



Green innovation and environmental performance: The role of green transformational leadership and green human resource management

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ABSTRACT

Drawing upon the resource-based view and the ability-motivation-opportunity theory, we examined how green human resource management interplays on to the linkages amongst green transformational leadership, green innovation and environmental performance. Using a survey questionnaire, we collected triadic data from 309 manufacturing sector small and medium-sized enterprises (SMEs). We used covariance-based structural equation modeling (SEM) to examine hypotheses in this study. Results of the study suggest that green HRM practices mediates the influence of green transformational leadership on green innovation. We also found that green HRM indirectly through green innovation influences firm's environmental performance. Overall, the findings of our study support all hypotheses of direct and indirect effects and have several theoretical and practical implications. Finally, our study significantly advances theory and suggests that HRM-performance relationship neither depends upon the additive effect of green transformational leadership and green innovation as antecedent and mediator, respectively, nor on their interactive effect but a mix of both combinational forms (ie., additive and interactive) to affect firm environmental performance. Overall, our study contributes and advances the previous studies wherein in leadership plays critical role to influence the HRM practices and that in turn to predict green innovation in the organization.

1. Introduction

Extant literature on organizational sustainability and sustainable uses of resources focused on large than small and medium size firms (Fassin et al., 2011), whereas small and medium-sized enterprises (SMEs) that together produce large portion of the environmental impacts from commercial activities remain under researched in the academic literature (Boiral et al., 2019; Tang and Tang, 2012). However, increased pressure from stakeholders to implement environmental management initiatives (Yu et al., 2017; Yu and Ramanathan, 2015; Chen and Chang, 2013) has become rule of business for firms across industry and geography to engage in green process and product development. It calls upon firm to rely on intangible resources to address the intricacy of environmental sustainability issues and respond in a manner to handle varied stakeholder pressures (Singh and El-Kassar, 2019; Dubey et al., 2015). Previous studies suggest that employees across function and levels in organization exert significant

influence on environmental performance (Del Giudice and Della Peruta, 2016; Dubey et al., 2015; Lewis et al., 2014) but the key role of the top management becomes critical as s/he has large latitude to make influence on the firm environmental performance (Singh and El-Kassar, 2019; Hambrick and Quigley, 2014).

Environmental management systems in organization depends upon developing and sustaining their internal competences and capabilities (Biscotti et al., 2018; Russo 2009; Yin and Schmeidler 2009) and wherein SMEs have been found as major defaulters due to shortfalls of employees' abilities and motivation combined with required organizational capabilities to address complex challenges of environmental sustainability (Boiral et al., 2014). We posit that leadership and HRM (Leroy et al., 2018) are involved in developing firm's internal competences and capabilities that are essential for people management in SMEs but from different perspectives (Leroy et al., 2018). At the same time, the past studies suggest that organizational culture (Brettel et al., 2015), employee's voice (Elsetouhi et al., 2018) alongwith employees'

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psychological traits (Palmer et al., 2019) explains SMEs performance. However, we propose that leadership which emphasizes understanding, predicting and controlling of personal and interpersonal dynamics of how employees affect each other towards shared goals (Northouse, 2015) and HRM practices that takes care of systems and processes to influence employees in an orderly manner on a bigger scale (Lievens, 2015) could be best predictors to enhance green innovation and green performance in SMEs, especially in society like the UAE which is relatively high on power-distance (AlMazrouei et al., 2016; Abdulla et al., 2011).

We speculate that top management of the SMEs should practice green transformational leadership (Chen and Chang, 2013) and green human resource management practices (Jia et al., 2018; Renwick et al., 2013) to create and support internal competencies necessary for green innovation (Zhou et al., 2018; Chen and Chang, 2013) to attain environmental performance (Chen and Chang, 2013; Chen et al., 2006). Our study attempts to find answers to two relevant research questions namely, (a). How green HRM affects green innovation performance of SMEs?, and (b). Does green transformational leadership relevant for implementation and use of green HRM practices for SMEs' green innovation and performance? We draw upon resource-based view (RBV: Barney, 1991) and the ability-motivation-opportunity (AMO) theory (Appelbaum et al., 2000) to explain how green transformational leadership as strategic resources and green human resource management practices help attract, develop, retain, and sustain green employees help SMEs to engage in green innovation for superior environmental performance (Kaur et al., 2019; Leal-Millán et al., 2016).

Our study contributes to advance green HRM-performance outcomes link of SMEs in the context of increased pressure from the stakeholders to take care of both built and physical environment. Firstly, our study contributes to advance both the RBV and the AMO theoretical lenses in the context of SMEs on how green transformational leadership and green HRM practices create internal competencies to work on green process and product innovation for sustained environmental performance. We believe that the RBV provides a guiding paradigm for better leverage the AMO theory to understand, predict and control human resources in the organization. Secondly, this study suggest that green transformational leadership directly as well as indirectly through green HRM practices affects green process and product innovation. Thirdly, our study offers an empirical explanation on why and how green HRM practices are necessary for both green innovation and environmental performance of the SMEs. Finally, our study contributes to advance key aim of Technological Forecasting and Social Change journal to bring together social, environmental and technological factors to explain and predict firm green performance.

The remainder of the paper is arranged wherein next section presents theory and hypotheses. Section 3 and Section 4 deal with methods and results followed by discussion, implications and limitations of the study in Section 5.

2. Theory and hypotheses

We draw upon the *resource-based view (RBV) of the firm* and the *ability-motivation-opportunity (AMO) theory* to examine and explain the HRM-performance link in the context of the manufacturing sector SMEs in the UAE. The link between human capital and firm performance is not new and have their roots in the extant literature in HRM and strategy (Takeuchi et al., 2007; Barney, 1991). *Resource-based view (RBV)* of the firm suggest that competitive advantage and performance depends upon how firms leverage their strategic resources that are valuable, rare and difficult to imitate by the rivals in the markets (e.g., Barney, 1991). Furthermore, if the critical resources are rare and pricy for rivals to replicate or to substitute it with alternative resources that can accomplish the similar tasks, the organization achieves lasting superior performance and continuous competitive advantage from those strategic resources (e.g., Amit & Schoemaker, 1993). While applying

RBV to the HRM-performance link, we consider leadership and employees as a critical resource similar to any other firm's resources, where the foremost aim of the green human resource management (GHRM) practices is to develop, motivate, and provide opportunities to exhibit superior job behaviors for firm's sustained competitive advantage and superior performance (Boxall and Steeneveld, 1999). We argue that human resource satisfies the above criteria of the RBV for generating and supporting higher performance and competitive advantage, as human capital is normally embedded in firm's multifaceted social systems and that make human capital to take on organization specific features useful enough for a particular firm than for the rivals in the markets (Takeuchi et al., 2007).

