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When Team Creativity Goes Green: Unpacking The Effects of Green Human Resource Management and Technological Turbulence

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ABSTRACT

With the cumbersome increase in global warming concerns and technological developments, manufacturing organizations' impact on the environment is undeniably a rising issue. This has incited calls for organisational teams to engage in more sustainable practices involving increased creativity initiates to help meet environmental needs. In an attempt to answer this call, we investigate the roles of technological turbulence (TT) and green human resource management (GHRM) bundles on green team creativity (GTC). Results indicate that TT, green recruitment and selection (GRS) and green training, involvement and development (GTID) are positive predictors of GTC. While green performance and compensation (GPC) negatively predicts GTC, we find that TT reinforces the positive impact of GRS on GTC, and dampens the positive impact of GTID on GTC. Implications and limitations are discussed.

Keywords: Green human resource management bundles; green recruitment and selection; green training, involvement and development; green performance and compensation; Green teams creativity; Technological turbulence.

INTRODUCTION

Technological turbulence (TT) is the constant change in technology occurrence in an industry that renders existing technologies, archaic or obsolete (Schumpeter, 1934). TT is an important catalyst for industrial development as well as a key source of social and environmental dynamism (Chavez, et al., 2015). Due to increasing TT, competitiveness and global warming, the practice of going "green" is progressively becoming more relevant as it helps organizations sustain competitive advantage and increase sustainable developments in the society (Awan, Sroufe, & Kraslawski, 2019). Therefore, to successfully implement "green" initiatives, studies (Ahmad, 2015: Jiang et al., 2012) advocate that it is important for tangible and intangible resources such as the capabilities of human resources management (HRM) and the creativity of teams, to also go "green". Ferreira et al. (2018) also support that it is pertinent that organizations indoctrinate their employees on the concept of green team creativity (GTC) in order to engender environmental sustainability. GTC is defined as the conception, improvement, and advancement of environmentally sustainable innovative ideas among teams in an organization (Chen et al., 2015; Ogbeibu et al., 2018). GTC could aid organisations to generate creative ideas that build distinctively upon broader spectrum of environmentally

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sustainable philosophies and further craft new elucidations that promote environmental sustainable outcomes (Chan, Yee, Dai, & Lim, 2016). Hence, the GTC and green human resource management (GHRM) conceptualizations.

GHRM is a set of guidelines and initiatives that inspire environmental focused behaviours among organizational employees so that they exploit their creativity towards green innovation outcomes, thus aiding the global cause to engender environmental sustainability (Kay, Kay, & Tuininga, 2018). GHRM practices can be examined via its sets of bundles known as green recruitment and selection (GRS), green performance and compensation (GPC), and green training, involvement and development (GTID) (Renwick et al., 2013; Zaid et al., 2018). GRS is argued to be the identifying, evaluating and hiring of individuals with task expertise, motivation and creativity skills which are congruent with environmental management tenets and development (Amabile, 1997; Jabbour & Jabbour, 2016; Zaid et al., 2018). Studies argue that GPC reflect established processes and policies that prompt teams to enhance their professional skills in the pursuit of addressing related environmental concerns of an organisation (Pham, Tuckova, & Jabbour, 2019; Zaid et al., 2018). Similarly, GTID is a process that mirrors the inclusion, engagement, upskilling and improvement of teams' skills, attitudes, and knowledge to pre-empt deterioration of green oriented capabilities and to further advance environmental sustainable knowledge which benefits an organisation and its stakeholders (Ahmad, 2015; Zoogah, 2011).

Furthermore, GHRM in Malaysia has identified human capital as a vital arbitrator in the relationship between HR practices and performance (Chen et al., 2015). However, lacking in the job descriptions for entry level employees of various manufacturing organizations in Malaysia, are green criteria and green key performance indicators (Yusoff et al., 2018). Equally, a lack of skills training and creativity development of teams on green values necessary to produce green centred creative ideas and behaviours in the workplace, is absent in several Malaysian manufacturing organizations (Yusliza et al., 2017). This has further led to inadequate articulation of green initiatives which is consequently argued to negatively influence green creativity in various Malaysian manufacturing organizations (Nejati et al., 2017). It is therefore, no surprise that performance appraisal used in several manufacturing firms in Malaysia do not have green performance as a key performance indicator (Chen et al., 2015). Consequently, this does not produce a conducive environment for fostering GTC as several pay and rewards systems are also not designed to encourage green centred creativity initiatives (Yusoff et al. 2018).

