Strengthening Managerial Innovation Behavior in the SMEs: The Role of CEO Transformational Leadership, Cross-Functional Integration and Innovation Culture

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Abstract

Managerial innovation as an internal change agent plays a central role in coping with the speed of today's fast-paced customer demand and highly competitive market, yet previous studies paid less attention to the potential measures of strengthening managerial innovation behavior within organizations. Drawing from transformational leadership theory, the current study shed new light on this issue by examining the role of CEO transformational leadership (TFL), innovation culture (IC) and cross-functional integration (CFI) in advancing managerial innovation behavior in SMEs. A cross-sectional study with a sample of 434 respondents from 24 SMEs operating in Rwanda was conducted. To genuinely analyze the relationship between the variables hypothesized in this study, we used structural equation modeling (SEM) and bootstrapping technique using Amos 23 and SPSS 24. The overall findings revealed that the relationship proposed in the model were significantly supported. However, our new mechanism implying innovation culture and cross-functional integration in the relationship between CEO transformational leadership and managerial innovation behavior, provide a substantial contribution to management literature.

Key words: *Transformational leadership, managerial innovation behavior, cross-functional integration, organizational innovation culture.*

Introduction

To maintain its competitiveness and sustainability in today's fast-paced changing and highly aggressive business condition, organizations need to settle new efforts into innovativeness (Khalili, 2016). Jaiswal & Dhar, (2015); Zuraik & Kelly, (2018) added that organizational managers need to address today's conglomerate customer disputes with new and creative solutions to keep pace with changing market demands. In this view, Henk, Volberda, Van Den Bosch, & Heij, (2013), suggested managerial innovation as an organizational internal change agent. However, in this regard, we hope that managerial innovation behavior would drive innovativeness within the organizational setting. In the same vein, Damanpour, (2014), argued that managerial innovations play a central role in an organizational change. In the same view, Birkinshaw, Hamel, & Mol, 2008; Heyden, Sidhu, & Volberda, (2018) suggested that managers need to recognize innovativeness when delineating and implementing the process, practice, structure, and approaches to be used to achieve long-term organizational goals. Therefore, as managerial innovation mentioned to be the most important in organizational innovation success, the mechanism in which organizations strengthen managerial innovation behavior within an organizational setting has not yet been established in the literature. The role of top leadership in building managerial innovation behavior within their organizations is not widely understood.

To unveil such a crucial aspect, this study uses evidence from SMEs in Rwanda to investigate how top leaders in organizations promote managerial innovation behavior within an organizational setting. While SMEs play the pivotal role in economic growth of many countries (Aksoy, 2017), innovation is not easily noticeable in the SMEs due to its routines and traditional practices of entrepreneurs and owners (Fernández-Esquinas, van Oostrom, & Pinto, 2017). However, bringing more in-depth analysis in SMEs would be a surmountable contribution to the existing literature. In this regard, based on transformational leadership theory (Bass, 2000) that link Transformational leaders with different innovation outcomes (Bass, Avolio, Jung, & Berson, 2003; Jung, Bass, & Sosik, 1995), this study employed organizational innovation culture and Cross-functional integration as a potential mechanism of building a strong relationship between CEO TFL and managerial innovation behavior within a organisational setting.

In line with TFL theory, the new model advanced in this study is consistent with considerable studies in the literature that associated TFL and innovation culture with diverse innovation outcomes. For examples, Park & Jo, 2018; Chen & Hou, (2016) identified Organizational innovation culture as one of the vital sources of innovation behavior. Ali Taha, Sirkova, & Ferencova, (2016) defined innovation culture as an organizational multi-dimensional context that avail infrastructure, shape environment, and operational level behavior to promote innovative work behavior within the organization. Using TFL theory, Jung et al., (1995) demonstrated that, fundamental dimensions of TFL arouse followers' competence and confidence. Afsar, Badir, & Khan, (2015), added that Transformational leaders use its inspirational motivation character to engage employees in innovative work initiatives. Using four dimensions of TFL namely; idealized influence, inspirational motivation, individualized consideration and intellectual stimulation, transformational leader act as a mentor or coach of his/her followers and causes them to generate creative solutions to diverse problems. (Bass et al., 2003; Jung et al., 1995; Bass & Avolio, 1990).

In another hand, CEOs or General managers are responsible for setting the organizational strategic direction (Makri & Scandura, 2010). However, as also indicated by Sattayaraksa & Sakun Boon-itt, (2016), we believe that CEO with TFL behavior would value innovation and develop strategic approaches for strengthening innovation culture within an organizational setting. In the same view, based on TFL theory, since leaders are trusted and respected (Bass et al., 2003), it stands to the reason that, CEO with TFL behavior would stimulate managerial innovation behavior among followers. In the same vein, due to the fact that, followers (managers) consider CEO with TFL qualities as their role model in which they can imitate, (Bass, 2000), we propose that, CEO TFL would influence managerial innovation behavior in two way; inspiring and stimulating innovation behavior among followers (managers) and also creating a strong culture for innovation within an organizational setting. As argued by Chang, (2016), CEO with TFL behavior could use his/her position to shape managerial innovation within the organization. In the same vein, Henk Wiltze Volberda, Van Den

Bosch, & Mihalache, (2014b), added that CEO develops new managerial practices that respond to an environmental change.

In organizations, it is essential that different units/departments cooperate, share new knowledge and to obtain mutual benefits, (Bendig, Enke, Thieme, & Brettel, 2018). As argued by several studies in the literature, when organizational units or departments are not in cooperation, it will be tough to achieve organizational goals. Troy, Hirunyawipada, & Paswan, (2008), put much emphasis on the integration of diverse disciplines within an organization and propose that cross-functional integration would make communication easy and facilitate information flow with an organization. However, despite the evidence of cross-functional integration to interact with organizational achievement, previous studies paid a little attention to the crucial role of cross-functional integration to managerial outcomes. Therefore, based on different arguments in the literature, we add cross-functional integration as a potential moderator in the relationship between CEO TFL and managerial innovation behavior. The moderating role of CFI in managerial innovation has also employed by Zhongfeng, Chen, & Wang, (2018), in investigating its moderating effect between organizational structure and managerial innovation.

Despite the theoretical foundation that link TFL with different innovation outcomes, previous works have overlooked on the role of TFL on organizational innovation and individual-level innovation behavior, such as employee's creativity (Khalili, 2016; Jaiswal & Dhar, 2015), manager's innovation behavior (Kang, Solomon, & Choi, 2015), innovative work behavior (Afsar, Badir, & Bin Saeed, 2014), organizational culture (Jung et al., 1995), innovation climate (Zuraik & Kelly, 2018). However, the role of TFL at the top organizational level on the managerial innovation behavior still need more studies. To date, the impact of TFL at a top executive level on organizational innovation culture and managerial innovation have not been dealt with in depth. In this regard, the current study addresses this issue by advancing the theoretical explanation of the relationship between CEO TFL, organizational innovation culture, cross-functional integration and managerial innovation behavior within an organizational setting. Drawing from TFL theory, we believe that, CEO TFL may frame an organizational innovation culture and encourage co-operation between different functional units, which in turn lead to managerial innovation behavior within an organizational setting. Henceforth, this study broadens current knowledge on leadership behavior at the top level and its ability to build an environment that stimulates innovativeness within an organizational setting. However, within the framework of these theoretical and conceptual arguments, this study makes three surmountable contributions to existing literature.