Alongwith the RBV, we used the *ability-motivation-opportunity (AMO) theory* to examine the HRM-performance link which suggests that employees' abilities, motivations, and opportunities contribute to organizational performance; this is an integrating perspective illustrating why and how leaders and strategic HRM practices promote firm performance (Appelbaum et al., 2000). Ability-Motivation-Opportunity (AMO) theory (Appelbaum et al., 2000) is frequently used in HRM performance research (Bos-Nehles et al., 2013). As per the AMO theory, HRM practices influence employee's ability (e.g., through recruitment & selection, training & development), motivation (e.g., rewards, incentive, and compensation), and opportunity (e.g., teamwork, empowerment) to contribute to firm performance (Gerhart, 2005). In this study, we applied AMO theory differently than focusing on employee's job attitudes and behaviors emanating from application of HRM practices (e.g., Appelbaum et al., 2000; Guest, 2011), we expect that production manager's ability, motivation and opportunity will predict HRM-Innovation-Performance link. Drawing upon the AMO theory, we argue that GHRM practices in organization aims at attracting, motivating, rewarding and sustaining employee job behaviors towards environmental management goals and objectives through green process and product innovation for superior green firm performance (Boselie et al., 2005). Furthermore, using the AMO theory (Appelbaum et al., 2000), GHRM helps firms with an overarching architecture through its green recruitment & selection, training & development, performance-based rewards, employee empowerment practices, etc. to attract, train, motivate, and retain green human talent for enhancing green firm performance through continuous innovations in process, products, and services (Gerhart, 2005).

The section below deals with hypotheses formulation and we have used both the RBV (Barney, 1991) and the AMO (Appelbaum et al., 2000) theoretical lenses to build arguments and propose several hypotheses to be empirically examined in this study.

2.1. Green transformational leadership

Transformational leadership promotes higher firm performance, but what mediates in between these two constructs remains unresolved and are of special interest to the researchers (Para-González et al., 2018; García-Morales et al., 2012). Such an interest on the linkage between transformational leadership and firm performance become pertinent especially when firms should be innovative in its processes and products to gain competitive advantage and superior firm performance (e.g., Della Peruta et al., 2018; Donate and de Pablo, 2015). In this study, we define green transformational leadership (GTFL) as a leadership behavior wherein key goal of leadership is to provide clear vision, inspiration, motivation to the employees and also support their developmental needs towards achievement of environmental goals of the organization (Mittal and Dhar, 2016; Chen and Chang, 2013). GTFL motivate employees to acquire new knowledge (Le and Lei, 2018; Han et al., 2016) and get them involve and engaged in green process & product innovation related activities that permits firm to introduce green products and / or services into the market (Andriopoulos, and Lewis, 2010) and to improve their environmental performance (Dranev et al., 2018; Martinez-Conesa et al., 2017). Therefore, past

studies suggest for further researches on what mediates between transformational leadership and innovations (Le and Lei, 2019; Para-González et al., 2018; Xiao et al., 2017; Gumusluoglu, and Ilsev, 2009) and HRM practices and firm performance (Para-González et al., 2018; Heffernan et al., 2016).

Drawing upon the RBV, leadership is viewed as a critical resource in environmental management in the organization (Zhou et al., 2018; Guest and Teplitzky, 2010). Amongst different types of leadership, transformational leadership entails creating innovative climate, inspiring, motivating and encouraging coworkers to have trust in and/or identify with the vision of leader that affects firm innovation and performance (Ng, 2017; Boehm et al., 2015; Mittal and Dhar, 2015). Previous studies suggest that GTFL is relevant and important to firm performance (Ng, 2017) as her/his followers are more productive at individual, team, and firm level (Barrick et al., 2015) as they excel in innovativeness, extra-role, and in-role task behaviors (Chen et al., 2013; Choi, 2009). In the context of stakeholder pressure on firm to pursue environmental management (Song and Yu, 2018; Mittal and Dhar, 2016), several past studies suggest for firms to practice green transformational leadership (GTFL) as it encourages and motivates coworkers to exhibit green job behaviors to attain green performance (Chen and Chang, 2013; Chen et al., 2006). Furthermore, the GTFL supports and encourages employees' green passion (Jia et al., 2018), green creativity (Jia et al., 2018; Chen and Chang, 2013), green innovation (Zhou et al., 2018; Chen and Chang, 2013) and green firm performance (Chen and Chang, 2013; Chen et al., 2006).

2.1.1. Green transformational leadership and green human resource management

Transformational leaders have a clear vision about what the firm's current and future course of actions amidst dynamic markets (Bass and Avolio, 1995). Leaders should create an innovative vision, have strong belief in that vision, articulate and communicate it clearly to the employees so that the later to believe in leaders' visions and be excited about it (Zhu et al. (2005). Zhu et al. (2005) suggest that transformational leadership drives higher level of motivation, trust, cohesion, commitment, and performance. Studies have shown that the intellectually inspired dimension of transformational leadership positively influences performance management, talent management, and employee efficiency (Jia et al., 2018; Carton et al., 2014). On the other hand, firm's green human resource management (GHRM) which refers to green side of human resource management (HRM) practices whose goal is help enterprise to acquire, develop, motivate, and sustain green employee job behaviors at workplace (Dumont et al., 2017; Haddock-Millar et al., 2016; Renwick et al., 2013). GTFL personifies beliefs and values of the top management, and has a decisive influence on firm's GHRM (Jia et al., 2018; Renwick et al., 2013). Therefore, we speculate that to attain firm green innovation and green performance, GTFL in organization play key role on the formulation of supportive green human resource management (GHRM) policies and practices (Jia et al., 2018) to help firm delivers on its strategies and visions (Carton et al., 2014) to achieve green performance. In other words, GTFL's emphasis on considering individual needs of their employees may persuade them to create and install GHRM practices to keep their followers motivated and empowered. As a result, we expect that GTFL have a larger role to play on supporting positive GHRM practices such as recruitment & selection, training & development, performance appraisal and management, and compensation & incentive systems as a means whereby GTFL inspires, stimulate and motivate followers to achieve organizational goals (Zhu et al., 2005). Using the AMO theory (Appelbaum et al., 2000), we posit that GTFL leverages GHRM in a manner to enhance followers' abilities and motivations and provides opportunities engage in environmental management related activities (Haddock-Millar et al., 2016; Berrone and Gomez-Mejia, 2009; Eiadat et al., 2008) for green innovations and environmental performance (Dumont et al., 2017; Haddock-Millar et al., 2016; Chen and Chang, 2013; Chen et al., 2006).

