PalArch's Journal of Archaeology of Egypt / Egyptology

ROLE OF GREEN TRANSFORMATIONAL LEADERSHIP IN SUSTAINABLE BUSINESS DEVELOPMENT: MEDIATING EFFECT OF GREEN TECHNOLOGY INNOVATION

Dr. Atalla Fahed Al-Serhan[1]

[1]Assistant Professor,Department of Economy and Business Administration,
Al-albyt university

Dr. Atalla Fahed Al-Serhan[1] Role Of Green Transformational Leadership In Sustainable Business Development: Mediating Effect Of Green Technology Innovation– Palarch's Journal of Archaeology of Egypt/Egyptology 17(7) ISSN 1567-214X

Key words: Green transformational leadership, green technological innovation, economic sustainability, social sustainability, environmental sustainability, Structural Equation Modeling.

ABSTRACT

The purpose of study to analyze the impact of green transformational leadership on sustainable business development and mediating effect of green innovation technology. The data gather from managers of manufacturing sector of Oman through online questionnaire and analyzed through structural equation modeling. The results show that green transformational leadership significantly influence environmental, social and economic sustainability. The mediating role of green technological innovation also have significant impact among green transformational leadership and economic, social and environmental sustainability. The performance of organizations enhances by competitive edge of green practices which also help in protection of environment. The utilization of green practices in business operations lead to reduce waste, cost, resources consumptions, emission of carbon and time and aid to increase positive image in mind of customer and show concern of organization for perseverance of ecology and also motivate others to adopt green practices for sustainable business development.

INTRODUCTION

From recent decades technology has improved a lot and help business in modifying the operational environment of organizations (Cancino, La Paz, Ramaprasad, & Syn, 2018). Organizations now focus of converting their performance dependence from tangible to intangible assets. Intellectual capital play an important role in sustenance of business (Ooi, 2014). This capital effectively utilized by enterprises in bring the customer satisfaction (Attia & Salama, 2018) and help in gaining competitive advantage (Mothe, Nguyen-Thi, & Triguero, 2018). The innovation of new strategies, process, product and services are accomplished with intellectual capital (Yusr, Mokhtar, Othman, & Sulaiman, 2017). In order to keep competitive advantage productive and

innovative, business should develop multiple effective strategies that lead to meet the demand of customers and also sustain the social, economic and environmental performance.Enterprises and individuals analyzing the environmental issues occur due to business operation and thinking of developing sustainable methods to run the business. Society and stakeholder also stresses the business to change practice that causes global warming and resource reduction from environment(Albort-Morant, Henseler, Leal-Millán, & Cepeda-Carrión, 2017)and emphasis on adopting practices that ensure sustainable development (Davenport, Delport, Blignaut, Hichert, & Van der Burgh, 2019). Social, environmental and economic sustainability are three indicators of sustainable development (Wijethilake, 2017). Environmental sustainability related with protection of natural resource and atmosphere, sustainability of society allied with society and people fortification while economic sustainability refer to economic and financial performance of firm (J. Guerrero-Villegas, Sierra-García, L., Palacios-Florencio,, 2018). The concept of green in operational activities help business in achieving sustainability standards. This innovation guide firm in producing environment friendly products (Xie, Huo, & Zou, 2019). In order to bring changes in activities, organization implement this innovation not only on technological level but also administrative level(Li, Zhao, Zhang, Chen, & Cao, 2018). Green technology innovation is advancement made in technology and aim to improve environment and technology. This advancement aid in implementing upgraded process that help in producing products which are environment friendly and reducing the wastage of raw material, resources and energy. These products bring harmony among environment, economic performance and production process (Fernando, Jabbour, & Wah, 2019). Green transformational leadership is modification made at administrative level and transformational leadership aims to encourage the attitude of employees towards green or pro-environmental behavior (Robertson &Barling, 2013). Leaders take initiatives and dedicate their employees of eliminating practices or process that have negative effect on environment.

As manufacturing sector of Oman play vital role in economy and lead to contribute about 15% in GDP. In Oman, manufacturing industries mostly consist of chemical, plastic, furniture, paper and textile. These industries are main source of effecting environment and social sustainability and operation of manufacturing industries quite different from service industries. So there is need to implement the green transformational leadership and green technological innovation in order to keep environment, social and economic sustainability. The upper management in manufacturing sector adopt green transformation leadership attitude that responsible to create and support the internal competence of employee to invent green practices to attain performance at all levels (Chen & Chang, 2013).The alternation in practices of business help in producing effective outcome and keep the environment sustainable which is major concern of customers and stakeholders. The main objectives of study to find the impact of green transformational leadership on business sustainability which is attained by economic, social and environment sustainability and also evaluate that green innovation technology effective enough to mediate associations among GTL and business sustainability in manufacturing sector of Oman. The ability opportunity theory (AMO)(Appelbaum, Bailey, Berg, Kalleberg, & Bailey) and resource based view (RBV)(Barney, Wright, & Ketchen Jr)show the effect of GTL on employees behavior and highlight the changes in strategies or practices that help to develop and divert the behavior of employees towards green practice or green innovation for greater environmental performance (Kaur, Gupta, Singh,

& Perano, 2019)(Leal-Millán, Roldán, Leal-Rodríguez, & Ortega-Gutiérrez, 2016).

The implication of green practices leads the manufacturing industry to a new level and help in gaining competitive advantage. Green practices help in gaining positive image in mind of customer that organizations are responsible and change their strategies to save environment from industrial hazards (Bird, Hall, Momentè, & Reggiani, 2007). The adoption of green practices from one sector also motivate other sector to implement these practice and bring green culture in society (Linnenluecke & Griffiths, 2010). As green transformational leadership and green innovation technology is intangible asset and measured as important attribute in enhancing the performance of enterprise. So, this intangible asset help in attaining the competitive advantage to Oman in comparison with other countries. The next section of study based on theory and hypothesis while next section covers the methods which used to run the analysis and last sections a comprised of results followed by discussion, implication, limitation and conclusion of the study.