First, most of the previous research has overlooked the impact of TFL on different individual and organizational innovation outcomes for example, TFL and product development (Sattayaraksa & Boon-itt, 2016), TFL and work-related attitudes (Walumbwa, Lawler, Avolio, Peng Wang, & Kan Shi, 2005), TFL and CSR (Waldman, Siegel, & Javidan, 2006), TFL and organizational innovation (Jung, Chow, & Wu, 2003). Although, the influence of top-level TFL on managerial innovation behavior is still unknown. However, this study sheds new light on how CEO TFL behavior stimulates managerial innovativeness within an organizational setting. Second, several studies associated innovation culture with different organizational positive outcomes, for instance, Dobni, (2008), linked innovation culture with performance outcomes, (Aksoy, 2017) found positive relationship between innovation culture and market performance, Harbi, Anderson, & Amamou, (2014) indicated that innovation culture enhance IT performance of SMEs. However, the relationship between organizational innovation culture and managerial innovation behavior is still missing in the literature. In this regard, this study examines the mediating role of an organizational innovation culture in the relationship between CEO TFL and managerial innovation behavior within an organizational setting. Third, in the literature, cross-functional integration evidenced to influence organizational outcomes, for examples, with NPD process (Bendig et al., 2018), Hirunyawipada, Beyerlein, & Blankson, (2010), used cross-functional integration as transformation knowledge. Zhongfeng et al., (2018), used this construct relation with managerial innovation and organizational structure.

Therefore, despite the recognized adequacy of cross-functional integration in organizational outcomes, investigation of the strength of cross-functional integration in relation to top leadership and managerial innovation is still unknown. In this view, Introduction of cross-functional integration in the model will add more understanding in management literature. However, with such extensive arguments in the literature, we propose that CEO TFL would influence managerial behavior in two ways, TFL would Stimulate innovation

behavior among managers since followers always tend to imitate a leader with specific qualities (Yammarino and Bass, 1990), TFL also would create a culture that supports innovation and encourages cooperation among different functional units in the organization. Although, the new model adds a vital and practical understanding of the TFL qualities and its potential outcomes at the organizational level.

The organization of this study is the following; introduction in the first section discusses the primary purposes of the study, the theory underlying the study, gap identification and possible contribution of the current study. Literature review in the Second section, review and explain the concepts used in the study, the theoretical relationship of the variables and hypothesis development. Methodology in the Third section, discuss the procedures used in data collection, sample, and selection technique. Findings in section four, describe in graphs and plot, the results using various indices. Discussion in section five, present interpretation of the findings, theoretical and managerial implication of the study. The conclusion in the section six, present the views of others in relation to research findings, some limitations and possible suggestions for further studies.

Literature Review

CEO transformational leadership

According to Bass, (1990) TFL occur when a particular leader is charismatic, inspiring followers, meeting the emotional needs of the followers and intellectually stimulating followers. In recent years, several studies used TFL theory to explain different individual and organizational innovation outcomes. Using some examples, according to Bass, (2000), transformational leaders move followers to go beyond their self-interest for the sake of their organizations. Jung et al., (1995) explained how transformational leaders denote huge expectations, possibility, and confidence in followers' capabilities. Intellectual stimulation of TFL arouses follower's innovativeness and creativity efforts (Bass et al., 2003). Afsar, Badir, & Khan, (2015), added that the qualities of transformational leaders strengthen employee's innovative work behavior. In the same view, Sattayaraksa & Boon-itt, (2016) argued that TFL promotes innovation culture through social interaction and organizational learning. Thus, within this framework and in line with (Jung et al., 1995), it stands to the reason that, CEO TFL behavior value innovation and fuel innovative work behavior in the workplace.

The contribution of TFL to innovation outcomes is also evidenced by its ability to transform follower's behavior and move them to higher moral maturity, achievement, and self-actualization (Bass & Steidlmeier, 1999). In the same view, Bass et al., (2003) argued that the fundamental qualities of transformational leaders help followers to question assumptions, reframing problems, and approaching old situations in new ways. However, in such case, transformational leaders would broaden and elevate innovation behavior of the followers (managers). However, with such theoretical arguments from the literature, we employ TFL theory in underlying a rationale of why and how transformational leaders promote managerial innovation behavior and build a culture for innovation within an organizational setting.

Managerial innovation

Hamel, (2006) explained managerial innovation as basic managerial tasks, where managers nurture organizational innovativeness like advancing and encouraging positive relationships among employees, facilitating knowledge sharing, allocating necessary resources, harmonizing and supervising innovative initiatives. Vaccaro, Jansen, van den Bosch, & Volberda, (2012) explained Managerial innovation as a revision of the decision-making process in the workplace. According to Volberda, Van Den Bosch, & Mihalache, (2014b), managerial innovation refers to the introduction of a new administrative system, practices and, processes to brighten the long-term organizational goals. In this view, Zhongfeng et al., (2018) argued that managerial innovation stimulates technological innovation through Optimization of the managerial process that value innovation opportunities and taking advantages of environmental changes. Managers are innovative when they change managerial principles, process and practices to strengthen organizational performance (Damanpour, 2014). Zhongfeng et al., (2018), identified managerial innovation and technological innovation as two major types of organizational innovation. However, previous studies concentrated extensively on technological innovation while paying less attention to managerial innovation which would play a central role in organizational changes.

Management innovation is an emerging construct in management studies that have been widely investigated in previous studies in relation with different organizational outcomes, for instance, Van Den Bosch, & Volberda, (2013) identified the contribution of management innovation to the technological innovation process. In the same view, Volberda et al., (2014b) found a positive influence on management innovation to competitive advantage. In the same vein, Birkinshaw et al., (2008); Mol & Birkinshaw (2014) witnessed management innovation as a primary engine to organizational novelty. According to Damanpour & Aravind, (2012), management innovation build-up new administrative systems, processes, structures, practices, and techniques that support the achievement of organizational goals. Managerial innovation builds a pleasant climate that triggers an employee's innovative activities within the organization (Nieves, (2016).

Organizational innovation culture

Ali Taha et al., (2016) defined innovation culture as a combination of structures, politics, practices, procedures and day-to-day operations that promote organizational innovation and creativity. Aksoy, (2017) explained innovation culture as a strategic approach to raise the overall organizational innovation performance. Linke & Zeffass, (2011) described innovation culture as an introduction of innovation within organizational philosophy and tracing each step practices from philosophy to action. Under organizational innovation culture, managers encourage freedom, risk-taking, and teamwork within an organizational system (Dobni, 2008). Innovation is a dynamic social process that needs good working conditions that promote innovative work behavior (Chen & Hou, 2016). Several studies proved the influence of innovation culture to different organizational outcomes, for instance, Harbi et al., (2014) found a significant influence of innovation culture to organizational performance. Sattayaraksa & Boon-itt, (2016), weighted innovation culture as an engine that feeds innovative work behavior within the organization.

Cross-functional integration

According to (Strese, Meuer, Flatten, & Brettel, 2016), cross-functional integration refers to the interactions among different departments or units within the organization. Hirunyawipada et al., (2010), defined cross-functional integration as the integration of diverse disciplines within the organization. Cross-functional integration creates a better understanding of cooperation between different departments, units and teams within the organization (Zhongfeng et al., 2018).

In the same vein, the collaboration of different functional groups, help in establishing an internal knowledge sharing platform to improve managerial competencies and practices (Bendig et al., 2018). When different units/departments are integrated, there is a possibility of sharing the vision, builds trust and reciprocity relationships (Zhongfeng et al., 2018). According to Hirunyawipada et al., (2010), organizational leaders have the ultimate ability to enhance cross-functional integration within an organizational setting. In this regard, we hope that cooperation between different units in the organization would create an alliance of efforts which lead to creativity and innovation within the organization. However, with such conceptual arguments from the literature, we hope that, units integration within an organization set to become a vital factor that fuels managerial innovation behavior.