Therefore, we predict that:

- H1. GTFL positively influences employee's green ability.
- H2. GTFL positively influences employee's green motivation.
- H3. GTFL positively influences employee's green opportunity.

2.2. Green human resource management

Extant literature suggests that human resource management (HRM) system has progressed from old-fashioned form of work such as low level of employee involvement, to a more participative and supportive processes wherein employee gets opportunities to develop skills, knowledge and attitude (Singh et al., 2019; Lengnick-Hall et al., 2009). In an era of increased awareness on environmental management and sustainable development of the resources (Phillips, 2018; Cavicchi, 2017; Roos and O'Connor, 2015), the green human resource management (GHRM) refers to HRM practices aimed at environmental and ecological influence of the firms and it is linked with firm environmental strategy and green behaviors of employees (Renwick et al., 2013). We argue that GHRM is integral to sustainable HRM literature and focuses on firm environmental management practices wherein green HRM acts as a platform to connect HRM practices to environmental management activities of the firm (Dumont et al., 2017; Masri and Jaaron, 2017). Therefore, GHRM mirrors organization's strategic orientation toward environmental protection and asks top management to pay attention to organizational processes and practices that emboldens people to take part in green job behaviors to reduce environmental pollutions at the workplace (Oh et al., 2016; Mishra et al., 2014; Berrone and Gomez-Mejia, 2009). In other words, GHRM encompasses incorporation of organization's ecological management goals to the HR processes namely, recruitment & selection, training & development, performance management & evaluation, rewards & recognition (Muller-Carmem et al., 2010; Renwick et al., 2008).

2.2.1. Green HRM and green innovation

Green innovation refers to developing environmentally friendly products and processes (Albort-Morant et al., Cepeda-Carrión, 2016) through adoption of organizational practices namely, greener raw materials, use of fewer materials during the design of products using eco-design principles and aim at reducing emissions, reduce the consumption of water, electricity, and other raw materials (Gunasekaran and Spalanzani 2012). Several past studies suggest that organizations with green innovativeness are highly successful (Albort-Morant et al., 2017) and have better overall performance than their rivals have, as they leverage their green resources and capabilities to respond quickly and appropriately to customers' needs (Albort-Morant et al., 2018; Del Giudice et al., 2018c; Allameh, 2018) and add intangible values & assets into the organization. Several past studies suggest that HRM positively and significantly influences technological and product innovation (Wei et al., 2011; Jiménez-Jiménez and Sanz-Valle, 2008; Verburg et al., 2007). HRM practices with focus on promoting a culture of commitment than compliance have positively influence on firm's innovative orientation (Verburg et al., 2007). Furthermore, Wei et al. (2011) suggest that strategic HRM positively influences product innovation in organizations, which have developmental culture and flat organizational structure.

At the same time, Seeck & Diehl (2017) in a review of the past studies on the HRM-Innovation note that as compared with product and technological innovation, the HRM does not have strong influence on administrative and process innovation (Seeck and Diehl, 2017). Therefore, previous studies suggest mixed findings on to the linkage between HRM and innovation in organization. Drawing upon the RBV (Barney, 2001) and the AMO (Appelbaum et al., 2000), we predict that organization which values and leverages potential of its human talent

will go about to institutionalize GHRM practices for the purpose of attracting, motivating and providing opportunities to green human resources to leverage their potentialities for green process and product innovation. Hence, we propose that:

H4. Employee's green ability positively influences green innovation.

H5. Employee's green motivation positively influences green innovation.

H6. Employee's green positively influences green innovation.

2.3. Green innovation and environmental performance

Environmental performance relates to organizational initiatives to meet and exceed societal expectations vis-à-vis the natural environment (Chan, 2005) in a manner to go beyond mere compliances with rules and regulations (Chen et al., 2015). It encompasses environmental effects of organizational processes, products, and resource consumption in a manner that best fit with legal environmental requirements (Dubey et al., 2015). Previous studies suggest that environmental performance depends upon the quality of environment-friendly products, green process and product innovation, and incorporation of ecological sustainability matters into business operations and product development (Oliva et al., 2019; Chen et al., 2015; Dubey et al., 2015; Darnall et al., 2008).

Green innovation is associated with firm environmental management agenda and that the green innovation stimulates environmental performance (Adegbile et al., 2017; Kammerer, 2009; Chen et al., 2006). Furthermore, green product and process innovation not only reduce negative environmental impact of the business but they also increase firm's financial and social performance through waste & cost reduction (Weng et al., 2015). Previous studies suggest that green innovation should not be perceived as firm's reactive measures towards stakeholder pressures though a proactive organizational intentions and practices to augment environmental performance to gain competitive advantage (Kratzer et al., 2017; Lin, Tang, & Geng, 2013; de Burgos-Jiménez et al., 2013). Using the RBV, we predict that green process and product innovation are critical organizational resources that firm uses to enhance its environmental performance and earn goodwill amongst key stakeholders. Therefore, we predict that:

H7. Green innovation positively influences environmental performance.

2.3.1. Green transformational leadership and green innovation: mediating role of green HRM

Leadership matters in any organization (Leroy et al., 2018) and human capital are firms' greatest resources (e.g., Cillo et al., 2019; Del Giudice et al., 2018a; Bradley and McDonald, 2011). Leadership focusses on understanding, predicting and controlling both personal and interpersonal dynamics of how people impact each other towards shared goals (Northouse, 2015), whereas, the HRM takes care of organization's systems and processes to influence employees in a orderly way, typically on a bigger scale (Lievens, 2015). Therefore, we believe that leadership and HRM together are involved in managing people at workplace but from different perspectives (Leroy et al., 2018). The first strand of extant literature suggest that leaders play vital role of mediating variable in ratifying the practices recommended by HRM to achieve employee motivation and performance (Gilbert et al., 2011; Nishii et al., 2008; Piening et al., 2014; Sikora et al., 2015). The second strand of extant HR literature indicate on leadership to play role of moderator between HRM practices and outcome variables (Vasilaki et al., 2016, 2011). Finally, the third strand of HR literature suggest leadership as antecedent of HRM-outcome relationships (Jia et al., 2018; Renwick et al., 2013). However, we believe that leadership to play vital role as antecedent than mediator or moderating role in HRM-Innovation-Performance linkages in SMEs as leadership to

influence HRM practices which influences innovation and superior performance.