Literature Review and Hypothesis Development

The link among green leadership practices and employee performance allied with resource-based view and ability motivation opportunity which lead to enhance the economic, social and environmental performance of manufacturing sector of Oman.

Resource Based View

According to RBV, performance of firm based on strategies and resources that are valuable, rare and unique from other competitors in market and leverage the firm in gaining competitive advantage (Barney). If innovation in strategies and resources are difficult for rivals to replicate and offer a substitute with alternative resources then organization accomplish superior competitive advantage and continuous performance towards success (Raphael & Schoemaker). Top management leadership and employees are essential resource of any enterprise and application of RBV on human resource practices help in making decisions and strategies. Implementation of green practice can be applied through RBV. As RBV provide critical analysis of resources to top management that aid to make strategies for execution of green practices the leaders motivate and encourage their employees green behavior and their effort to achieve green objectives for sustainable environment and superior competitive advantage or performance (Boxall & Steeneveld).As RBV satisfy the firm on achieving competitive advantage and enhance performance through critical analysis and effective utilization of human resources. But the competitive advantage attained through leadership, intact and intellectual behavior of employees remain embed in complex system of organization. Firm should use the leadership and intellectual behavior as their competitive edge and made it beneficial for environment and economic performance through green transformational leadership for sustainable business practices (Takeuchi, Lepak, Wang, & Takeuchi, 2007).

Ability Motivation Opportunity

The AMO theory based on abilities, capabilities, inspirations and opportunities of employees that help in enhancing the performance of organization and role of leader in encouraging the employee for enrichment which lead the organization towards improvement (Appelbaum et al.). According to AMO theory the abilities of employees access through recruitment or selection then training or development which enriched by opportunities provided to employees by empowerment or team work which help in learning or improvement and motivation of employees boosted by rewards, compensations

or incentives offered by organization on achieving the goals (Gerhart).AMO theory helped in implication of green practices on employee behavior and job attitude for sustainable business practices. As AMO theory focused on link among human resource, innovation and performance i.e. leaders motivate employees for seek opportunity and enhance the performance. So leader should adopt green practices and develop strategies that aims to attract, inspire and sustain employee behavior towards environment protection through green products and process by green technological innovation which help business in attaining competitive advantage (Boselie, Dietz, & Boon). The implication of green practices in business activities embracing and changes the operation in to green like green recruitment and selection of employees and then capabilities of flocks enrich by green training or development which encouraged by performance based rewards. All this changes made to entice, train, motivate and modify the mind of human towards green practices. So leaders made green strategies and goals and employees achieve that objectives or goals by continuous innovation in process, products and service according to sustainability development which help in improving social, economic and environment performance (Gerhart).The section below deals with prior studies which help in formulation of hypothesis. The arguments and propose of hypothesis based on RBV and AMO theory.

Green transformational leadership and environmental sustainability

In organization, leadership consider as vital resource on the basis of RBV (Zhou, Zhang, Lyu, & Zhang, 2018). Green transformational leadership create such an environment in enterprise where leader inspire the employees with green vision and motivate or encourage them to put their efforts in green innovative product, process and services for sustainability of environment (Ng, 2017); (Boehm, Dwertmann, Bruch, & Shamir, 2015); (Mittal & Dhar, 2015). Environmental sustainability related with protection of ecology from organizational products, process and consumptions and it is responsibility of organization to fulfill the legal environment requirement (Dubey, Gunasekaran, & Ali, 2015). So organizations focuses on promoting ecology fortification through GTL. It is found that GTL motivate subordinates in sustaining the green behavior for the development of green products which help to save the ecosystem and reduce the pressure from stakeholder for sustainable environment (Chen & Chang, 2013). GTL is a key component of delivering or implementing green strategies through green practices or policies to accomplish green sustainability (Jia, Liu, Chin, & Hu, 2018). As Oman is one of leading economy of the world and started to focus on sustainability of environment. But there is no evidence from prior studies which show the effect of green transformational leadership on environmental performance. This study helps a lot in analyzing the impact of GTL on sustainable environment of Oman manufacturing sector.

H1: GTL have significant and positive impact on environmental sustainability.

Green transformational leadership and economic sustainability

Leader provide clear vision of goals and motivate employee or fulfill their development needs for accomplishment of organizational goals (Mittal & Dhar, 2016); (Chen & Chang, 2013). Green transformational leadership also inspire and encourage employees to obtain new information for development of new process and product that related with green practices which is essential for environment protection (Le & Lei, 2019); (Han, Seo, Li, & Yoon, 2016). The introduction of green products, process and services help in improving the environmental performance and also increase the economic performance of organization (Dranev, Izosimova, & Meissner, 2018); (Martinez-Conesa, Soto-Acosta, & Carayannis, 2017). The economic performance of firm effectively improve by GTL, as employees work more efficiently and goals proficiently

achieved by extra effort of leader towards task, employee behavior and innovations (Barrick, Thurgood, Smith, & Courtright, 2015). It is GTL which support employee passion towards green innovatively, green initiation of products and process and economic sustainability (Zhou et al., 2018). It is found that major role in implication of green practices played by GTL which enthuses the morale of employee through appraisal or incentives and stimulate the passion of workers to achieve organizational goals to improve economic performance (Zhu, Chew, & Spangler).