Hypothesis development

CEO transformational leadership and managerial innovation behavior

In line with several studies in the literature, TFL qualities have been associated with different follower's innovation outcomes, see, for instance, Khalili, (2016), TFL feed follower's creativity, Eisenberger, (2014), TFL encourage employee risk-taking, TFL promote employee's self-confidence (Zuraik & Kelly, 2018). Drawing from TFL theory, Walumbwa et al., (2005) indicated that, TFL components induce followers to exhibit higher levels of innovativeness. Bass et al., (2003), added that TFL challenges followers to look and take advantages for new environmental opportunities. According to Jaiswal & Dhar, (2015), TFL build a favorable climate that inspires and support employee's innovative work behavior. In the same view, TFL encourages employees to tackle problems using their ways, (Bass & Avolio, 1990), TFL intellectually stimulate followers to re-examine and re-frame their challenging tasks in fresh and new ways (Walumbwa, Avolio, Gardner,

Wernsing, & Peterson, 2008). However, with such extensive theoretical evidence, we hope that TFL influence managerial innovation behavior due its ability of raising employee's needs (Jung et al., 1995) and boosting dramatic changes (Bass, 1990), in this view, according to Bass, Avolio, Jung, & Berson (2003), transformational leaders always strive to support for risk-taking behavior in workplace. Thus, the study states the hypothesis as follows:

H1: CEO transformational leadership influence managerial innovation behavior

CEO transformational leadership and organizational innovation culture

Drawing from TFL theory, extant studies endorsed the ability of CEOs in shaping the organizational environment. For instance, Aragón-Correa, García-Morales, & Cordon-Pozo, (2007), explained the TFL's influence on the development of organizational learning and innovation. In the same context, Waldman et al., (2006), explained the ability of CEOs with TFL qualities to engage their organizations in Corporate social responsibilities. In the same vein, Zuraik & Kelly, (2018), used a case of US-based organizations to explain how CEO's TFL build-up a climate that favors organizational innovation. In the same view, CEO TFL has been associated with the product development process (Sattayaraksa & Boon-itt, 2016). Makri & Scandura, (2010) found a significant impact of creative CEO on innovation in technology firms. In line with Kang et al., (2015), we hope that CEO as the highest-ranking executive in the organization would promote innovation culture by creating opportunities for new knowledge, facilitating knowledge sharing, and mobilize resources for innovation within an organizational setting. Thus, the study states the hypothesis as follows:

H2: CEO transformational leadership influence organizational innovation culture

Organizational innovation culture and managerial innovation

According to Perez Jolles, McBeath, Carnochan, & Austin, (2016), innovation-supporting environment equips the organization with adequate strategies that encourage employee's new ideas, building a charming innovation team, assist brainstorming practices and create flexible working conditions that advance organizational innovativeness. In this view, Damanpour, (2014), argued that management innovation would flourish if the organization support managers to rejuvenate from traditional managerial processes, principles, practices and embrace new managerial approaches that cultivate organizational performance.

Innovation culture fortifies employee's creative performance (Kang et al., 2015; Panuwatwanich, Stewart, & Mohamed, 2008). However, in line with these arguments from the literature, we hope that organizational innovation culture arouses managerial innovation behavior due to its ability to encourage new methods and strategies in the workplace (Aksoy, 2017). In the same view, (Volberda et al., (2014b) added that, when innovation culture is settled, managers are likely to advance new management practices, processes, and structures within the organization.

Our model is suggesting a significant influence of innovation culture to managerial innovation behavior is consistent with several studies in the literature. For instance, Dobni, (2008) argued that innovation culture shapes a convenient environment that vitalizes innovative activities in the workplace. In this regard, such an atmosphere would produce managerial innovation behavior within the organization. In the same view, as indicated by Linke & Zeffass, (2011), innovation culture would promote management innovation behavior through simplifying internal communication and knowledge sharing within the organizational system. In the same vein, Shanker, Bhanugopan, van der Heijden, & Farrell, (2017) added that organizational innovation culture set to become a vital aspect in framing innovation supporting a climate that promotes managerial innovation behavior. However, in line with previous studies that associated innovation culture with the different organizational outcomes like organizational performance (Padilha & Gomes, 2016), organizational innovativeness (Harbi et al., 2014), product development (Sattayaraksa & Boon-itt, 2016), resistance to change (Terziovski, 2010), we thus state the following hypothesis:

H3: Organizational innovation culture positively influences managerial innovation behavior

The moderating role of cross-functional integration

Several studies in the literature linked cross-functional integration with different organizational outcomes, for examples, cross-functional integration feed collaborations and jointly problem solutions,(Bendig et al., 2018; Hirunyawipada et al., 2010). Cross-functional integration acts as a conductor of managerial innovation as it helps to create new knowledge internally to improve its managerial capabilities and practices (Zhongfeng et al., 2018). Hirunyawipada et al., (2010) added that Cross-functional integration typically enhances internal communication and cooperation among organizational, functional units. Additional to this view, cross-functional integration eliminates conflicts and contradictions among departments within the organization (Zhongfeng et al., 2018). In the same view, cooperation among firm functional units is set to become vital for firm performance (Bendig et al., 2018). Cross-functional integration would flourish when different functional units are encouraged to cooperate in order to achieve overall corporate goals (Strese et al., 2016). Thus, the study states the hypothesis as follows:

H4: Cross-functional integration moderates the relationship between CEO TFL and managerial innovation behavior

Research Methodology

Sample and procedure of data collection

A cross-sectional design was conducted with the sample size of 434 employees from 24 SMEs operating in Rwanda to test the hypotheses proposed in this study. Our procedure of data collection started by requesting permission from general managers of selected (random selection) SMEs registered in Rwanda development board, then the HR office of each selected enterprise provided a list of managers who were fully available during the survey and due to the narrow structure of SMEs all respondents (managers) used in this study frequently work directly with general managers in their enterprises. Our survey questionnaire was distributed in two phases to minimize possible common method bias. 464 copies of survey questionnaire were distributed in the first phase, rating CEO transformational leadership, cross-functional integration and innovation culture within their organizations. 60 days later, 464 copies of the survey questionnaire were distributed to the same respondents rating their managerial innovation behaviors. After matching time-lag of data collection, the total 446 questionnaires (96% of response rate) for both phases were completed and returned. During the data screening process, 12 questionnaires were found untrustworthy and dropped, such as missing complete information or filling in the same score for all items. Finally, the total 434 questionnaires were fully completed around 93% of the total response rate.

Measurement

To test the relationship between the variables in this study, we used multi-item scales adopted from prior studies in the literature. Aside from the general identification of respondents, all other items were measured on a seven-point Likert-type scale where (1) strongly disagree to (7) strongly agree. **Managerial innovation behavior.** We used six items adopted by Zhongfeng et al., (2018), measuring capabilities of integrating logistics system, human resource management, financial management, cost control, marketing and forecasting accuracies on returns and profits,(Birkinshaw et al., 2008; Hamel, 2006). **Innovation culture.** We adopted a short measure of 6 items used by Terziovski, (2010; Sattayaraksa & Sakun Boon-itt, (2016). **CEO transformational leadership.** We used Global transformational leadership scale (GTL) developed by Carless, Wearing, & Mann, (2000), this shorten scale is evidenced to have a high degree of convergent validity compared to other leadership measurement scales (Ghadi et al., 2012), this scale is also brief, quick and easy to administer (Şahin, Gürbüz & Şeşen 2017; Carless et al., 2000). **Cross-functional integration.** We used five items adopted by Zhongfeng et al., (2018). **Control variables.** In line with Bligh, Kohles, & Yan, (2018); Chang, (2016); Vaccaro et al., (2012), we controlled the age, gender, and tenure of managers to rule out the alternative effects of these variables.

