents of both types of innovation, such as organizational form, social networks (Jansen et al., 2006), incentive systems (Tushman & O'Reilly, 1996). Future research may also incorporate multiple levels of analysis and examine organizational-level as well as top management team-level antecedents. Investigating such combined or moderating effects would further enhance our understanding of how organizations pursue exploratory and exploitative innovation. Fourth, although our study provides new insights how leadership behaviors are related to pursuing exploratory and exploitative innovation, it does not address how they are triggered to change levels of exploratory and exploitative innovation. Hence, it would be useful to conduct in-depth case studies to better understand how change efforts are initiated and exploratory and exploitative strategies are changed over time.

Limitations aside, our study represents a significant step in leadership and innovation. In response to calls for research on managing exploratory and exploitative innovation within organizations, our study not only examines how strategic leaders contribute to the development of different types of innovations, but also reveals how environmental dynamism moderates the effectiveness of leadership behaviors in organizations.

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## Appendix A. Measures and Items<sup>a</sup>

Exploratory innovation
Our organization accepts demands that go beyond existing products and services
We invent new products and services
We experiment with new products and services in our local market
We commercialize products and services that are completely new to our organization
We frequently utilize new opportunities in new markets
Our organization regularly uses new distribution channels
We regularly search for and approach new clients in new markets <sup>b</sup>
Exploitative innovation
We frequently refine the provision of existing products and services
We regularly implement small adaptations to existing products and services
We introduce improved, but existing products and services for our local market
We improve our provision's efficiency of products and services
We increase economies of scales in existing markets
Our organization expands services for existing clients
Lowering costs of internal processes is an important objective <sup>b</sup>
Environmental dynamism
Environmental changes in our local market are intense
Our clients regularly ask for new products and services
In our local market, changes are taking place continuously
In a year, nothing has changed in our market <sup>®</sup>
In our market, the volumes of products and services to be delivered change fast and often

<sup>a</sup>All items were measured on a seven-point scale, anchored by 1 = strongly disagree and 7 = strongly agree; <sup>b</sup>Item deleted after exploratory factor analysis.

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