H2: GTL has positive and significant impact on the economic sustainability

Green transformational leadership and social sustainability

Green transformational leadership is understanding, guiding and controlling of coworkers towards green organizational goals (Northouse, 2015). GTL supervise employee social behavior and encourage the production of eco-friendly product that reduces pollution and utilized less resources (Mazzelli, De Massis, Petruzzelli, Del Giudice, & Khan, 2019). Social sustainability focuses on enhancing organizational relationship among human or society and promoting wellbeing of human by meeting their demands or needs (J. Guerrero-Villegas, Sierra-García, L., Palacios-Florencio, B., 2018.). (Mittal & Dhar, 2016) found that GTL significantly associated with creativity of green products according to demand of customers for bring social sustainability. A study conducted on hospital sector of India on GTL and social sustainability. The results show that GTL had significant effect on social sustainability (Chen & Chang, 2013). Social sustainability also deal with wellbeing of employees or environmental management. GTL enhances the employee green proficiencies or skills through green training and development for creating stable green workplace which put their efforts for social suitability by reducing waste, energy consumption or recycling of products (Singh & El-Kassar, 2019). GTL show confidence in employees solicitude which increase commitment of subordinate towards organization objectives and contributing an effective role in sustainable social value (Dionne, Yammarino, Atwater, & Spangler). (Khalili, 2016)scrutinized that GTL assures the creation or maintenance of green organizational behavior which promotes wellbeing of members and society through green creativity and innovation. It is evaluated that GTL directly influenced the social sustainability.

H3: GTL has positive and significant impact on social sustainability

Mediating role of green innovation technology

Initiation and development of environment friendly products and process is known as green innovation technology (Albort-Morant, Leal-Millán, & Cepeda-Carrión, 2016). Green process and products are formed through utilization of green raw material and products are designed on the basis of ecosystem principle which dictate towards less consumption of energy, resources and electricity or less usage of raw material and reduces the emission of chemical in ecosystem (Gunasekaran & Spalanzani, 2012). GTL indirectly influence the business sustainability which is mediated by green innovative products or processes (Barney). (Singh & El-Kassar, 2019) considered green innovation as strategic tool which maintain environmental management in firm for achieving goals and enhancing environmental performance. GTL play an important role in innovation of green product and process (Zuraik & Kelly, 2019). The negative impression of business on environment reduces due to innovation of green products or process which reduces waste emission and save time, money and resources that lead to increase the social, economic and environmental performance (El-Kassar & Singh, 2019). As green innovation significant effect on business sustainability and GTL. So green innovation capable enough to act as mediator among firm environment performance and

GTL. As Oman moving towards technological advancement but there is no such study found which analyze the mediating effect of green innovation between sustainability and green transformational leadership.

H4: GTL significantly influence the environmental sustainability through green innovation technology

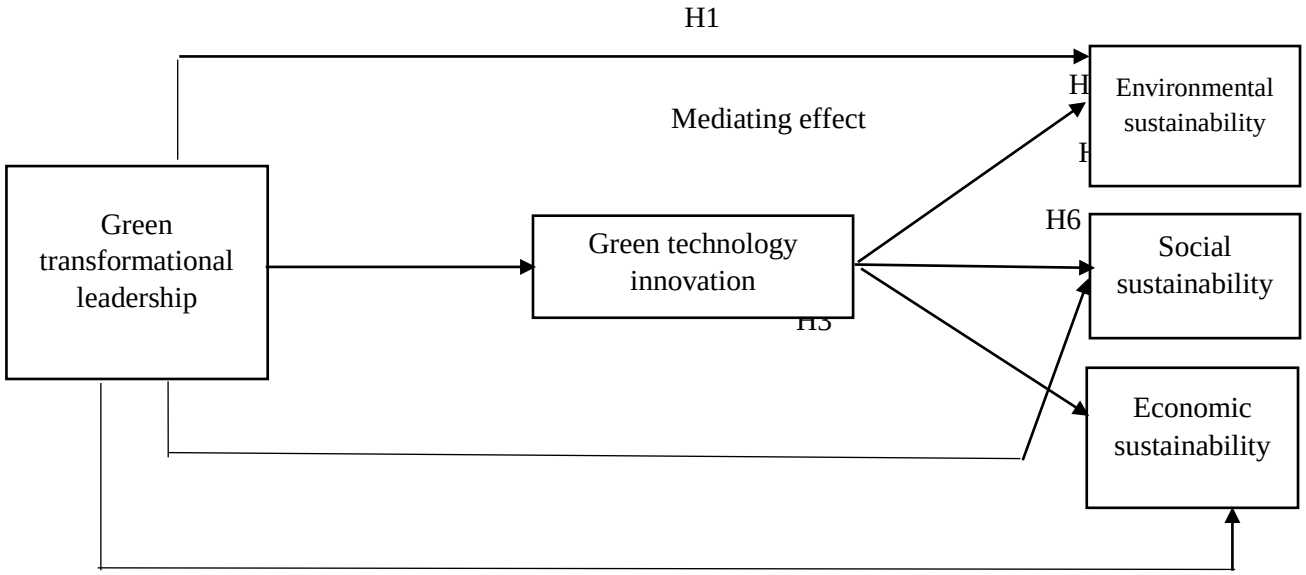
H5: GTL significantly influence the economic sustainability through green innovation technology

H6: GTL significantly influence the social sustainability through green innovation technology

Theoretical framework

The framework represent the dependent and independent variables of study. The independent variable of study is green transformational leadership (GTL) and green technology innovation act as mediator. The independent variables of the study are environmental, social and economic sustainability. See figure 1