Equally, by positively contributing towards environmental sustainability for primary and secondary stakeholders such as employees, shareholders, suppliers, customers, the community and government (Clarkson, 1995), GHRM bundles are therefore, congruent with the stakeholders theory which addresses how stakeholders and the organisations interact with each other to ensure satisfaction of stakeholders needs and expectations (Amran, Ooi, Wong, & Hashim, 2016). Although, this theory espouses the role of actors in an organisation's environment, it however overlooks how organisational GHRM bundles really act to contribute towards sustainable environmental outcomes which benefits all stakeholders alike (Amran, Zain, Sulaiman, Sarker, & Ooi, 2013). This is supported by the lack of sufficient empirical evidence that predicts the association of GHRM bundles and GTC, as a strategy towards subsequently contributing to the tenets of the stakeholder's theory (Freeman, 1984; Yong et al., 2019). It is thus, unclear what causal and practical inferences could be deduced from extant results due to a lack of coherent evidences matched against today's rise in constant change and technological uncertainty. We therefore, seek to deepen prior insights by investigating the

predictive capabilities of TT on the impact of GHRM bundles on GTC. We also attempt to see how GTC is directly predicted by TT.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Green Human Resource Management (GHRM) Bundles and Green Team Creativity (GTC)

Faced with today's technological turbulence and dynamic environment, organisations are beginning to intensify their GRS pursuit in order to continuously obtain, exploit and deploy cognitive resources exemplified by GTC (Ahmad, 2015). Studies relate that GRS mirrors an effective way to initially catalyse creativity of employees, who before being creative team members, are originally concerned about environmental sustainability (Ahmad, 2015; Jiang, Wang, & Zhao, 2012; Zaid et al., 2018). By consistently including green goals into leaders' job descriptions and green job descriptions for teams, organisations may be able to realign creative ideas of teams towards more environmentally sustainable outcomes. Thus, boosting creativity of teams that are green oriented (Jiang et al., 2012).

Although GPC is another important GHRM bundle, empirical evidence of its impact on team creativity is yet scarce (Jiang et al., 2012). In an attempt to foster GPC underpinnings, prior research debate an adoption of corporate-wide standards of environmental performance and compensations to further determine how teams exert sustainable practices like waste management use and waste reductions (Marcus & Fremeth, 2009; Renwick, Redman, & Maguire, 2013). Ahmad (2015) espoused that GPC can have a positive impact on the knowledge, ability and skills of employees and further aid organisations' green orientations and objectives. By leveraging on GPC core features of auditing, appraising, offering of constructive feedbacks, rewarding, and compensating team environmental behaviours that meet or exceed both organisational and stakeholders' expectations, leaders are able to motivate and inspire more team creativity (Renwick et al., 2013).

Likewise, provision of environmental awareness trainings that ensures staff involvement and empowerment in the use of emerging technologies that translates traditional work processes from piles of paperwork into operations in digital workspaces is also a supportive green grounded strategy (Renwick et al., 2013). Employing an efficient system of GTID can thus, be argued to be an effective tool for fostering GTC in organisations (Jiang et al., 2012). Equally, exhibiting green driven creative behaviours requires continuous acquisition of defined expertise and skills that can enhance team knowledge and skills base (Brio, Fernandez, & Junquera, 2007). Hence, GTID can promote divergent thinking and create opportunities that fosters learning and task domain expertise enhancement (Amabile & Mueller, 2008; Langat & Kwasira, 2016).