Previous studies suggest that transformational leadership plays important role in innovation in the organization (Zuraik, and Kelly, 2019; García-Morales et al., 2012; Gumusluoglu and İlsev, 2009; Elkins and Keller, 2003). García-Morales et al. (2012) is a study found support for the influence of transformational leadership on innovation through development of key competencies and capabilities through collective decisions-making process to achieve collective goals. Transformational leadership commit themselves openly to continuous learning and use collective vision to breed bigger awareness and recognition of organizational purpose and mission amongst its people (García-Morales et al., 2012). Transformational leaders drives innovation within organization and positively influence market successes of innovations in products and services (Gumusluoglu and İlsev, 2009) through inspirational motivation and intellectual stimulation (Elkins and Keller, 2003). Furthermore, for transformational leadership to fuel innovation though providing freedom to employees to choose what they want to work on and how to go about achieving their goals (Jung et al., 2008).

Top-management encouragement, especially supervisory support, promotes employee environmental actions – designing eco-friendly product through reduced resources and reducing pollution (Mazzelli et al., 2019). GTFL fully exemplifies beliefs, attitudes, values and behaviors of top management, and has a vital impact on firm's GHRM practices (e.g., Renwick et al., 2013). Therefore, we predict that GTFL plays critical role towards formulation of GHRM policies and practices (Marshall et al., 2005), as GTFL leverages GHRM practices for talent management, performance management, and employee efficiency (e.g., Bass and Riggio, 2006) and to deliver on firm's strategies and visions (Carton et al., 2014). Furthermore, Jia et al. (2018) suggests that GHRM mediates the influence of transformational leadership on organizational green outcomes. As a result, we posit that GTFL influences adoption of GHRM practices to communicate proenvironmental image to enhance reputation of the firm in the eyes of all its key stakeholders. Therefore, we propose that:

H8. GTFL indirectly but positively influences green innovation through employee's green ability.

H9. GTFL indirectly but positively influences green innovation through employee's green motivation.

H10. GTFL indirectly but positively influences green innovation through employee's green opportunity.

2.3.2. Green HRM and environmental performance: mediating role of green innovation

GHRM increases employees' environmental awareness (Renwick et al., 2008, 2013), green creativity (Jia et al., 2018; Chen and Chang, 2013), and green firm performance (Chen and Chang, 2013; Chen et al., 2006). Previous studies suggest that GHRM influences green innovation (Zhou et al., 2018; Chen and Chang, 2013) and green firm performance (Guerci et al., 2016; O'Donohue and Torugsa, 2016) but these areas of research inquires remain largely scarce and needs more empirical inquiries especially when firms experience increased pressure from their key stakeholders to engage in eco-friendly management practices. Furthermore, extant literature suggest that firm should hire potential employees by drawing upon their environmental beliefs & values and knowledge (Renwick et al., 2013) through green recruitment and selections system to ensure that new recruits appreciate and comprehend firm's environmental beliefs and values (Jackson and Seo, 2010) by drawing upon prospective employees' environmental beliefs, values and knowledge (Renwick et al., 2013). Similarly, green training & development (Singh & El-Kassar, 2019; El-Kassar and Singh, 2018; Renwick et al., 2013), performance management & appraisal (Renwick et al., 2013), green rewards & compensation (Jabbour and de Sousa Jabbour, 2016; Arulrajah et al.,

2015) stand out as core HRM practices to support superior environmental performance. We argue that green training & development programs aimed at developing proficient skills of employees for green workplace analysis, recycling, waste management, and energy efficiency (Singh & El-Kasar, 2019; Renwick et al., 2013) alongwith institutionalizing eco-friendly objectives, responsibilities, and evaluation in the performance management system (PMS) (Renwick et al., 2013; Jabbour and de Sousa Jabbour, 2016) enhances environmental performance.

Previous studies suggest that HRM bundles or systems influences innovation (e.g., Fu et al., 2015; Wei et al., 2011; De Winne and Sels, 2010; De Saá-Pérez and Díaz-Díaz, 2010; Jiménez-Jiménez and Sanz-Valle, 2008; Verburg et al., 2007). We posit that HRM bundles or systems affect administrative, process, and product innovation (Jiménez-Jiménez and Sanz-Valle, 2008) and including even the start-ups which have lesser human capital wherein HRM systems significantly fuels innovation (De Winne and Sels, 2010). Furthermore, HRM practices promotes employee commitment than compliance to organizational processes and systems (Verburg et al., 2007). Furthermore, Zhou, Hong, & Liu, (2013) suggest differential influence of commitment and collaboration oriented HRM practices on firm innovation wherein the former enhances internal innovative capability and the later drives innovation through building and nurturing social networks with external sources. On the other hand, green innovation is a strategic resource for the environmental performance (Singh and El-Kassar, 2019; El-Kassar and Singh, 2018; Kammerer, 2009; Chen et al., 2006) and firm leverages it to attain its environmental management goals. Green product and process innovation significantly reduces negative environmental impact of the business, if any, and increases firm performance – financial, social and environmental performance through huge waste & cost reduction that saves money, time, and resources (e.g., Del Giudice et al., 2018b; Weng et al., 2015). Therefore, using the AMO theory (Appelbaum et al., 2000) and RBV (Barney, 2001), we predict that GHRM indirectly influences firm environmental performance through the mediating role of green process and product innovation. Therefore, we propose that:

H11. Employee's green ability indirectly but positively influences environmental performance through green innovation.

H12. Employee's green motivation indirectly but positively influences environmental performance through green innovation.

H13. Employee's green opportunities indirectly but positively influences environmental performance through green innovation.

We present here conceptual research model (Fig. 1), based on the extensive literature review and the hypotheses formulation, that we empirical examined in our study.