Figure 1: Research model



3. METHODOLOGY

The methodology explain the research population, sampling and measures regarding data of study and tools or techniques applied to run analysis. The data gather from manufacturing sector of Oman and respondents of study are managers of different department and levels such as chief operating officer, human resource manager, production manager and research or development department. The data collected through electronic media due to COVID pandemic and requested them to fill the questionnaire by analyzing the performance of organization on the five point likert scale which ranges from strongly agree to strongly disagree regarding green transformational leadership, green innovational technology as well as economic, social and environmental sustainability. As managers well know the policies and practices of organization, so data accumulated from management staff

Measurements

As questionnaire used to gather data which divided in to four sections. The first section of questionnaire based on demographics which describe the information about respondents. The second section based on green transformational leadership with six items adopted from(Chen & Chang, 2013). The third section based on fifteen items for three dimension of corporate sustainable

development i.e. economic, social and environmental sustainability (Bansal, 2005)and (Turker, 2009). The fourth section related with green innovation technology with eight items (Wong, 2013)and (Wang, Ahmed, & Rafiq, 2008).

Data analysis tools and techniques

Structural equation model (SEM) utilized to evaluate relational effect among GTL, green technological innovation and business sustainability. As SEM removed the biasness occurred due to measurement error and strong enough to build hierarchy of latent construct (Prajogo & Cooper, 2010). The software used to analyze the data are AMOS or SPSS. The data should be adequate i.e. free from multi collinearity common based bias, in order to perform mutli variate analysis trailed by SEM (Lee, Ooi, Tan, & Chong, 2010). To avoid CBM, Harman's single factor test is applied, as CBM effect analysis or finding if single factor show more than 50% of whole variance (Podsakoff, MacKenzie, & Podsakoff, 2012).

Empirical Findings

This section elaborate the findings get after implication of different test and analysis. These findings explicate the acceptance or rejection of hypothesis. This consist of different test or analysis, while table 1 explain the demographics of respondents.

Table 1: Respondent Profile

		Frequency	Percent
Gender	Male	262	55.6
	Female	209	44.4
	Total	471	100.0
Age	Less Than 25 Year	149	31.6
	25 to 35 Years	204	43.3
	35 to 45 Years	101	21.4
	More Than 45 Years	17	3.6
	Total	471	100.0
Experience	Less than 2 Year	80	17.0
	2 to 5 Year	210	44.6
	5 to 8 Year	139	29.5
	More than 8 Year	42	8.9
	Total	471	100.0

The figures in table 1 illuminate gender, age and experience of respondents. As data gather from managers at different levels from manufacturing sector of Oman. The most of respondents are male with percentage of 55.6%, whereas percentage of female respondent are 44.4%. The data gather from age group less than 25 years is 31.6%, 43.3% is collected from age ranges from 25 to 35 years, 21.4% from age range of 35 to 45 years and only 3.6 % from age group more than 45 years. On the basis of experience, 17% respondents have experience of less than 2 years, 44.6% have 2 to 5 years' experience, 29.5% have 5 to 8 years' experience and respondents with more than 8 years have 8.9% of experience.

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
GreTLead	471	1.00	5.00	3.1444	1.04792	-.121	.113
GreTecInn	471	1.00	5.00	3.2553	1.00158	-.283	.113
EnvSustain	471	1.00	5.00	3.4561	1.18246	-.462	.113
SocSustain	471	1.00	5.00	3.3830	1.17552	-.474	.113

EcoSustain	471	1.00	5.00	3.5154	1.15703	-.443	.113

Table 2 describe minimum, maximum, mean, skewness and deviation of variables from standard. As data of all variable gather through 5 point likert scale with maximum value of 5, minimum value of 1 and mean value is 3 which show normal distribution of variables. The normality of data assess through skewness threshold value which ranges from +1 to -1. As value of all variables under the range of threshold value which show normality of data.

Kaiser Meyer –Olkin test is used to measure data and to analyze the suitability for factor analysis (Kaiser). The test mainly analyze the sampling adequacy of all variables in model and whole model where sampling adequacy related with proportion of variance in variable which occur due to underlying factors. If the value of KMO ranges from 0.8 to 1.0 then sampling of data is adequate (Cerny & Kaiser). Bartlett's test of sphericity used to identify matrix by comparing matrix correlation, which show that variables are related or not for structure detection. (Snedecor & Cochran). If value less than significance level 0.05 then it indicate that factor analysis is useful for data.

Table 3: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.932
Bartlett's Test of Sphericity	Approx. Chi-Square	12118.292
	Df	276
	Sig.	.000

Table 3 show results of KMO and Bartlett's test. As value of KMO is 0.932 which fall under range of 0.8 to 1.0 which enlighten that sampling of all variables is adequate. The findings of Bartlett's test of sphericity show that value is less then significance value 0.05 which means factor analysis is suitable for data.

Rotated component matrix is related with loadings to carry out component analysis. It estimates the correlation among all variables and estimated components. It mainly describe which variable express by which component (Ehrenberg).

Table 4: Rotated Component Matrix					
	Component				
	1	2	3	4	5
GTL1	.829				
GTL2	.871				
GTL3	.827				
GTL4	.790				
GTL5	.826				
GTL6	.850				
GTI1					.765
GTI2					.782
GTI3					.798
GTI4					.837
ENS1			.842		
ENS2			.842		
ENS3			.855		
ENS4			.884		

ENS5			.897		
SOS1		.853			
SOS2		.869			
SOS3		.862			
SOS4		.876			
SOS5		.880			
ECS1				.836	
ECS2				.859	
ECS3				.883	
ECS4				.873	

The table 4 represents the loading of components which are correlation among components and variables and possible value ranges from +1 to -1. As green transformational leadership (GTL) is highly correlated with component 1 so GTL represent by component 1. Meanwhile, green technological innovation (GTI) express by component 5, environmental sustainability (ENS) explicate by component 3, social sustainability (SOS) by component 2 and economic sustainability (ECS) by component 4.