H1a: *GRS positively predicts GTC*
H1b: *GPC positively predicts GTC*
H1c: *GTID positively predicts GTC*

Predictive Capability of Technological Turbulence (TT) on GTC

Given the constant change in technological advancements, exhibiting creative behaviours that may further bolster GTC could be very challenging for teams (Chan et al., 2016). However, TT is debated to be capable of provoking teams to constantly engage in and thereby,

increasingly exhibit green creativity (Wu, Liu, & Zhang, 2017). Additionally, by driving a continuous need for increased competition between organisational teams, TT may thus, increase team creativity (Chan et al., 2016). Studies thus, emphasize the need for teams to possess and demonstrate strong technological analytic skills in other to foster GTC (Huang et al., 2014; Jansen et al., 2009).

H2: *TT positively predicts GTC*

The Moderating Effects of Technological Turbulence (TT)

Despite varying positive efforts from GHRM bundles tailored towards GTC enhancement, studies (Kim, Kim, Choi, & Phetvaroon, 2019; Tang, Chen, & Jin, 2015) opine that anticipated "green" outcomes are often met with intense uncertainty under influence of TT. Wu et al. (2017) advocate that fast changing technological environments are known for rapid technological obsolescence. This is also supported by extant research that espouse that TT has a tendency to provoke increased team creativity or dampen a team's motivation to continue to exhibit creative behaviours (Chen et al., 2018). Nevertheless, recent findings yet fail to empirically exemplify how TT influences the capabilities of GHRM bundles in the attempt to foster GTC under uncertainty (Jiang et al., 2012; Kim et al., 2019; Tang et al., 2015).

H3a: *TT would strengthen the relationship between GRS and GTC.*
H3b: *TT would reinforce the relationship between GPC and GTC.*
H3c: *TT would strengthen the relationship between GTID and GTC.*

RESEARCH METHOD

Sample Size and Data Collection Procedure

Leaders and subordinates of teams from HRM departments and research and development (R&D) of 31 manufacturing organisations characterized this study's target population. The Malaysian Stock Exchange have been examined to identify the manufacturing organisations and this approach is congruent with prior literature (Goh, Rasli, & Khan, 2014). The locations of the manufacturing organisations are Klang Valley and Penang, which are established major industrial trading hubs in Malaysia (Abdullah, Jamaludin, & Talib, 2015). The Krejcie and Morgan (1970) determinant of sample size helped guide this study's sample size measurement, and for achieving a stratified proportionate sampling of respondents. Out of a total of 623 copies of distributed questionnaires, we received only 229 completed copies that were found useful for subsequent analysis. This mirrors a 36% response rate that far exceeds that of similar prior research (Abdullah et al., 2015). Ages of respondents ranged from 24 to 58 years. A total of 44% of male respondents indicate that neither gender have been overrepresented. Equally, 39% had undergraduate degrees, 33.8% were master's degree holders, 20.6% had a diploma/equivalent and 6.6% had a PhD.

Three experts and three researchers aided our questionnaire items evaluations prior to distribution. Data collection was done by nine recruited and trained research assistants (RAs). Consistent with extant research, pilot study was conducted with 50 respondents (Ogbeibu et al., 2018). SPSS software (22) was used for data analysis and several poorly loaded items were consequently dropped (Hair, William, Barry, & Rolph, 2010). However, a minimum of three indicators were retained for all constructs to maintain reliability (Hair et al., 2010). Actual data

collection was executed by RAs who contacted HR managers of respective organisations. Participants were also instructed to ensure completed questionnaires were sealed and returned to respective HR managers, for further collection and collation purposes by the RAs. Likewise, participants anonymity was assured to help pre-empt common method bias (CMB) (Podsakoff, MacKenzie, & Podsakoff, 2012). Equally, to mitigate common source bias (CSB), team leaders assessed the GTC measures of their subordinates and themselves while other constructs were assessed by leaders and subordinates respectively. Furthermore, congruent with Kock (2015) recommendations for collinearity assessment, the variance inflation factor (VIF) result of 1.553 (See Table 1) shows that the highest VIF value is significantly below the threshold of 3.3. Hence, it can be inferred that CMB is not a major issue in this study (Kock, 2015).