3. Methods

3.1. Sample and procedure

We approached 669 manufacturing sector SMEs in the United Arab Emirates (UAE). As and when a particular SME, those who were approached, volunteered to participate in this study, one of the co-authors visited it in person and met with the Chief Operating Officer (COO), the human resource (HR) manager, and the Production manager and they filled-in the questionnaire on the spot and gave it back to us the same day. The Chief Operating Officer (COO) filled in survey questionnaires

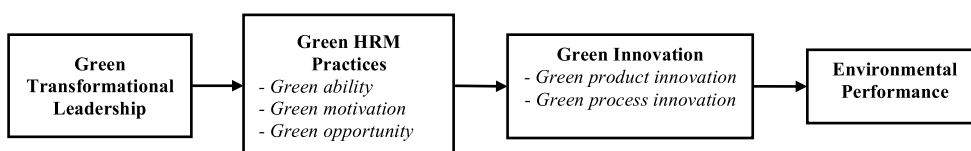


Fig. 1. Conceptual research framework.

Table 1
Non-response bias test.

Construct	Levene's test	Sig.
Green Transformational Leadership (GTFL)	0.534	0.465
Green Ability (GABL)	0.380	0.538
Green Motivation (GMOT)	0.226	0.635
Green Opportunities (GOPP)	0.003	0.957
Green Process Innovation (GPRI)	0.010	0.922
Green Product Innovation (GPDI)	1.167	0.281
Green Performance (GPERF)	0.460	0.498

on green transformational leadership (GTFL) and environmental performance (EPRF), whereas, the human resource (HR) manager and the production manager filled in survey questionnaire on green human resource management (GHRM) practices and green innovation (GINNOV), respectively. The survey questionnaire was rated on seven-point rating scale (wherein 1 = strongly disagree and 7 = strongly agree) by the COO, the HR manager, and the production managers. We note that one of the co-authors had to make several phone calls to the manufacturing SMEs to get their consent to participate in this study and also to give us appointment on a particular date & timing for the visit in person to get the questionnaire filled-in on the spot from each of the triads (i.e., the COO, the HR manager, the Production manager). Overall, the data was collected in two waves and each of the waves lasted for a month. In this study, we used translation-back translation procedure – from English to Arabic and back to English, as per Brislin (1986), as majority of the respondents were Arabic speaking.

Before proceeding for data analysis to examine hypotheses, we performed the Levene's test for the homogeneity of variance between early (wave 1) and late (wave 2) respondents and found that the obtained Levene's statistics were non-significant (Table 1). Therefore, the dataset of this study was free from non-response biases and we can generalize the results of this study to the larger population (Becker and Ismail, 2016; Cochran, 1977; Armstrong and Overton, 1977). Thereafter, we used average full collinearity VIF (AFVIF) to test for the common method biases (CMB) wherein AFVIF and found to be in the acceptable range and <3.3 (Kock, 2017) and that indicates that the CMB was not an issue in the dataset. The Cochran's sample size formula was used to examine for minimum size of sample required to proceed with the study (Cochran, 1977; Bartlett et al., 2001) and found that this study should have minimum 209 sample (with margin error = 0.03 and alpha value = 0.01) to proceed with data analysis and test the hypotheses. Thus, our study with 309 SMEs wherein the sample in this study consisted of 309 triads of the respondents (the COO, the HR Manager, and the Production Manager) pass the minimum required sample size to examine the hypotheses. Table 2 presents sample details. The COOs consisted 67.31% male and 32.69% female, and approximately 77% of them had minimum bachelor level degrees in science, technology, & business. Similarly, the HR managers consisted of 57.61% male and 32.39% female respondents and 64.07% had minimum bachelor level degree in science, technology, business, & humanities. On the other hand, the Production managers consisted of 80.26% male and 19.74% female respondents and 56.31% had minimum bachelor degree in science, technology, and engineering. Finally, over 55% of SMEs in the study had 200 and more employee counts during the time of data collection for our study.

Table 2
Sample and Organization Details.

The Chief Operating Officer (n = 309)	Percentage	Production Manager (n = 309)	Percentage	HR Manager (n = 309)	Percentage	SMEs	Percentage
Age (in Years)	48.30	Age (in Years)	36.28	Age (in Years)	37.65	Year when born	
						2000–2007	149(48.22%)
						2008–2012	160(51.78%)
Gender		Gender		Gender		Employee Counts	
Male	208(67.31%)	Male	248(80.26%)	Male	178(57.61%)	50–100	48(15.53%)
Female	101(32.69%)	Female	61(19.74%)	Female	131(32.39%)	101–200	89(28.80%)
						201–300	153(49.52%)
						> 301	19(6.15%)
Educational Qualification		Educational Qualification		Educational Qualification			
Bachelor	238(77.02%)	Bachelor	174(56.31%)	Bachelor	198(64.07%)		
Master	71(22.98%)	Master	135(43.69%)	Master	111(43.69%)		

3.2. Measuring instruments

Green transformational leadership (GTFL). We adopted six items scale of GTFL from [Chen and Chang \(2013\)](#). The sample item includes, ‘the leadership in my organization emphasize achievement of environmental goals’. The Cronbach alpha for the GTFL scale in this study was 0.904 ([Appendix 1a](#)). The confirmatory factor analysis (CFA) results suggest that the goodness-of-fit-indices of the measuring instrument of GTFL ($\chi^2/df = 1.279, p < 0.249$; CFI = 0.998; TLI = 0.996; SRMR = 0.016; RMSEA = 0.029) were in acceptable range.

Green HRM (GHRM). We adapted thirteen items GHRM scale from [Sun et al. \(2007\)](#) and [Renwick et al. \(2013\)](#) and they belonged to across three key brackets as per the AMO theory – green ability, green motivation, and green opportunity (e.g., [Appelbaum et al., 2000](#)). The sample item include, ‘employee gets reward for acquiring specific environmental competencies’. The Cronbach alpha for the green ability, green motivation and green opportunity were 0.898, 0.839, and 0.848, respectively ([Appendix 1a](#)). The CFA suggest that the GHRM measuring instruments had goodness-of-fit-indices ($\chi^2/df = 2.827, p < 0.000$; CFI = 0.961; TLI = 0.951; SRMR = 0.033; RMSEA = 0.075) in the range.

Green Innovation (GINNOV). We adopted seven items GINNOV scale consisting of four items for green product innovation and three items for green process innovation from [Chen et al. \(2006\)](#). The sample item includes, ‘use of materials that produce least amount of pollution’. The Cronbach alpha for green product and green process innovation were 0.884 and 0.842, respectively ([Appendix 1b](#)). The goodness-of-fit-indices of GINNOV measuring instrument were in the acceptable range ($\chi^2/df = 2.670, p < 0.001$; CFI = 0.986; TLI = 0.978; SRMR = 0.023; RMSEA = 0.071).