The validity of each construct measures through convergent and discriminant validity. The values of composite reliability (CR) and average variance extract used to analyze the validity (Hair, Sarstedt, Ringle, & Mena, 2012). The construct are validate or reliable if value of CR is more than 0.7 and AVE is higher than 0.5 (Ponterotto & Ruckdeschel, 2007). The discriminant validity evaluate chances of collinearity and multi co linearity and all variables discriminate from one and another (Gronemus et al., 2010).

Table 5: Convergent and Discriminant Validity

	CR	AVE	MSV	SOS	GTL	GTI	ENS	ECS
SOS	0.901	0.830	0.294	0.911				
GTL	0.947	0.750	0.315	0.455	0.866			
GTI	0.891	0.673	0.315	0.437	0.561	0.820		
ENS	0.904	0.844	0.294	0.542	0.472	0.424	0.919	
ECS	0.936	0.785	0.228	0.358	0.431	0.477	0.426	0.886

The table 5 show result of different analysis for convergent and discriminant validity. The CR value of all variables are more than 0.7 and value of AVE are less than MSV or more than 0.5 which indicate that all variables are consistence and reliable. In discriminant validity, top value of variables should be higher than inferior values. The figures in table show that all bold top values are more than their lower values which implicate there is no chances of collinearity and multi collinearity and every variable discriminate from others.

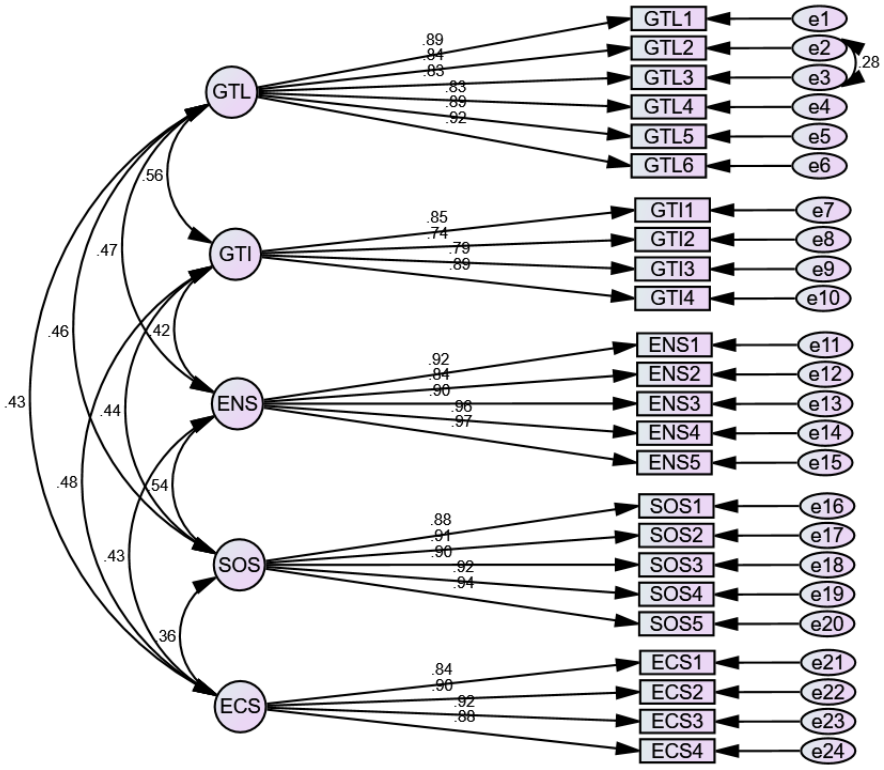
Confirmatory factor analysis is multivariate arithmetic process which used to identify significance of each construct for each variable and also analyze the link of studied construct with latent construct as well as required figures essential for data. Meanwhile, it measures model fitness i.e. well for study or not.

Table 6: Model Fit Indices

CFA Indicators	CMIN/DF	GFI	IFI	CFI	RMSEA
Threshold Value	≤ 3	≥ 0.80	≥ 0.90	≥ 0.90	≤ 0.08
Observed Value	2.903	0.885	0.962	0.962	0.064

The indicators of table 6 express threshold or observed value for model fitness. All the observed values should be higher or lower than their threshold values. As CMIN/DF threshold value is less or equal to 3. The findings show that CMIN/DF observed value is 2.903 which is less 3. The observed value of GFI is 0.885 which should be more or equal to 0.80, IFI and CFI value 0.962 which fulfills the required threshold value greater or equal to 0.90. The observed value of RMSEA is 0.064 which should be smaller or equal to 0.08. All indicators fulfills the requirement and explicate fitness of model. The following figure 2 describe confirmatory factor analysis of all variables.