Table 1: SmartPLS3 Factor Analysis

Construct	rho_A	VIF values	Composite reliability (CR)	AVE	PLS PREDICT RMSE	LM RMSE	q^2 effect size (Q^2)
Green performance and compensation	0.987	1.040	0.966	0.934			0.389 (large)
Green team creativity (GTC)	0.889		0.926	0.807			
GC2					1.458	1.482	
GP3					1.158	1.36	
GP4					1.128	1.253	
Green recruitment and selection	0.902	1.504	0.936	0.829			0.391 (large)
Green training, involvement and development	0.864	1.553	0.901	0.753			0.233 (medium)
Technological turbulence	0.943	1.060	0.938	0.835			0.395 (large)

Measures

The questionnaire comprised of 7-point Likert scales, ranging from strongly disagree to strongly agree. Four items were adapted from Nejati, Rabiei, and Jabbour (2017) to measure GRS. An example is "This organization is very particular about mainly recruiting and selecting new employees with environmental concerns, knowledge and attitude". Cronbach Alpha is 0.92 (Nejati et al., 2017). Five items were adapted from Zaid et al. (2018) and one more from Nejati et al. (2017) to measure GPC. An example is "Organizational members' assessment comprises of their environmental performance". Cronbach Alpha is 0.92 (Zaid et al., 2018). Four items were adapted from Zaid et al. (2018) and one more item from Nejati et al. (2017) to measure GTID. An example is "This organization offers ecological training for employees". Cronbach Alpha is 0.94 (Zaid et al., 2018). Six items were adapted from Mittal and Dhar (2016) to measure GTC. An example is "This team member suggests new ways to accomplish environmental goals". Cronbach Alpha is 0.94 (Mittal & Dhar, 2016). Likewise, three items were adapted from Wu et al. (2017), and one item from Chavez et al. (2015) to measure TT. An example is "Technologies in this industry are rapidly changing". Cronbach Alhpa was 0.82 (Wu et al., 2017).

RESULTS

Standard deviation (SD) results from descriptive statistics range from 1.5 to 2.0 and mean values of 5.1 to 6.0 suggests no substantial difference among the constructs examined in this study, given the relatively close construct scores. Likewise, skewness and Kurtosis results ranged from -1.902 to 0.11 and -1.976 to 1.492 respectively. The results consequently suggest a distributed data normality (Hair et al., 2010). Figure 1 shows that all measurement items loaded above the minimum threshold of 0.7 (Ringle et al., 2018). Consequently, it can be concluded that all respective measurement items add substantial value to their examined constructs (Ringle et al., 2018). Rho_A and CR values in Table 1 indicate constructs' consistency and internal reliability, and the AVE values also suggests that convergent validity has been confirmed (Hair et al., 2016). The heterotrait-monotrait ratio (HTMT) results of Table 2 indicates constructs' discriminant validity confirmation (Ogbeibu et al., 2018). Table 1 also shows that multi-collinearity is not a problem in this study, given that all VIF values are less than the threshold of 5 (Hair et al., 2016).

With regards to model fit, Hair, Risher, Sarstedt, and Ringle (2019) strongly recommends that the use of model fit in PLS-SEM should be done with excessive caution as the measures' assessments are yet incomprehensive, recent encouraged thresholds are very tentative, and the concept of model fit as in covariance based SEM is of questionable value to PLS-SEM in general. Consequently, Sarstedt, Ringle, and Hair (2017) and Ringle et al. (2018) advocate that estimations in PLS-SEM maintain a causal-predictive approach and should rely on the model's predictive accuracy and relevance (Q^2, β, and R^2). Therefore, as a point of departure, the structural model has been estimated using the PLS bootstrapping preference and an overall model's statistical significance test of 5000 subsamples. R^2 value of GTC (β = 0.536, t = 8.007, p=.000) exemplifies significantly moderate degrees of variance explained in GTC (Sarstedt et al., 2017). Following the recommendations of extant research (Hair et al., 2019; Ringle et al., 2018; Sarstedt et al., 2017), inner model values of Figures 2 and 3 indicates that GTID is a positive and most significant predictor of GTC.