Environmental performance. We adopted the environmental performance (EPERF) with five items from [Melnyk et al. \(2003\)](#) and [Daily et al. \(2007\)](#). The sample item consisted was “Environmental activities in my organization has significantly improved product and/or process

quality”. The Cronbach alpha was found to be 0.896 ([Appendix1b](#)). The goodness-of-fit-indices of EPERF scale were in the acceptable range ($\chi^2/df = 1.239, p < 0.288$; TLI = 0.997; CFI = 0.999; SRMR = 0.014; RMSEA = 0.027).

4. Results

4.1. Measurement scale validation

The Cronbach alpha was used to calculate reliability coefficient of the measuring instruments in this study ([Hair et al., 2006](#)) and it ranges from 0.839 to 0.904 ([Appendices 1a & 1b](#)). The construct validity of the measuring instruments were assessed through their convergent and discriminant validity. As per [Fornell and Larcker \(1981\)](#), the construct (s) has convergent validity, if the individual measuring item loads on its corresponding construct with standardized loading ranging from > 0.50 to ≥ 0.70 ([Niemand and Mai, 2018](#)), combined with scale composite reliability (SCR) greater than 0.70, and average variance extracted (AVE) should be atleast 0.50 and above. All the measurement scales that we used in this research inquiry satisfy to the requirements ([Fornell and Larcker, 1981](#)) and all of the constructs in the study have high convergent validity ([Appendix 1](#)) as the individual item loaded on their respective construct in the range of ≥ 0.686 to 0.837, had $SCR \geq 0.844$ to 0.898, and the AVE was ≥ 0.509 to 0.659. Thereafter, we tested for the discriminant validity as suggested by [Fawcett et al. \(2009\)](#) and found that standardized loading of individual item ranges in between 0.686 to 0.837 ([Appendices 1a & 1b](#)) and the square root of AVE for the construct was greater than obtained correlations amongst the construct in the study ([Table 3](#)). Thus, we note that all the measuring instruments had both convergent ([Fornell and Larcker, 1981](#)), and discriminant validity ([Fawcett et al., 2009](#)).

Table 3
Testing for discriminant validity.

	Mean	Std. Dev.	GTFL	GABL	GMOT	GOPP	GPDI	GPRI	FGPERF
GTFL	5.33	0.872	0.713						
GABL	5.22	0.831	0.652**	0.772					
GMOT	5.17	0.814	0.657**	0.660**	0.752				
GOPP	5.15	0.928	0.658**	0.609**	0.630**	0.806			
GPDI	5.01	0.897	0.661**	0.625**	0.621**	0.643**	0.812		
GPRI	5.05	0.907	0.636**	0.698**	0.627**	0.610**	0.657**	0.803	
EPERF	5.08	0.934	0.656**	0.681**	0.692**	0.663**	0.691**	0.682**	0.781

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

#1 Wherein, GTFL = Green Transformational Leadership, GABL = Green Ability, GMOT = Green Motivation, GOPP = Green Opportunity, GPDI = Green Product Innovation, GPRI = Green Process Innovation, EPERF = Environmental Performance.

#2 Diagonal value (bold & italic) are the square roots of AVE.

Table 4
Testing for direct effect.

Direct effect	Standardized direct effect	Standard error	t value	Sig. level	Hypothesis testing
GABL<—GTFL	0.652	0.028	29.422	<i>P</i> < 0.000	H1 accepted
GMOT<—GTFL	0.657	0.018	30.132	<i>P</i> < 0.000	H2 accepted
GOPP<—GTFL	0.658	0.015	30.206	<i>P</i> < 0.000	H3 accepted
GINNOV<—GABL	0.272	0.059	5.573	<i>P</i> < 0.000	H4 accepted
GINNOV<—GMOT	0.288	0.095	5.601	<i>P</i> < 0.000	H5 accepted
GINNOV<—GOPP	0.40	0.098	8.955	<i>P</i> < 0.000	H6 accepted
EPERF<—GINNOV	0.616	0.022	25.599	<i>P</i> < 0.000	H7 accepted

Table 5
Testing for indirect effect.

Indirect effect	Standardized Indirect Effect	Sig. level	Hypothesis testing
GINNOV<—GABL<—GTFL	0.077	<i>P</i> < 0.002	H8 accepted
GINNOV<—GMOT<—GTFL	0.075	<i>P</i> < 0.002	H9 accepted
GINNOV<—GOPP<—GTFL	0.144	<i>P</i> < 0.000	H10 accepted
EPERF<—GINNOV<—GABL	0.042	<i>P</i> < 0.002	H11 accepted
EGPERF<—GINNOV<—GMOT	0.059	<i>P</i> < 0.001	H12 accepted
EGPERF<—GINNOV<—GOPP	0.084	<i>P</i> < 0.000	H13 accepted

4.2. The structural model

We used covariance-based structural equation modeling (SEM) to examine direct (Table 4) and indirect hypotheses (Table 5) of this study.

Testing for direct effect. Table 4 depicts that H1 [GABL<—GTFL]; H2 [GMOT<—GTFL]; and H3 [GOPP<—GTFL] are supported ($\beta = 0.652$; $t = 29.422$, $p < 0.000$); ($\beta = 0.657$; $t = 30.132$, $p < 0.000$); and ($\beta = 0.658$, $t = 30.206$, $p < 0.000$), respectively. Therefore, it means that green transformational leadership (GTFL) positively and significantly influences the green HRM (GHRM) practices namely employee green ability, green motivation, and green opportunity. Similarly, Table 4 illustrates that H4 [GINNOV<—GABL]; H5 [GINNOV<—GMOT]; and H6 [GINNOV<—GOPP] are supported ($\beta = 0.272$; $t = 5.573$, $p < 0.001$); ($\beta = 0.288$; $t = 5.601$, $p < 0.000$); and ($\beta = 0.40$; $t = 8.955$, $p < 0.000$), respectively. It means that green HRM (GHRM) practices namely employee green ability, green motivation, and green opportunity positively and significantly predict green innovation (GINNOV). Finally, H7 [EPERF<—GINNOV] is supported

Appendix 1a
Testing for convergent validity.