Figure 2: CFA



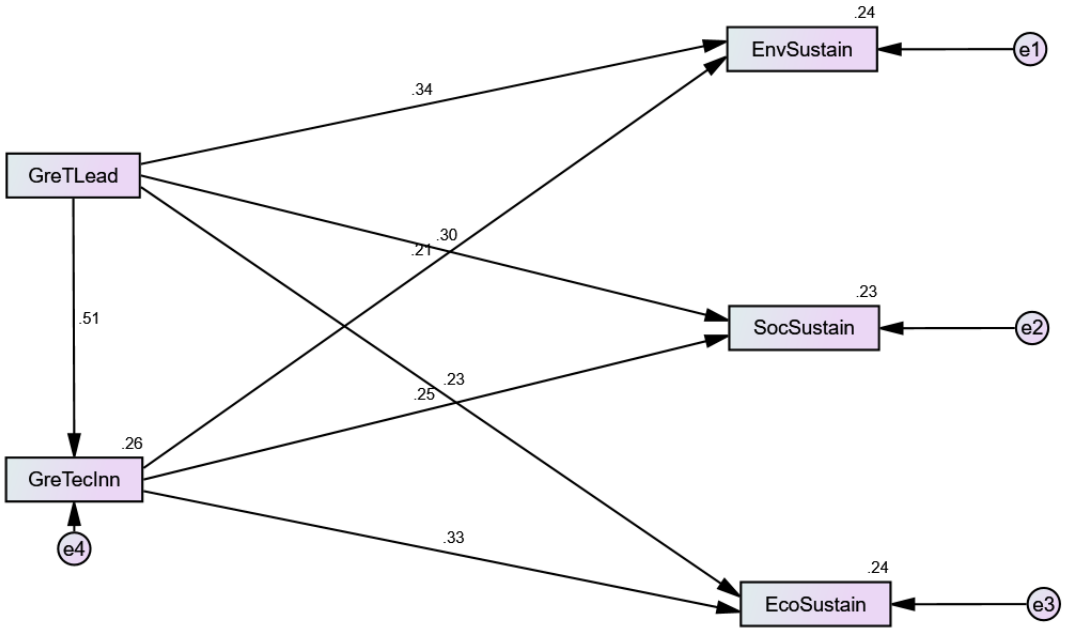
The structurao assoistion among variables analyzed through structural equation modeling which is multi variate statistical tool. SEM biscally measures structural assoisation among latent variable and each construct because it is combination of factor analysis and multivariate regression analysis.

Table 7: Structural Equation Modeling

Direction	B-Value	SE	P-Value	**Hypothesis**	Decision
GTL→ENS	.343	.053	.000	H1	Accepted
GTL→SOS	.303	.053	.000	H2	Accepted
GTL→ECS	.231	.052	.000	H3	Accepted
GTL→GTI→ENS	.108	.026	.010	H4	Accepted
GTL→GTI→SOS	.129	.029	.010	H5	Accepted
GTL→GTI→ECS	.168	.032	.010	H6	Accepted

The table 7 show each construct regression weight on another and acceptance or rejection of hypothesis. The findings illustrate that impact of GTL on ENS is positive and significant with coefficient value of 0.343 which means that one unit change in GTL causes 0.343 increase in ENS. The effect of GTL on SOS is also optimistic and substantial and bring enhancement of 0.303 with one unit change in GTL. Positive and substantial influence of GTL on ECS also analyze with increase of 0.231 in ECS. GTI significantly and positively play a mediating role between GTL or ENS, GTL or SOS and GTL or ECS and improve the effect among GTL and ENS with 0.108, and 0.129 between GTL and SOS. The mediating effect of GTI enhance ECS with 0.168. Following show the mediating effect of green technology innovation between green transformational leadership and economic, social as well as environmental sustainability.

Figure 3: SEM



DISCUSSION AND CONCLUSION

Discussion

The study accompanied to examine the influence of green transformational leadership (GTL) on business sustainability (ENS, SOS, ECS) and mediating role of green innovation technology among GTL and ENS, SOS or ECS. This section illustrate acceptance or rejection of hypothesis and support the findings from previous studies. The results depict that GTL positively and significantly effect ECS and this finding affirms hypothesis (H1). The study of (Jia et al., 2018) also support result that GTL enhances ENS with effective strategies and productive implication of green practices by continuously enhancing employee passion. The impact of GTL on SOS is also substantial and it approve hypothesis (H2). The similar findings also analyzed by(Khalili, 2016)that GTL play vital role in creating green management environment and behavior in organization which enhances SOS by wellbeing of members or society. The outcome of study also accept hypothesis (H3) which is significant influence of GTL on ECS. The familiar results also depict in studies of (Le & Lei, 2019),(Han et al., 2016). It scrutinized that GTL boost the employee's passion

for development of new green product and practices which bring stability in ecology and increase economic performance of firm. The result show that GTI significantly mediated the effect among GTL and ENS, GTL and SOS as well as GTL and ECS. (Barney)found that GTI is one of biggest tool for reducing cost and waste emission in ecosystem and significantly mediating the impact of GTL on business sustainability.

RESEARCH IMPLICATIONS

The research mainly focus of utilization of green practices for stability of environment. The implication of green practices in business operations bring competitive advantage for organization. It leverage the organization for creating superior environmental performance. It also beneficial in crafting positive image in mind of stakeholders and also increase the demand of firm green products, process and services by customers. Enterprises should also invest in green transformational leadership which play essential role in training, motivating or sustaining employees efforts toward green process, product and services. Firm should consider GTL and GTI as strategic tool which channelize the environmental management activities. Green innovation in product, processes and services reduces stakeholder pressure for causing pollution and it is proactive measures of decreasing negative impression of firm on environment.

CONCLUSION

The purpose of study is to determine the impact of green transformational leadership on economic, social and environmental sustainability and mediating role of green technological innovation among them. The data collected through online questionnaire from managers of manufacturing sector of Oman. SEM technique used to perform the analysis. The result show that green transformational leadership have significant and positive effect on environmental, social and economic sustainability. The findings also depict the significant mediating role of green technology innovation on economic, social and environmental sustainability. As Oman is one of the leading economy of world and effort made on sustainability of ecosystem is beneficial for society as well as it also enhances the performance of sector by making green technology innovation utilization in business operation as their competitive edge. Green practices also improve sustainability of Oman.