Common Method Variance

Two widely adopted approaches namely; variance inflation factor (VIF) suggested by (Kock & Lynn, 2012) and Harman's one-factor recommended by Organ & Kovovsky, (1989), was used to test possible common method bias in this study, due to the fact that the data were collected from the same source. The results from the two tests indicated that common method bias was not detected in this study. For instance, Harman's one-factor results revealed that the first factor explained 34.9% which is below the cutoff of 50% suggested. Variance inflation factor (VIF) results indicated that all variables in the study were below 3.3 recommended.

Findings

Procedures for Data Analysis

To conduct confirmatory factor analysis (CFA) and reliability analysis, a two-step modeling approach as suggested by Anderson & Gerbing, (1988) were conducted using AMOS version 23. In the first step, we conducted CFA for each construct to examine measurement validity of the constructs. In the second step, we conducted CFA for structural paths to test the relationship among all variables in the model. We also used a bootstrapping technique developed by Hayes, (2009) using both Amos 23 and SPSS 24 to test the hypothesis in the study deeply.

We adopted this emerging approach because of its adequacy, as suggested by Fairchild & MacKinnon, (2009); Hayes, (2009), this valid and impressive approach does not require normality assumptions.

First step: Assessment of measurement model

In this step, we adopted two types of indices which include; absolute fit indices and incremental fit indices suggested by Hu & Bentler, (1998). In this view, we examined the widely adopted fit indices namely; χ^2/df , instead of χ^2 Since it is sensitive to sample size, (Shah & Goldstein, 2006), Hair, Black, Babin, & Anderson, (2010) suggested <3.00 cutoff. Root Mean Square Error of Approximation (RMSEA), Standardized Root-Mean-Square Residual (SRMR), with ≤ 0.08 cutoff (Hu & Bentler, 1998). We have also tested the Tucker-Lewis Index (TLI) and comparative-fit index (CFI), ≥ 0.90 cutoffs (Hu & Bentler, 1998 ; Hair et al., 2010). As presented in table I, the CFA results indicate that all constructs have adequate fit in the data.

Table 1: Validity and reliability of the constructs

Constructs	χ^2/df	TLI	CFI	SRMR	RMSEA
CEO TFL	2.412	.97	.98	<0.05	.05
MI	1.819	.99	.99	<0.05	.04
IC	2.209	.98	.99	<0.05	.05
CFI	.833	1.00	1.00	<0.05	<0.05

CEO TFL= CEO transformational leadership/ MI= Managerial innovation

IC= Innovation culture/ CFI= Cross-functional integration

In line with Fornell & Larcker, (1981), we have used Confirmatory factor analysis (CFA), to examine composite reliability (CR) and average variance extracted (AVE). In this study, we have also conducted Cronbach alpha, (Cronbach, 1951) to measure internal consistency and Kaiser-Meyer-Olkin (KMO) to measure sampling adequacy for each variable in the model. (Panuwatwanich et al., 2008) Using SPSS a version 24. The results presented in table II, show that AVE, CR, KMO, and Cronbach alpha are within recommended ranges. (i.e. AVE>0.50, CR>0.70 & α >0.60, KMO>0.60). Fornell & Larcker, (1981); Cronbach, (1951); Panuwatwanich et al., (2008).

Table 2: Findings on the measurement model

Constructs	Items	Loadings	α	KMO	CR	AVE
MI	MI1	.68	.893	.856	.88	.55
	MI2	.732				
	MI3	.72				
	MI4	.784				
	MI5	.807				
	MI6	.742				
IC	IC1	.787	.882	.868	.87	.55
	IC2	.643				
	IC3	.704				
	IC4	.785				
	IC5	.693				
	IC6	.822				
TFL	TFL1	.694	.869	.850	.85	.50
	TFL2	.743				
	TFL3	.676				
	TFL4	.61				
	TFL5	.712				
	TFL6	.66				
	TFL7	.674				
CFI	CFI1	.931	.918	.857	.89	.64
	CFI2	.744				
	CFI3	.73				
	CFI4	.791				
	CFI5	.8				

CR=composite reliability, AVE= average variance extracted, KMO=Kaiser-Meyer-Olkin

Second step: Structural model assessment

In line with Peterson, Walumbwa, Byron, & Myrowitz, (2009), we tested two alternative models in comparison with our baseline model of four constructs to find out which model has adequate fit in the data, As indicated in table III, the CFA results suggested that our hypothesized (baseline) model show adequate fit in data compared with other alternative models.

Table 3: CFA results, Comparison of the alternative models

Models	χ^2	$\Delta \chi^2$	χ^2/df	TLI	CFI	SRMR	RMSEA
Baseline model (**)	645.148	-	2.932	0.92	0.94	0.04	0.06
3 constructs model (***)	680.962	35.814	4.601	0.87	0.88	0.06	0.09
1 construct model (*)	1966.656	1285.6	8.514	0.68	0.73	0.14	0.11

***= Transformational leadership, managerial innovation, and innovation culture were merged

*= all factors were merged

**= Transformational leadership, managerial innovation, innovation culture, and cross-functional integration were merged

Hypotheses testing

Alongside with the CFA results revealed the adequate fit of our baseline model, (i.e., $\chi^2=645.148$, $\chi^2/df=2.932$, TLI=0.92, CFI=0.94, SRMR=0.04 & RMSEA=0.06), we have also analyzed correlations among the variables using descriptive and inferential statistical tools in order to test the hypotheses of this study. The results revealed that all four hypotheses proposed in this study adequately fitted in the data (see, table III.). The results proved a positive relationship between CEO TFL and managerial innovation ($r=0.43$; $p < 0.01$)

and also between CEO TFL and innovation culture ($r=0.40$; $p < 0.01$). Thus, Hypothesis 1& two were supported. In the same results, innovation culture showed a positive relationship with managerial innovation ($r=0.55$; $p < 0.01$). Thus, hypothesis 3 is supported. The same results also revealed that cross-functional integration influences managerial innovation behavior ($r=0.42$; $p < 0.01$). Thus, hypothesis 4 was supported, confirming the moderation effect of cross-functional integration in the model.

Table 4: Descriptive statistics and inter-correlations

	M	SD	1	2	3	4	5	6	7	8
1. Age	3.06	0.846	1.00							
2. Gender	1.47	0.500	.33**	1.00						
3. Tenure	3.95	1.242	-.10*	-.36**	1.00					
4. Education	5.26	0.657	0.07	-.26**	.35**	1.00				
5. TFL	27.4332	13.20425	-0.08	-.26**	.19**	0.09	1.00			
6. MI	26.0760	12.58087	-0.04	-.31**	.27**	.28**	.43**	1.00		
7. IC	29.5161	12.24334	-.25**	-.27**	.13**	0.06	.40**	.55**	1.00	
8. CFI	23.0415	11.11885	-.13**	-.26**	.28**	.17**	.21**	.42**	.27**	1.00

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

N=434

Mediation analysis

In order genuinely examine the mediating effect proposed in the model, we adopted bootstrapping techniques using Haye's Process Macro developed by Hayes (2009), to thoroughly measure the potential effect of meditation suggested in the model. This emerging approach in social science studies has been evidenced to produce indispensable information for mediation analysis. (Hayes 2009 ; Fairchild & MacKinnon, 2009). In this regard, using Haye's Process Macro in SPSS 24, we conducted a bootstrapping procedure with 5000 resample. The main three paths in the structural model were tested as recommended by Hayes (2009), to confirm whether there is mediation or non-mediation in the hypothesized model. As presented in table IV, the bootstrapping the results revealed that all paths in the model are significant. In the same vein, the results also show that zero does not lie in between the confidence intervals (see Appendix II). The results also indicated that the relationship between IV & DV is weakened by the introduction of mediation in the model (.4123>.2409). It is, however, against these results that we confirm the mediation effect in the study.