	Indicators	Std Loading	Variance	Error	Cronbach Alfa	SCR	AVE
Green Transformational Leadership (GTFL)					0.904	0.886	0.509
	I inspire subordinates with environmental plan.	GTFL1	0.808	0.653	0.347		
	I provide subordinates a clear environmental vision.	GTFL2	0.833	0.694	0.306		
	I encourage subordinates to work on environmental plan	GTFL3	0.686	0.471	0.529		
	I encourage employees to attain environmental goals	GTFL4	0.781	0.61	0.39		
	I consider environmental beliefs of my subordinates.	GTFL5	0.79	0.624	0.376		
	I stimulate subordinates to think & share their green ideas.	GTFL6	0.771	0.594	0.406		
Green Human Resource Management (GHRM)					0.898	0.898	0.596
	Great effort goes in to select right person.	GABL1	0.774	0.599	0.401		
	Hiring only those who possess environmental values.	GABL2	0.769	0.591	0.409		
	Considerable importance given to green staffing process.	GABL3	0.764	0.584	0.416		
	Every employee undergoes mandatory environmental training	GABL4	0.736	0.542	0.458		
	Environmental training is designed to enhance employee's environmental skills & knowledge.	GABL5	0.774	0.599	0.401		
	Employees to use environmental training in their jobs.	GABL6	0.812	0.659	0.341		
					0.839	0.838	0.565
	Performance appraisal records environmental performance.	GMOT1	0.788	0.621	0.379		
	Performance appraisal includes environmental incidents, responsibilities, concerns and policy.	GMOT2	0.719	0.517	0.483		
	Employee gets reward for environmental management.	GMOT3	0.771	0.594	0.406		
	Employee gets reward for acquiring specific environmental competencies.	GMOT4	0.726	0.527	0.473		
					0.848	0.847	0.65
	Employees are involved to become environmental friendly.	GOPP1	0.783	0.613	0.387		
	Using team-work for resolving environmental issues.	GOPP2	0.835	0.697	0.303		
	Employees to discuss environmental issues in team meetings.	GOPP3	0.799	0.638	0.362		

($\beta = 0.616$; $t = 25.599$, $p < 0.000$) as in Table 4. As a result, the result suggests that green innovation (GINNOV) positively and significantly affect environmental performance (EPERF). Thus, the findings of the study supports all the direct hypotheses.

Testing for indirect effect. We used covariance-based SEM to assess for the mediation related hypotheses in this study (Iacobucci et al., 2007). The results in the Table 5 illustrates that H8 [GINNOV<—GABL<—GTFL]; H9 [GINNOV<—GMOT<—GTFL]; and H10 [GINNOV<—GOPP<—GTFL] are supported ($\beta = 0.077$, $p < 0.002$); ($\beta = 0.075$, $p < 0.002$); and ($\beta = 0.144$, $p < 0.000$), respectively. These results suggest that green HRM (GHRM) practices namely employee green ability, green motivation, and green opportunity positively and significantly mediates on the influence of green transformational leadership (GTFL) on green innovation (GINNOV). Similarly, Table 5 depicts that H11 [EPERF<—GINNOV<—GABL]; H12 [EGPERF<—GINNOV<—GMOT]; and H13 [EGPERF<—GINNOV<—GOPP] are supported ($\beta = 0.042$, $p < 0.002$); ($\beta = 0.059$, $p < 0.001$); and ($\beta = 0.084$, $p < 0.000$), respectively. The findings illustrate that green innovation (GINNOV) positively and significantly mediates the effect of green HRM (GHRM) practices on environmental performance (EPERF). Therefore, the results in Table 5 suggest that all the indirect hypotheses namely H8, H9, H10, H11, H12, and H13 of the study are accepted.

5. Discussion and conclusion

The study investigated interplay of green transformational leadership, green HRM, and green innovation on environmental performance. Our study supports and advances previous studies wherein green

Appendix 1b

Testing for convergent validity.

	Indicators	Std Loading	Variance	Error	Cronbach Alfa	SCR	AVE
Green product Innovation					0.884	0.885	0.659
<i>My company uses materials that</i>							
...produce least pollution.	GPD11	0.837	0.701	0.299			
... consumes less energy and resources.	GPD12	0.816	0.666	0.334			
...to design environment friendly product.	GPD13	0.775	0.601	0.399			
...are easy to recycle, reuse, and decompose.	GPD14	0.818	0.669	0.331			
Green Process Innovation					0.842	0.844	0.644
<i>The manufacturing processes of my company effectively reduces...</i>							
...hazardous substance or waste.	GPR11	0.782	0.612	0.388			
...consumption of coal, oil, electricity or water.	GPR12	0.829	0.687	0.313			
...use of raw materials.	GPR13	0.796	0.634	0.366			
Environmental Performance					0.896	0.887	0.611
<i>Environmental activities significantly...</i>							
...reduced overall costs.	EPERF1	0.779	0.607	0.393			
...reduced the lead times.	EPERF2	0.755	0.57	0.43			
...improved product / process quality.	EPERF3	0.821	0.674	0.326			
...improved reputation of my company.	EPERF4	0.808	0.652	0.347			
...reduced waste within the entire value chain process.	EPERF5	0.741	0.549	0.451			

transformational leadership to influence green HRM practices (e.g., Jia et al., 2018; Carton et al., 2014; Renwick et al., 2013) and green HRM affects green innovation (e.g., (Singh and El-Kassar, 2019; El-Kassar and Singh, 2018; Albort-Morant et al., 2016) in an organization. The findings of our study also advances literature in the field (e.g., Santoro et al., 2019; Chen et al., 2015; Dubey et al., 2015; Weng et al., 2015) wherein green product and process innovation results in improved firm environmental performance (e.g., Kim and Phillips, 2013). Furthermore, the results of the study supports the hypothesis that green HRM practices mediates the influence of green transformational leadership on green innovation. Such finding of our study contributes and advances the previous studies (Jia et al., 2018; Renwick et al., 2013) wherein in leadership plays critical role to influence the HRM practices and that in turn to predict green innovation in the organization. We also found that green HRM indirectly through green innovation influences environmental performance of the SMEs. Overall, the obtained results in this study support all direct and indirect hypotheses and have several theoretical and practical implications.