LIMITATIONS AND FURTHER SUGGESTIONS

The innovation of green process, product and services will bring environmental, social and economic sustainability. As study conducted on only manufacturing sector of Oman. So further studies will be held on other sectors like petroleum, agriculture and banks etc. This study mainly focus on leadership behavior and ignore the fact of employee's beliefs or values. The future study should also cover the employee attitude towards green development and also the perception of external and internal stakeholder about green innovation and environmental performance.

REFERENCES

Albort-Morant, G., Henseler, J., Leal-Millán, A., & Cepeda-Carrión, G. (2017). Mapping the field: A bibliometric analysis of green innovation. *Sustainability, 9*(6), 1011.

Albort-Morant, G., Leal-Millán, A., & Cepeda-Carrión, G. (2016). The antecedents of green innovation performance: A model of learning and capabilities. *Journal of Business Research, 69*(11), 4912-4917.

Appelbaum, E., Bailey, T., Berg, P., Kalleberg, A. L., & Bailey, T. A. *Manufacturing advantage: Why high-performance work systems pay off*: Cornell University Press.
Attia, A., & Salama, I. (2018). Knowledge management capability and supply chain management practices in the Saudi food industry. *Business Process Management Journal*.
Bansal, P. (2005). Evolving sustainably: A longitudinal study of corporate sustainable development. *Strategic management journal, 26*(3), 197-218.
Barney, J. Firm resources and sustained competitive advantage. *Journal of management, 17*(1), 99-120.
Barney, J., Wright, M., & Ketchen Jr, D. J. The resource-based view of the firm: Ten years after 1991. *Journal of management, 27*(6), 625-641.
Barrick, M. R., Thurgood, G. R., Smith, T. A., & Courtright, S. H. (2015). Collective organizational engagement: Linking motivational antecedents, strategic implementation, and firm performance. *Academy of Management journal, 58*(1), 111-135.
Bird, R., Hall, A. D., Momentè, F., & Reggiani, F. (2007). What corporate social responsibility activities are valued by the market? *Journal of business ethics, 76*(2), 189-206.
Boehm, S. A., Dwertmann, D. J., Bruch, H., & Shamir, B. (2015). The missing link? Investigating organizational identity strength and transformational leadership climate as mechanisms that connect CEO charisma with firm performance. *The Leadership Quarterly, 26*(2), 156-171.
Boselie, P., Dietz, G., & Boon, C. Commonalities and contradictions in HRM and performance research. *Human resource management journal, 15*(3), 67-94.
Boxall, P., & Steeneveld, M. Human resource strategy and competitive advantage: A longitudinal study of engineering consultancies. *Journal of Management studies, 36*(4), 443-463.
Cancino, C. A., La Paz, A. I., Ramaprasad, A., & Syn, T. (2018). Technological innovation for sustainable growth: An ontological perspective. *Journal of Cleaner Production, 179*, 31-41.
Cerny, B. A., & Kaiser, H. F. A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate behavioral research, 12*(1), 43-47.
Chen, Y.-S., & Chang, C.-H. (2013). The determinants of green product development performance: Green dynamic capabilities, green transformational leadership, and green creativity. *Journal of business ethics, 116*(1), 107-119.
Davenport, M., Delport, M., Blignaut, J. N., Hichert, T., & Van der Burgh, G. (2019). Combining theory and wisdom in pragmatic, scenario-based decision support for sustainable development. *Journal of Environmental Planning and Management, 62*(4), 692-716.
Dionne, S. D., Yammarino, F. J., Atwater, L. E., & Spangler, W. D. Transformational leadership and team performance. *Journal of organizational change management, 17*(2), 177-193.
Dranev, Y., Izosimova, A., & Meissner, D. (2018). Organizational Ambidexterity, Performance and Knowledge Management: Empirical Evidence from the Energy and Pharmaceutical Sectors. *Higher School of Economics Research Paper No. WP BRP, 83*.
Dubey, R., Gunasekaran, A., & Ali, S. S. (2015). Exploring the relationship between leadership, operational practices, institutional pressures and environmental performance: A framework for green supply chain. *International journal of production economics, 160*, 120-132.
Ehrenberg, A. S. The problem of numeracy. *The American Statistician, 35*(2), 67-71.