Table 5: Path analysis using Hayes bootstrapping matrix

Paths	Prediction results
CEO TFL → IC (Path-a)	a. $F(1,432) = 82.9, p < 0.01, R^2 = .161$ b. $b = .3721, t(432) = 9.10, p < 0.01$
CEO TFL → IC → MI (Path-b, c')	a. $F(2,431) = 119, p = p < 0.01, R^2 = .3559$ i. $b = .46, t(431) = 10.6, p < 0.01 (M \rightarrow Y, \text{path-b})$ ii. $b = .2409, t(431) = 5.99, p < 0.01 (X \rightarrow Y, \text{path-c'})$
CEO TFL → Y (Path-c)	a. $F(432) = 99.5, p < 0.01, R^2 = .187$ b. $b = .4123, t(432) = 9.97, p < 0.01$

Moderation analysis

To evaluate more specifically whether cross-functional integration moderates the relationship between TFL and managerial innovation behavior, we used multiple regression analysis based on Haye's Process Macro using SPSS version 24. The results indicate that moderation is positively and significantly affect the variable relationship. The summary results indicate that, $R = .5755, R^2 = .311, \text{MSE} = 106.6038, F = 70.9632, \text{df}_1 = 3.0000, \text{df}_2 = 430, p < 0.001$. As suggested by Hayes (2009), the moderation effect in the model is also confirmed by the fact that zero does not lie in between the bias-corrected bootstrap confidence intervals (CI).

Hayes (2009), also suggested drawing the plot for the conditional effect of the focal predictor. In this regard, we plotted the interaction effect of Cross-functional integration in relation to CEO TFL and managerial innovation behavior. As indicated in figure 1, the results show that cross-functional integration plays a pivotal role in the relationship between CEO TFL and managerial innovation behavior, such that the relationship between CEO TFL and managerial innovation is more positive with high than with low cross-functional integration within an organizational setting. Thus, the hypothesis stating that cross-functional integration moderates the relationship between CEO TFL and managerial innovation behavior is supported.

Table 6: Model summary outcomes/managerial innovation behavior

Constructs	Coeff	SE	t	LLCI/95%	ULCI/95%
TFL	.6072 ***	0.955	6.3563	.4195	.7950
CFI	.6869***	.1026	6.6932	.4852	.8887
Int. Eff.	-.0106**	.0035	-3.0391	-.0175	-.0038

***=p<0.001

**=p<0.005

Table 7: Conditional effects of the focal predictor at values of the moderator

CFI	Coeff	SE	t	LLCI	ULCI
9.0000	.5116***	.0679	7.5341	.3781	.6451
29.0000	.2991***	.0408	7.3296	.2189	.3793
35.0000	.2354***	.0518	4.5400	.1335	.3373

***=p<0.001

Figure 1: Plot of moderation effect

Discussion

The primary purpose of this study was to examine the role of TFL qualities at the top management level in reinforcing managerial innovation behavior in the hierarchical management structure of SMEs. In this study, TFL theory underlies the new mechanisms that link CEO TFL with managerial innovation behavior, using the mediating effect of organizational innovation culture and the moderating effect of cross-functional integration in this relationship. As hypothesized in the study, the findings revealed that CEO TFL energizes both organizational culture and managerial innovation behavior within the organization. Hence, H1 & H2 are supported. This relationship is also consistent with the TFL theory, for example, Bass (2000), used the TFL theory to explain the relationship between transformational leaders, organizational effectiveness, innovativeness, and commitment. Bass et al. (2003) added that leaders with TFL behavior arouse follower's efforts to be innovative. In the same vein, Vaccaro et al. (2012), evidenced the top leader's ability to persuade managerial innovation behavior within the organization.

In the same view, the relationship between managerial innovation and organizational innovation culture were also supported. Thus, H3 is supported. The relationship between innovation culture and managerial innovation behavior is consistent with various studies in the literature. For instance, Aksoy, (2017), found a positive relationship between innovation culture and product innovation in SMEs. According to Dobni, (2008), organizational innovation culture strengthens organizational performance. The findings also revealed that cross-functional integration moderates the relationship between CEO TFL and managerial innovation behavior, such that, managers would display more innovation behavior with high rather than low cross-functional integration within an organizational system. However, H4 is supported. This relationship is also consistent with other studies in the literature, such as, Zhongfeng et al. (2018), who found a positive relationship between cross-functional integration and managerial innovation. (Sattayaraksa & Boon-itt 2016), linked cross-functional integration with New NPD process. However, drawing from TFL theory and extant conceptual arguments from the literature, this study extends the current understanding on the possible role of the top managerial level TFL in stimulating managerial innovation behavior within the hierarchical management structure of SMEs.

Theoretical contributions and managerial implications

The rationale underlying the model developed in this study is based on TFL theory. This widely used theory in management studies (Jung et al., 1995), was developed firstly by James MacGregor Burns in 1978 (Bass et al. 2003), later in 1985, Bernard M. Bass extended the work of Burns (Bass, 2000). In this theory, Bass explained the psychological mechanisms that underlie transforming and transactional leadership (Bass et al., 2003). TFL qualities have been abundantly linked with different organizational outcomes, like innovation behavior, employee's creativity, product development process, and performance (Peterson et al. 2009; Waldman et al. 2006; Sattayaraksa & Boon-itt, 2016; De Jong & Den Hartog, 2007; Afsar et al., 2014). The role of TFL at the top executive level in the organization to managerial-level innovation behavior is not yet developed. In this regard, given the fact that transformational leader's ability to fuel innovation behavior has been testified in TFL theory and by several studies in the literature, (Afsar et al. 2014; Kang et al. 2015; Choi, Kim, Ullah, & Kang 2016), we suppose that TFL qualities at top executive level in organization is set to play a vital role in building innovation culture within an organizational system and stimulating managerial innovation behavior among the followers (managers).

The new model developed in this study is consistent with various studies in the literature. For instance, Harbi et al., (2014), indicated that innovation culture could arouse innovativeness in SMEs. Chang, (2016), added that multi-level TFL might encourage management innovation. Hirunyawipada et al., (2010) ; Bendig et al., (2018), found a relationship between cross-functional integration with new product development. Jung et al. (1995), found a positive relationship between leadership style and culture. Jung linked TFL with organizational innovation. Khalili, (2016) found a positive relationship between TFL and climate for innovation. Vaccaro et al. 2012; Su & Baird, (2017), explained the possible relationship that can be found between leadership and management innovation. Padilha & Gomes, (2016), found a significant influence of innovation culture on the product innovation process. Su et al., (2018), linked cross-functional integration with managerial innovation. Therefore, within this framework, this study extends the current knowledge by employing innovation culture and cross-functional integration in the mechanism of which transformational leaders influence managerial innovation behavior in the hierarchical management structure of SMEs.

However, within the framework of this theoretical and conceptual relationship between leadership and different organizational and individual outcomes, the strength of this study lies on its specific focus to unveiling the pivotal role of top-level executive leadership behavior in advancing innovation behavior in managerial practices and processes within an organizational setting. Another implication of this study is that knowledge is cumulative, every piece of the research adds another piece to it. In this regard, investigating the major factors that stimulate managerial innovation practices especially in SMEs which suffer mostly from limited capital (Olmos-Peñuela, García-Granero, Castro-Martínez, & D'Este, 2017) and also which play a significant role in national economic growth (Curado, 2018), add more understanding about innovation outcomes at managerial level. In the same vein, previous studies focused mostly on large organizations and pay less attention to SMEs (Aksoy, 2017). However, this paper sheds new light on the pivotal role of CEO

TFL to managerial innovation behavior in SMEs which would add surmountable understanding on managerial alternatives in SMEs.