Figure 2: Measurement or Outer Model

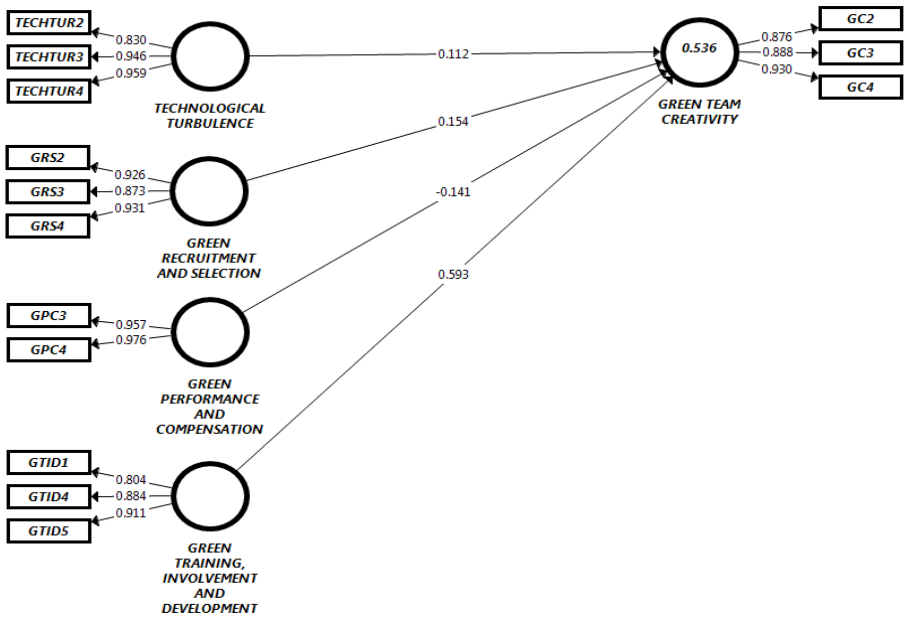
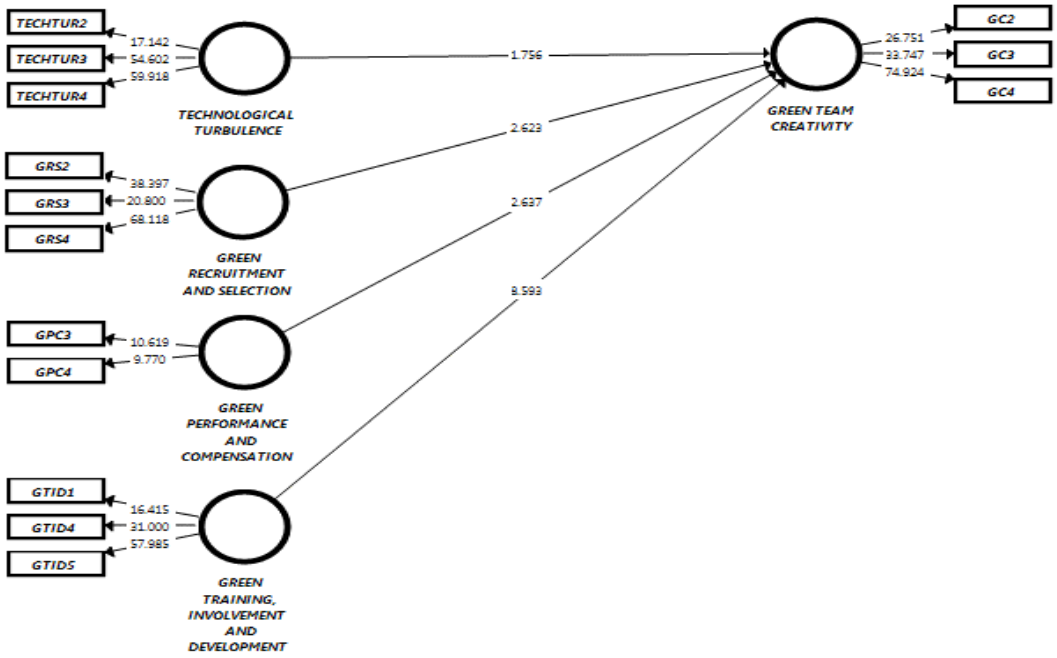