5.1. Theoretical implications

The results of our study have three main implications to advance theory. First, our study contributes to advance the RBV (Barney, 1991) and the AMO theory (Appelbaum et al., 2000; Guest, 2011) to understand and explain what causes firm green innovation and environmental performance. Basing our arguments on the results of this study, we suggest that GTFL is a strategic resource that firm should leverage to shape and implement GHRM which in turn to influence green innovation and environmental performance. While applying RBV to the HRM-performance link, we suggest that leadership and employees are critical resource as any other organizational resources that should be valued in a manner that it becomes difficult for the competing firms to imitate (e.g., Takeuchi et al., 2007; Barney and Wright, 1998; Barney, 1991). Similarly, our study suggests and advances the AMO theory (Appelbaum et al., 2000) wherein we suggest that firm should design and implement GHRM practices to attract, train, motivate, and retain green employees to enhance green innovation and environmental performance (Gerhart, 2005) under the continuous monitoring role of GTFL. Therefore, our study integrates the RBV and the AMO theory and illustrate why and how leaders and green HRM practices promote green innovation and firm green performance (e.g., Guest, 2011; Takeuchi et al., 2007; Appelbaum et al., 2000; Barney and Wright, 1998; Barney, 1991).

Second, leadership and HRM play critical role in unleashing human potential (Leroy et al., 2018) but from different perspectives. Previous

studies differ on whether leadership in organization play role of antecedent (Jia et al., 2018; Renwick et al., 2013), mediator (Piening et al., 2014; Sikora et al., 2015), and moderator (Vasilaki et al., 2016) on the HRM-outcome relationships. Our findings suggest that GTFL plays critical role as antecedent of the GHRM to cause green innovation for enhanced firm environmental performance. Furthermore, we suggest that firm should use GTFL to install and implement GHRM policies and practices to enhance employee's green abilities and motivations and provide them with opportunities at workplace to engage in environmental management related activities (Berrone and Gomez-Mejia, 2009; Eiadat et al., 2008) to enhance green innovation and environmental performance (Renwick et al., 2013; Chen and Chang, 2013).

Third, we found that green innovation on its own as well as under the influence of GHRM practices influence firm environmental performance. As such, we suggest that GHRM practices through green hiring, training, performance-based rewards, empowerment, etc. help firm to attract, retain, and sustain green employees towards green innovation in process, products, and services (Gerhart, 2005) for sustained superior environmental performance. Therefore, our study suggests that firm should embed green human resource practices in organization's multi-faceted social systems to make human capital to take on organization specific features useful enough for a particular firm than for the competing firms in the markets (Takeuchi et al., 2007). Results of our study suggest that firm should have proactive GHRM architecture to attract, develop, and retain green employees for green innovation and improve environmental performance to gain competitive advantage over their rivals in the markets (Lin et al., 2013).

Finally, our study significantly advances theory and suggests that HRM-performance relationship neither depends upon the additive effect of green transformational leadership and green innovation as antecedent and mediator, respectively, nor on their interactive effect but a mix of both combinational forms (ie., additive and interactive) to affect firm environmental performance.

5.2. Practical implications

Our study offers several key suggestions to leaders and managers on how to make green innovation happen and leverage it for superior environmental performance to beat rivals in the markets.

First, we suggest that investing in environmental management is beneficial to firm to earn good image in the eyes of stakeholders, as the later has become more demanding and pressurizing firms to go green in all its process, products and/or services. Results of our study suggest that firm should emphasize and reinforce green leadership behaviors

necessary for implementing green HRM practices. Green HRM practices are essential for acquiring, developing and sustaining employees who bring to work green beliefs and values to help support firm's strategy to compete with competitors through green process and green products. Therefore, we suggest that firm's transformational leadership make employees with green ability and motivation feel comfort through supportive environment and provide them opportunities to realize their green potentialities to help firm make green innovation in its processes and product to stay relevant and competitive in the markets.

Second, firm should invest in green HRM practices and consider it as strategic asset to channelize human potential towards its environmental management activities. We had posited that GHRM mirrors firm's strategic orientation toward environmental management and encourages employees to exhibit green job behaviors to reduce environmental pollutions. Therefore, based on the findings of our study, we suggest that top management should work on integrating firm's environmental management goals with green HRM policies and practices to support and sustain green process and product innovation. Furthermore, we suggest that green HRM practices need developmental culture and flat organizational structure to support and enhance green innovation for sustained competitive advantage.

Third, our study suggests that environmental performance depends upon the quality of green process and green product innovation. Therefore, we suggest that green process and product innovation should not be a knee jerk reaction to stakeholder pressure but proactive measures aimed at reducing negative environmental impact, if any, to enhance environmental performance. Furthermore, our study suggest that leaders and managers in organization should perceive green innovation as a strategic resource and leverage it to attain firm's environmental management goals. Such an arrangement can work wonder for green innovation vis-à-vis environmental performance if the green HRM practices receives unconditional support and commitment of the top management. To sum it up, we suggest that leaders and managers should institutionalize environmental management responsibilities in the performance appraisal and management system for employees to continuously display job behaviors namely green workplace analysis, recycling, waste management, and energy efficiency. All these organizational efforts and support to employees will help organization to

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.techfore.2019.119762](https://doi.org/10.1016/j.techfore.2019.119762).

Appendices

XXX.

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enhance and sustain its environmental performance.

Therefore, our study offers numerous practical implications for managers, leaders and policy makers on how to attain and sustain superior environmental performance through green transformational leadership, green HRM practices, and green innovation.

5.3. Limitations and directions for future research

Our study has limitations and we present them alongwith direction for future research. First, we conducted this study in the manufacturing sector SMEs in the UAE and it limits the generalization of our study to the non-manufacturing sector SMEs. Therefore, we suggest that future research should extend our conceptual research framework to the non-manufacturing sector SMEs in the UAE. Second, this study did not use employee level construct namely environmental beliefs and values to find its moderating role on the HRM-performance outcomes. As a result, we propose that researches in future should advance our research framework to include employee's environmental beliefs and values as moderator on to the influence of green HRM on green innovation. Third, this study investigated the internal factors only vis-à-vis adoption of SMEs' environmental strategy. We suggest that the future study in SMEs in the UAE should investigate both internal and external factors vis-à-vis in the adoption of the environmental strategy in SMEs for deeper understanding of formulating, implementing and sustaining proactive environmental strategies. Finally, our study sampled organizational members' perception to measure green innovation and environmental performance. We suggest that future research should sample perception of both internal and external stakeholders to better understand and explain SMEs' green innovation and environmental performance.

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