Conclusion

This study used the mediation effect of organizational innovation culture and the moderating effect of cross-functional integration to examine the relationship between CEO TFL and managerial innovation behavior. The findings revealed that the model hypothesized in this study fit adequately in the data. However, we hope that the new model developed in this study extends the current knowledge on the potential impact of organizational top-leaders on organizational innovation outcomes. Aksoy (2017), suggested further studies on manager's role in organizational culture, marketing promotion and product development in SMEs, in this regard, this study uncovers the central role of SMEs top leaders in fostering managerial innovation behavior and developing an organizational culture that supports innovativeness within an organizational setting.

Despite the real contribution of this study to the existing literature, this study still has some limitations and propositions of further studies. First, while management innovation as an emerging construct in management studies would cause more innovation outcomes in the organizations (Damanpour & Aravind, (2012), our study did not produce the outcomes of managerial innovation behavior. It is, however, within this view that we suggest further studies to extend managerial innovation and its final outcomes within the organization. Second, the data used in this study were collected from SMEs operating in Rwanda. However, we suggest replication of similar studies in other countries and more specifically in large organizations, to avoid possible generalizability of the model. Third, this study used the same respondents for all constructs, namely; innovation culture, managerial innovation, CEO transformational leadership, and cross-functional integration. However, this may cause measurement inaccuracy, in this regard, future studies may try to use multiple-respondents for some specific survey questions.

References

- Afsar, B., Badir, Y., & Khan, M. M. (2015). Person-job fit, person-organization fit and innovative work behavior: The mediating role of innovation trust. *Journal of High Technology Management Research*, 26(2), 105–116. <https://doi.org/10.1016/j.hitech.2015.09.001>
- Afsar, B., F. Badir, Y., & Bin Saeed, B. (2014). Transformational leadership and innovative work behavior. *Industrial Management & Data Systems*, 114(8), 1270–1300. <https://doi.org/10.1108/IMDS-05-2014-0152>
- Aksoy, H. (2017). How do innovation culture, marketing innovation and product innovation affect the market performance of small and medium-sized enterprises (SMEs)? *Technology in Society*, 51, 133–141. <https://doi.org/10.1016/j.techsoc.2017.08.005>
- Ali Taha, V., Sirkova, M., & Ferencova, M. (2016). the Impact of Organizational Culture on Creativity and Innovation. *Polish Journal of Management Studies*, 14(1), 7–17. <https://doi.org/10.17512/pjms.2016.14.1.01>
- Aragón-Correa, J. A., García-Morales, V. J., & Cordón-Pozo, E. (2007). Leadership and organizational learning's role on innovation and performance: Lessons from Spain. *Industrial Marketing Management*, 36(3), 349–359. <https://doi.org/10.1016/j.indmarman.2005.09.006>
- Bass, B.M.(1990).From Transactional to Iransformational Leadership :Learning to Share the Vision.*Organizational Dynamics*,18(3),19–32.[https://doi.org/10.1016/0090-2616\(90\)90061-S](https://doi.org/10.1016/0090-2616(90)90061-S)
- Bass, B. M. (2000). The Future of Leadership in Learning Organizations. *Journal of Leadership Studies*, 7(3), 18–40. <https://doi.org/10.1177/107179190000700302>
- Bass, B. M., & Avolio, B. J. (1990). Developing Transformational Leadership: 1992 and Beyond. *Journal of European Industrial Training*, 14(5). <https://doi.org/10.1108/03090599010135122>
- Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology*, 88(2), 207–218. <https://doi.org/10.1037/0021-9010.88.2.207>
- Bass, B. M., & Steidlmeier, P. (1999). Ethics, character, and authentic transformational leadership behavior. *The Leadership Quarterly*, 10(2), 181–217.[https://doi.org/10.1016/S1048-9843\(99\)00016-8](https://doi.org/10.1016/S1048-9843(99)00016-8)

- Bendig, D., Enke, S., Thieme, N., & Brettel, M. (2018). Performance implications of cross-functional coopetition in new product development: the mediating role of organizational learning. *Industrial Marketing Management*, 73(February), 137–153. <https://doi.org/10.1016/j.indmarman.2018.02.007>
- Birkinshaw, J., Hamel, G., & Mol, M. J. (2008). Management innovation. *Academy of Management Review*, 33(4), 825–845.
- Bligh, M. C., Kohles, J. C., & Yan, Q. (2018). Leading and Learning to Change: The Role of Leadership Style and Mindset in Error Learning and Organizational Change. *Journal of Change Management*, 18(2), 116–141. <https://doi.org/10.1080/14697017.2018.1446693>
- Carless, S. A., Wearing, A. J., & Mann, L. (2000). A short measure of transformational leadership. *Journal of Business and Psychology*, 14(3). <https://doi.org/10.1023/A:1022991115523>
- Chang, Y. Y. (2016). Multilevel transformational leadership and management innovation: Intermediate linkage evidence. *Leadership and Organization Development Journal*, 37(2), 265–288. <https://doi.org/10.1108/LODJ-06-2014-0111>
- Chen, A. S. Y., & Hou, Y. H. (2016). The effects of ethical leadership, voice behavior and climates for innovation on creativity: A moderated mediation examination. *Leadership Quarterly*, 27(1), 1–13. <https://doi.org/10.1016/j.leaqua.2015.10.007>
- Choi, S. B., Kim, K., Ullah, S. M. E., & Kang, S. (2016). How transformational leadership facilitates innovative behavior of Korean workers. *Personnel Review*, 45(3), 459–479. <https://doi.org/10.1108/PR-03-2014-0058>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334. <https://doi.org/10.1007/BF02310555>
- Curado, C. (2018). Human resource management contribution to innovation in small and medium-sized enterprises: A mixed methods approach. *Creativity and Innovation Management*, 27(1), 79–90. <https://doi.org/10.1111/caim.12251>
- Damanpour, F. (2014). Footnotes to research on management innovation. *Organization Studies*, 35(9), 1265–1285. <https://doi.org/10.1177/0170840614539312>
- Damanpour, F., & Aravind, D. (2012). Managerial Innovation: Conceptions, Processes, and Antecedents. *Management and Organization Review*, 8(2), 423–454. <https://doi.org/10.1111/j.1740-8784.2011.00233.x>
- De Jong, J. P. J., & Den Hartog, D. N. (2007). How leaders influence employees' innovative behaviour. *European Journal of Innovation Management*, 10(1), 41–64. <https://doi.org/10.1108/14601060710720546>
- Dobni, C. B. (2008). Measuring innovation culture in organizations: The development of a generalized innovation culture construct using exploratory factor analysis. *European Journal of Innovation Management*, 11(4), 539–559. <https://doi.org/10.1108/14601060810911156>
- Fairchild, A. J., & MacKinnon, D. P. (2009). A general model for testing mediation and moderation effects. *Prevention Science*, 10(2), 87–99. <https://doi.org/10.1007/s11121-008-0109-6>
- Faruk Şahin, Sait Gürbüz, H. Ş. (2017). Leaders' managerial assumptions and transformational leadership: the moderating role of gender. *Leadership & Organization Development Journal*, 38(1), 105–125. <https://doi.org/10.1108/LODJ-11-2015-0239>
- Fernández-Esquinas, M., van Oostrom, M., & Pinto, H. (2017). Key issues on innovation, culture and institutions: implications for SMEs and micro firms. *European Planning Studies*, 25(11), 1897–1907. <https://doi.org/10.1080/09654313.2017.1364770>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Francis J. Yammarino and Bernard M. Bass. (1990). transformational leadership and multiple levels of analysis. *SAGE Social Science Collections*, 43(10), 975–995.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*. Vectors. <https://doi.org/10.1016/j.ijpharm.2011.02.019>
- Hamel, G. (2006). The Why, What, and How of Management Innovation. *Havard Business Review*, 84(2), 72. <https://doi.org/10.1080/09537320802557384>