Table 2: Heterotrait-Monotrait Ratio (HTMT) Test

Construct	GPC	GRS	GTC	GTID	TT
Green performance and compensation (GPC)					
Green recruitment and selection (GRS)	0.048				
Green team creativity (GTC)	0.132	0.576			
Green training, involvement and development (GTID)	0.080	0.656	0.788		
Technological turbulence (TT)	0.139	0.108	0.284	0.199	

Figure 3: Structural or Inner Model



This is followed by GRS, and TT. These results confirm the prior **H1a, c,** and **H3** hypotheses, and are thus, **supported**. Contrary to initial theorization, GPC is a negative predictor of GTC. So, **H1b** is significant but not supported. Effect sizes (f^2) for GTID (0.488), GRS (0.034), GPC (0.041), and TT (0.026) suggests a large, small, small, and small effects respectively (Ogbeibu et al., 2018). Furthermore, moderation analysis results relate that TT (β = 0.030, t = 0.382, p=0.703) doesn't moderate the positive association between GPC and GTC as it is insignificant. So, **H5b** is not supported. We also find that TT reinforces (β = 0.111, t = 1.646, p=0.1) the positive relationship of GRS on GTC, but attenuates (β = -0.191, t = 2.746, p=0.006) the positive association of GTID on GTC. While **H5a** is **supported**, **H5c** is not supported due to its surprisingly significant negative interaction effect. In view of our model's predictive relevance, the Q^2 of GTC (0.403) and q^2 values (see Table 1) indicate an acceptable level of predictive relevance and support for our model's large predictive accuracy (Shmueli, Ray, Velasquez Estrada, & Chatla, 2016). Finally, to assess our model's out-of-sample predictive power, we initiate the PLS predict procedure with 10 folds and 10 replications, and compare PLS-SEM RMSE values with those from a naive linear benchmark (RMSE of linear model (LM)) in the PLS predict output. Results indicate lower prediction errors in PLS-SEM RMSE analysis compared to the naive benchmark highlighted in the LM RMSE output (See Table 1), thus, offering support for our model's large predictive power (Shmueli et al., 2016).

DISCUSSIONS

Congruent with the debates of extant literature (Jabbour & Jabbour, 2016; Jiang et al., 2012), our study demonstrate that all GHRM bundles except GPC, are positive predictors of GTC. GPC is evidenced to be a negative predictor. These findings are consistent with the discourse of prior research (Ahmad, 2015; Nejati et al., 2017; Pham et al., 2019; Zaid et al., 2018). Equally, GPC being a negative predictor, has been unexpected. This outcome could be a consequence of inadequate environmental guidelines or environmental policies that are not quite supportive of GTC (Marcus & Fremeth, 2009). Exclusion of adequate green performance indicators or inclusion of stringent tenets advocated by rigid GPC standards have been argued to mirror a negative impact on the degree at which creativity could be exerted (Jiang et al., 2012; Renwick et al., 2013). Consequently, Arulrajah, Opatha, and Nawaratne (2015) opine that leaders ought to ensure that a firm-wide dialogue on green concerns are adequately established in order to foster effective communication of green schemes. Likewise, setting up too high or less clearly defined GPC targets and responsibilities for green teams, are unlikely to provoke high creativity, especially when a team's creative efforts are influenced by constant technological turbulence (Chen, Li, Chen, & Ou, 2018; Jiang et al., 2012). Additionally, a negative impact of GPC is likely an outcome should environmental policies on compensations and rewards be overlooked or not effectively implemented, thus dampening the drive to exhibit creative behaviours by team members (Nejati et al., 2017; Zhu, Gardner, & Chen, 2016).