El-Kassar, A.-N., & Singh, S. K. (2019). Green innovation and organizational performance: the influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change, 144*, 483-498.
Fernando, Y., Jabbour, C. J. C., & Wah, W.-X. (2019). Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: does service capability matter? *Resources, Conservation and Recycling, 141*, 8-20.
Gerhart, B. Human resources and business performance: Findings, unanswered questions, and an alternative approach. *Management revue*, 174-185.
Gronemus, J. Q., Hair, P. S., Crawford, K. B., Nyalwidhe, J. O., Cunnion, K. M., & Krishna, N. K. (2010). Potent inhibition of the classical pathway of complement by a novel C1q-binding peptide derived from the human astrovirus coat protein. *Molecular immunology, 48*(1-3), 305-313.
Guerrero-Villegas, J., Sierra-García, L., Palacios-Florencio,. (2018). The role of sus-tainable development and innovation on firm performance. Corp. Soc. Responsib. Environ. Manag.
Guerrero-Villegas, J., Sierra-García, L., Palacios-Florencio, B. (2018.). The role of sus-tainable development and innovation on firm performance. Corp. Soc. Responsib. Environ. Manag.
Gunasekaran, A., & Spalanzani, A. (2012). Sustainability of manufacturing and services: Investigations for research and applications. *International journal of production economics, 140*(1), 35-47.
Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science, 40*(3), 414-433.
Han, S.-h., Seo, G., Li, J., & Yoon, S. W. (2016). The mediating effect of organizational commitment and employee empowerment: How transformational leadership impacts employee knowledge sharing intention. *Human Resource Development International, 19*(2), 98-115.
Jia, J., Liu, H., Chin, T., & Hu, D. (2018). The continuous mediating effects of GHRM on employees' green passion via transformational leadership and green creativity. *Sustainability, 10*(9), 3237.
Kaiser, H. F. An index of factorial simplicity. *Psychometrika, 39*(1), 31-36.
Kaur, S., Gupta, S., Singh, S. K., & Perano, M. (2019). Organizational ambidexterity through global strategic partnerships: a cognitive computing perspective. *Technological Forecasting and Social Change, 145*, 43-54.
Khalili, A. (2016). Linking transformational leadership, creativity, innovation, and innovation-supportive climate. *Management Decision*.
Le, P. B., & Lei, H. (2019). Determinants of innovation capability: the roles of transformational leadership, knowledge sharing and perceived organizational support. *Journal of Knowledge Management*.
Leal-Millán, A., Roldán, J. L., Leal-Rodríguez, A. L., & Ortega-Gutiérrez, J. (2016). IT and relationship learning in networks as drivers of green innovation and customer capital: Evidence from the automobile sector. *Journal of Knowledge Management*.
Lee, V. H., Ooi, K. B., Tan, B. I., & Chong, A. Y. L. (2010). A structural analysis of the relationship between TQM practices and product innovation. *Asian Journal of Technology Innovation, 18*(1), 73-96.
Li, D., Zhao, Y., Zhang, L., Chen, X., & Cao, C. (2018). Impact of quality management on green innovation. *Journal of Cleaner Production, 170*, 462-470.
Linnenluecke, M. K., & Griffiths, A. (2010). Corporate sustainability and organizational culture. *Journal of world business, 45*(4), 357-366.

Martinez-Conesa, I., Soto-Acosta, P., & Carayannis, E. G. (2017). On the path towards open innovation: Assessing the role of knowledge management capability and environmental dynamism in SMEs. *Journal of Knowledge Management*.
Mazzelli, A., De Massis, A., Petruzzelli, A. M., Del Giudice, M., & Khan, Z. (2019). Behind ambidextrous search: The microfoundations of search in family and non-family firms. *Long Range Planning*, 101882.
Mittal, S., & Dhar, R. L. (2015). Transformational leadership and employee creativity. *Management Decision*.
Mittal, S., & Dhar, R. L. (2016). Effect of green transformational leadership on green creativity: A study of tourist hotels. *Tourism Management, 57*, 118-127.
Mothe, C., Nguyen-Thi, U. T., & Triguero, Á. (2018). Innovative products and services with environmental benefits: design of search strategies for external knowledge and absorptive capacity. *Journal of Environmental Planning and Management, 61*(11), 1934-1954.
Ng, T. W. (2017). Transformational leadership and performance outcomes: Analyses of multiple mediation pathways. *The Leadership Quarterly, 28*(3), 385-417.
Northouse, P. G. (2015). Leadership Theory and Practice.
Ooi, K.-B. (2014). TQM: A facilitator to enhance knowledge management? A structural analysis. *Expert Systems with Applications, 41*(11), 5167-5179.
Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology, 63*, 539-569.
Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and motor skills, 105*(3), 997-1014.
Prajogo, D. I., & Cooper, B. K. (2010). The effect of people-related TQM practices on job satisfaction: a hierarchical model. *Production Planning and Control, 21*(1), 26-35.
Raphael, A., & Schoemaker, P. J. Strategic assets and organizational rent. *Strategic Management Journal (1986-1998), 14*(1), 33.
Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro- environmental behaviors. *Journal of organizational behavior, 34*(2), 176-194.
Singh, S. K., & El-Kassar, A.-N. (2019). Role of big data analytics in developing sustainable capabilities. *Journal of Cleaner Production, 213*, 1264-1273.
Snedecor, G. W., & Cochran, W. G. Statistical Methods, eight edition. *Iowa state University press, Ames, Iowa*.
Takeuchi, R., Lepak, D. P., Wang, H., & Takeuchi, K. (2007). An empirical examination of the mechanisms mediating between high-performance work systems and the performance of Japanese organizations. *Journal of Applied psychology, 92*(4), 1069.
Turker, D. (2009). Measuring corporate social responsibility: A scale development study. *Journal of business ethics, 85*(4), 411-427.
Wang, C. L., Ahmed, P. K., & Rafiq, M. (2008). Knowledge management orientation: construct development and empirical validation. *European Journal of Information Systems, 17*(3), 219-235.
Wijethilake, C. (2017). Proactive sustainability strategy and corporate sustainability performance: The mediating effect of sustainability control systems. *Journal of environmental management, 196*, 569-582.

Wong, S. K. S. (2013). Environmental requirements, knowledge sharing and green innovation: Empirical evidence from the electronics industry in China. *Business Strategy and the Environment, 22*(5), 321-338.
Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research, 101*, 697-706.
Yusr, M. M., Mokhtar, S. S. M., Othman, A. R., & Sulaiman, Y. (2017). Does interaction between TQM practices and knowledge management processes enhance the innovation performance? *International Journal of Quality & Reliability Management*.
Zhou, S., Zhang, D., Lyu, C., & Zhang, H. (2018). Does seeing "mind acts upon mind" affect green psychological climate and green product development performance? The role of matching between green transformational leadership and individual green values. *Sustainability, 10*(9), 3206.
Zhu, W., Chew, I. K., & Spangler, W. D. CEO transformational leadership and organizational outcomes: The mediating role of human–capital-enhancing human resource management. *The Leadership Quarterly, 16*(1), 39-52.
Zuraik, A., & Kelly, L. (2019). The role of CEO transformational leadership and innovation climate in exploration and exploitation. *European Journal of Innovation Management*.