- Harbi, S. El, Anderson, A. R., & Amamou, M. (2014). Innovation culture in small Tunisian ICT firms. *Journal of Small Business and Enterprise Development*, 21(1), 132–151. <https://doi.org/10.1108/JSBED-06-2013-0086>
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76(4), 408–420. <https://doi.org/10.1080/03637750903310360>
- Heyden, M. L. M., Sidhu, J. S., & Volberda, H. W. (2018). The Conjoint Influence of Top and Middle Management Characteristics on Management Innovation. *Journal of Management*, 44(4), 1505–1529. <https://doi.org/10.1177/0149206315614373>
- Hirunyawipada, T., Beyerlein, M., & Blankson, C. (2010). Industrial Marketing Management Cross-functional integration as a knowledge transformation mechanism : Implications for new product development. *Industrial Marketing Management*, 39(4), 650–660. <https://doi.org/10.1016/j.indmarman.2009.06.003>
- Hollen, R. M. A., Van Den Bosch, F. A. J., & Volberda, H. W. (2013). The Role of Management Innovation in Enabling Technological Process Innovation: An inter-organizational perspective. *European Management Review*, 10(1), 35–50. <https://doi.org/10.1111/emre.12003>
- Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, 3(4), 424–453. <https://doi.org/10.1037//1082-989x.3.4.424>
- Jaiswal, N. K., & Dhar, R. L. (2015). Transformational leadership, innovation climate, creative self-efficacy and employee creativity: A multilevel study. *International Journal of Hospitality Management*, 51, 30–41. <https://doi.org/10.1016/j.ijhm.2015.07.002>
- James C. Anderson & David W. Gerbing. (1988). Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411–423.
- Jung, D. I., Bass, B. M., & Sosik, J. J. (1995). Bridging Leadership and Culture: A Theoretical Consideration of Transformational Leadership and Collectivistic Cultures. *Journal of Leadership Studies*, 2(4), 3–18. <https://doi.org/10.1177/107179199500200402>
- Jung, D. I., Chow, C., & Wu, A. (2003). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *Leadership Quarterly*, 14(4–5), 525–544. [https://doi.org/10.1016/S1048-9843\(03\)00050-X](https://doi.org/10.1016/S1048-9843(03)00050-X)
- Kang, J. H., Solomon, G. T., & Choi, D. Y. (2015). CEOs' Leadership styles and managers' Innovative behaviour: Investigation of intervening effects in an entrepreneurial context. *Journal of Management Studies*, 52(4), 531–554. <https://doi.org/10.1111/joms.12125>
- Khalili, A. (2016). Linking transformational leadership, creativity, innovation, and innovation-supportive climate. *Management Decision*, 54(9), 2277–2293. <https://doi.org/10.1108/MD-03-2016-0196>
- Kock, N., & Lynn, G. S. (2012). Lateral Collinearity and Misleading Results in Variance-Based SEM : An Illustration and Recommendations. *Journal of the Association for Information Systems*, 13(7), 546–580.
- Linke, A., & Zeffass, A. (2011). Internal communication and innovation culture: developing a change framework. *Journal of Communication Management*, 15(4), 332–348. <https://doi.org/10.1108/13632541111183361>
- Makri, M., & Scandura, T. A. (2010). Exploring the effects of creative CEO leadership on innovation in high-technology firms. *Leadership Quarterly*, 21(1), 75–88. <https://doi.org/10.1016/j.leaqua.2009.10.006>
- Mol, M. J., & Birkinshaw, J. (2014). The role of external involvement in the creation of management innovations. *Organization Studies*, 35(9), 1287–1312. <https://doi.org/10.1177/0170840614539313>
- Neves, P., & Eisenberger, R. (2014). Perceived organizational support and risk taking. *Journal of Managerial Psychology*, 29(2), 187–205. <https://doi.org/10.1108/JMP-07-2011-0021>
- Nieves, J. (2016). Outcomes of Management Innovation: An Empirical Analysis in the Services Industry. *European Management Review*, 13(2), 125–136. <https://doi.org/10.1111/emre.12071>
- Olmos-Peñuela, J., García-Granero, A., Castro-Martínez, E., & D'Este, P. (2017). Strengthening SMEs' innovation culture through collaborations with public research organizations. Do all firms benefit equally *European Planning Studies*, 25(11), 2001–2020. <https://doi.org/10.1080/09654313.2017.1279592>

- Organ, D. W., & Kovovsky, M. (1989). Cognitive versus affective determinants of organizational citizenship behavior. *Journal of Applied Psychology*, 74(1), 157–164.
- Padilha, C. K., & Gomes, G. (2016). Innovation culture and performance in innovation of products and processes: a study in companies of textile industry. *RAI Revista de Administração e Inovação*, 13(4), 285–294. <https://doi.org/10.1016/j.rai.2016.09.004>
- Panuwatwanich, K., Stewart, R. A., & Mohamed, S. (2008). The role of climate for innovation in enhancing business performance: The case of design firms. *Engineering, Construction and Architectural Management*, 15(5), 407–422. <https://doi.org/10.1108/09699980810902712>
- Park, S., & Jo, S. J. (2018). The impact of proactivity, leader-member exchange, and climate for innovation on innovative behavior in the Korean government sector. *Leadership and Organization Development Journal*, 39(1), 130–149. <https://doi.org/10.1108/LODJ-09-2016-0216>
- Perez Jolles, M., McBeath, B., Carnochan, S., & Austin, M. J. (2016). Factors Associated With Managerial Innovation in Public Human Service Organizations. *Human Service Organizations: Management, Leadership & Governance*, 40(4), 421–434. <https://doi.org/10.1080/23303131.2016.1184208>
- Peterson, S. J., Walumbwa, F. O., Byron, K., & Myrowitz, J. (2009). CEO positive psychological traits, transformational leadership, and firm performance in high-technology start-up and established firms. *Journal of Management*, 35(2), 348–368. <https://doi.org/10.1177/0149206307312512>
- Shah, R., & Goldstein, S. M. (2006). Use of structural equation modeling in operations management research: Looking back and forward. *Journal of Operations Management*, 24(2), 148–169. <https://doi.org/10.1016/j.jom.2005.05.001>
- Shanker, R., Bhanugopan, R., van der Heijden, B. I. J. M., & Farrell, M. (2017). Organizational climate for innovation and organizational performance: The mediating effect of innovative work behavior. *Journal of Vocational Behavior*, 100, 67–77. <https://doi.org/10.1016/j.jvb.2017.02.004>
- Strese, S., Meuer, M. W., Flatten, T. C., & Brettel, M. (2016). Organizational antecedents of cross-functional cooperation: The impact of leadership and organizational structure on cross-functional cooperation. *Industrial Marketing Management*, 53, 42–55. <https://doi.org/10.1016/j.indmarman.2015.11.006>
- Su, S., & Baird, K. (2017). The role of leaders in generating management innovation†. *International Journal of Human Resource Management*, 51(92), 1–22. <https://doi.org/10.1080/09585192.2017.1282533>
- Terzioviski, M. (2010). Innovation practice and its performance implications in small and medium enterprises (smes) in the manufacturing sector: a resource-based view. *Strategic Management Journal*, 31(8), 892–902. <https://doi.org/10.1002/smj>
- Tharnpas Sattayaraksa, Sakun Boon-itt. (2016). CEO transformational leadership and the new product development process The mediating roles of organizational. *Leadership & Organization Development Journal*, 37(6), 730–749. <https://doi.org/10.1108/LODJ-10-2014-0197>
- Troy, L. C., Hirunyawipada, T., & Paswan, A. K. (2008). New Product Success : An Empirical. *Journal of Marketing*, 72(November), 132–146.
- Vaccaro, I. G., Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2012). Management innovation and leadership: The moderating role of organizational size. *Journal of Management Studies*, 49(1), 28–51. <https://doi.org/10.1111/j.1467-6486.2010.00976.x>
- Volberda, H. W., Van Den Bosch, F. A. J., & Heij, C. V. (2013). Management innovation: Management as fertile ground for innovation. *European Management Review*, 10(1), 1–15. <https://doi.org/10.1111/emre.12007>
- Volberda, H. W., Van Den Bosch, F. A. J., & Mihalache, O. R. (2014a). Advancing management innovation: Synthesizing processes, levels of analysis, and change agents. *Organization Studies*, 35(9), 1245–1264. <https://doi.org/10.1177/0170840614546155>
- Volberda, H. W., Van Den Bosch, F. A. J., & Mihalache, O. R. (2014b). Advancing management innovation: Synthesizing processes, levels of analysis, and change agents. *Organization Studies*, 35(9), 1245–1264. <https://doi.org/10.1177/0170840614546155>