Likewise, our study is consistent with the assertions of prior literature in that TT is found to positively predict GTC (Huang et al., 2014; Wu et al., 2017). Given the pursuit for continued maintenance and possibly increased competitive advantage, learning centred organisations are now beginning to embrace the impacts of TT as a positive influence on green teams who feel constantly motivated to exert high levels of creativity (Jiang et al., 2012; Wu et al., 2017). Moreover, we found that TT positively reinforces GRS impact on GTC. GRS processes have been espoused to mirror a positive association with GTC, and congruent with our findings, studies (Huang et al., 2014; Wu et al., 2017) contend that the presence of TT can provoke teams to exhibit increased creative behaviours. This outcome is important to ensure organisational survival in the long run (Bai, Lin, & Li, 2016). Likewise, our findings show that TT attenuates the positive impact of GTID on GTC. This finding is consistent with extant literature which advocate that although GTID is a necessary GHRM bundle which can facilitate GTC, the presence of constant TT may likely leave a green team frustrated and less motivated to exert creative behaviours (Chen et al., 2018; Jansen et al., 2009). Consequently, the positive effects of GTID on GTC is likely to have less positive impact as even willing green team members become overburdened with constant GTID related initiatives. Studies therefore, elucidate on the importance of ensuring that GHRM practices are sufficiently aligned to adequately identify with motivation schemes that inspire rather than dampen creativity among green teams (Ahmad, 2015; Chen et al., 2018; Zhu et al., 2016).

THEORETICAL AND MANAGERIAL IMPLICATIONS

We stretch prior traditional HRM conceptualisations to reflect a more environmentally sustainable GHRM framework. As a major gap in several prior research, our study is among the first to have considered the distinct roles of TT and how it acts to inhibit or foster GHRM bundles which predicts GTC. We thus, advance the tenets of the stakeholder theory by deepening insights into how the much overlooked GHRM undergirding contributes towards environmental sustainability. Consequently, we expand prior insights by demonstrating that GTID is a more significant and large predictor of GTC compared to GRS and TT. It is thus,

important for policymakers and practitioners to intensify and reinforce their GTID strategies as this is evidenced to have a more significant prediction of GTC. Organisational policies could be refined to ensure teams are consistently trained on green related practices. It is also relevant for teams to have a sense of inclusion in strategies development and motivated to remain as part of respective green teams. Likewise, leaders may attempt to initiate green schemes that support teams in acquiring external trainings or programs tailored towards green skills development. We provide evidence which supports that GPC is a negative predictor. Hence, practitioners ought to aptly enforce GPC standards with some degree of flexibility that doesn't relay excessive force and control. This is important to make teams feel more willing to commit towards green creativity initiatives.

We also show that TT acts as a positive predictor, and a positive and negative moderator. We exemplify that TT isn't mainly a positive predictor of GTC but TT also reinforces the positive relationship between GRS and GTC. Congruently, practitioners can more confidently apply related strategies in the knowledge that TT may not often be perceived as a negative antecedent of GTC but actually a facilitator. Likewise, policies may be further instituted to ensure GRS processes are constantly re-evaluated to align with constantly evolving technologies as this does mirror a positive influence on GTC. We demonstrate that TT also attenuates the positive association between GTID and GTC. So, leaders ought to note that while GTID is a large predictor of GTC, the presence of TT is quite likely to dampen GTID initiatives that could have otherwise engendered GTC. Thus, trainings, inclusions and developments programs ought to be applied with careful considerations to already well-established technologies.

FUTURE RESEARCH DIRECTIONS

Our study mirrors a team level analysis, thus, organisational level implications ought not to be inferred. This however, provides opportunity for future research into an organisational level analysis that deepens insights into green organisational creativity. Implicitly grounded on the tenets of the stakeholder theory, our study did not directly examine perceptions of shareholders, suppliers, customers, societal or corporate level factors as such divergence would have directed our focus in contrary directions to our main study aim. It is therefore, important for future researchers to consider incorporating factors stemming from the aforementioned concepts into a similar investigation. This study is cross-sectional in nature. To facilitate much robust insights, our study may be replicated using a longitudinal approach. Furthermore, our findings ought to be generalised with caution. This is also because, our study investigated mainly 31 manufacturing organisations. Nevertheless, more manufacturing organisations could be added by future research, and even across just the manufacturing industry.

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