- Waldman, D. A., Siegel, D. S., & Javidan, M. (2006). Components of CEO Transformational Leadership and Corporate Social Responsibility Components of CEO Transformational Leadership. *Journal of Management Studies* <https://doi.org/10.1111/j.1467-6486.2006.00642.x>
- Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S., & Peterson, S. J. (2008). Authentic Leadership: Development and Validation of a Theory-Based Measure†. *Journal of Management*, 34(1), 89–126. <https://doi.org/10.1177/0149206307308913>
- Walumbwa, F. O., Lawler, J. J., Avolio, B. J., Peng Wang, & Kan Shi. (2005). Transformational Leadership and Work-Related Attitudes: The Moderating Effects of Collective and Self-Efficacy Across Cultures. *Journal of Leadership & Organizational Studies*, 11(3), 2–16. <https://doi.org/10.1177/107179190501100301>
- Yasin Ghadi, M., Fernando, M., & Caputi, P. (2012). Transformational leadership and work engagement. *Leadership & Organization Development Journal*, 34(6), 532–550. <https://doi.org/10.1108/LODJ-10-2011-0110>
- Zhongfeng, Chen, J., & Wang, D. (2018). Technology Analysis & Strategic Management Organisational structure and managerial innovation: the mediating effect of cross- functional integration. *Technology Analysis & Strategic Management*, 1–13. <https://doi.org/10.1080/09537325.2018.1495324>
- Zuraik, A., & Kelly, L. (2018). The role of CEO transformational leadership and innovation climate in exploration and exploitation. *European Journal of Innovation Management*, 40(2), 412–432. <https://doi.org/10.1108/EJIM-10-2017-0142>

ANNEX

Appendix I: Existing literature on management innovation

Selected studies	IV	DV	Mediator (s)	Moderator	Journals
Hayden et al.,2015	The Conjoint Influence of Top and Middle Management Characteristics	Management innovation	professional characteristics/ biodemographic characteristics	-	Journal of Management
Chang,2014	Multilevel transformational leadership	management innovation	Firm-level Empowerment Climate/ Unit-level Trust	-	Leadership & Organization Development Journal
Magnier-Watanabe & Benton,2017	Management innovation	Firm performance	tacit and explicit knowledge	-	Knowledge Management Research & Practice
Sophia Su & Kevin Baird,2017	leaders	management innovation	leadership style/ use of controls		The International Journal of HRM
Vaccaro et al.,2012	Transformational leadership and transactional leadership	Management innovation		Organizational Size	Journal of Management Studies
Jolles,2016	Managerial Innovation	Innovation	individual characteristics		Human Service Organizations
Damanpour,2014	Footnotes to Research on Management Innovation	-	-	-	Organization Studies
Mol et.,2014	External Involvement	Management innovations	-	-	Organization Studies
Volberda et al.,2014	Synthesizing Processes, Levels of Analysis, and Change Agents	Management innovation	-	-	Organization Studies
Damanpour & Aravind,2011	Managerial Innovation: Conceptions, Processes, and Antecedents	-	-	-	Management and Organization Review
NIEVES,2016	Outcomes of Management Innovation	firms' success.	-	-	European Management Review
Hamel,2012	Why, What, and How of Management Innovation	-	-	-	Harvard business review
Volberda,2013	Managerial antecedents	Managerial innovation	Firm performance/ productivity growth	-	European Management Review

IV= independent variable DV= dependent variable

Appendix II: Hayes bootstrapping matrix (mediation analysis)

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 3.1 ***** Written by Andrew F. Hayes, Ph.D.

Model: 4

Y: MI (managerial innovation)

X: TFL (transformational leadership)

M: IC (innovation culture)

Sample

Size: 434

OUTCOME VARIABLE:

IC

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.4014	.1611	126.0439	82.9506	1.0000	432.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	19.3070	1.2437	15.5232	.0000	16.8624	21.7515
TFL	.3721	.0409	9.1077	.0000	.2918	.4525

OUTCOME VARIABLE:

MI

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.5965	.3559	102.4257	119.0572	2.0000	431.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	5.8710	1.3994	4.1954	.0000	3.1205	8.6214
TFL	.2409	.0402	5.9910	.0000	.1619	.3200
IC	.4606	.0434	10.6204	.0000	.3754	.5459

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

MI

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.4328	.1873	128.9314	99.5579	1.0000	432.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	14.7641	1.2579	11.7370	.0000	12.2917	17.2365
TFL	.4123	.0413	9.9779	.0000	.3311	.4936

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
.4123	.0413	9.9779	.0000	.3311	.4936	.0328	.4328

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps	c'_cs
.2409	.0402	5.9910	.0000	.1619	.3200	.0192	.2529

Indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI
IC	.1714	.0258	.1249

Partially standardized indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI
IC	.0136	.0020	.0101

Completely standardized indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI

IC .1799 .0261 .1321 .2333
***** ANALYSIS NOTES AND ERRORS *****
Level of confidence for all confidence intervals in output:
95.0000
Number of bootstrap samples for percentile bootstrap confidence intervals; 5000
----- END MATRIX -----

Appendix III: Hayes bootstrapping matrix (moderation analysis)

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 3.1 *****Written by Andrew F. Hayes, Ph.D.

Model: 1

Y: MI (managerial innovation)

X: TFL (transformational leadership)

W: CFI (cross-functional integration)

Sample

Size: 434

OUTCOME VARIABLE:

MI

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.5755	.3311	106.6038	70.9632	3.0000	430.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	26.3993	.5069	52.0801	.0000	25.4030	27.3956
TFL	.3573	.0387	9.2248	.0000	.2812	.4334
CFI	.3955	.0446	8.8654	.0000	.3078	.4832
Int_1	-.0106	.0035	-3.0391	.0025	-.0175	-.0038

Product terms key:

Int_1: TFL x CFI

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0144	9.2360	1.0000	430.0000	.0025

Focal predict: TFL (X)

Mod var: CFI (W)

Conditional effects of the focal predictor at values of the moderator(s):

CFI	Effect	se	t	p	LLCI	ULCI
-14.5253	.5116	.0679	7.5341	.0000	.3781	.6451
5.4747	.2991	.0408	7.3296	.0000	.2189	.3793
11.4747	.2354	.0518	4.5400	.0000	.1335	.3373

Data for visualizing the conditional effect of the focal predictor:

Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/

TFL CFI MI.

BEGIN DATA.

-13.4332	-14.5253	13.7819
-2.4332	-14.5253	19.4095
16.5668	-14.5253	29.1299
-13.4332	5.4747	24.5463
-2.4332	5.4747	27.8368
16.5668	5.4747	33.5203

-13.4332 11.4747 27.7756
-2.4332 11.4747 30.3649
16.5668 11.4747 34.8374

END DATA.

GRAPH/SCATTERPLOT=

TFL WITH MI BY CFI.

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output: 95.0000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

NOTE: The following variables were mean centred prior to analysis:

CFI TFL

----- END MATRIX -----