

Moderating Role of Environmental Governance Policies in the Relationship between Attitude towards Technology Innovation and Sustainability

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The present study strives to examine the influence of attitude towards technology innovation (ATTI) on environmental and social sustainability (SOS) while considering the mediating role of digital entrepreneurship (DIE) and the moderating role of environmental government policies (ENGP). The researchers gathered data from employees working in automobile sectors of Saudi Arabia. A self-administered survey instrument was distributed to the respondents using a convenient sampling technique. The study employed a quantitative research approach and utilised a cross-sectional research design. The collected data was subjected to analysis using structural equation modelling, specifically employing the AMOS software. The findings of the study suggest that individuals' attitudes towards technology have a significant and positive impact on both environmental and social sustainability (SOS) as well as digital entrepreneurship (DIE). The Decoupling of Industrial Emissions (DIE) exhibits a noteworthy and constructive impact on both environmental factors and the state of social-ecological systems (SOS). The indirect mediating effect of digital innovation ecosystems (DIE) also serves as a significant mediator between individuals' attitudes towards technology innovation (ATTI) and their environmental and social outcomes (SOS). Environmental governance policies (ENGP) play a crucial role in moderating the relationship between technological innovation and environmental and social outcomes. Numerous research studies have examined the intersection of technological innovation with other conceptual domains. However, as earlier scholars suggested, there hasn't been much research into how these two variables interact. The findings of this study demonstrate a significant association between the two variables under investigation. This study also aimed to examine the interrelationships between attitudes towards technological innovations, digital information ecosystems (DIE), and socioeconomic sustainability. Previous research has predominantly examined the impact of government environmental policies on the interplay between individuals' perspectives on technological innovation, the environment, and social responsibility. However, this study has made a valuable contribution by investigating the moderating effect of this relationship. The research findings may also provide valuable insights for policy and investment entities seeking to allocate resources towards innovative initiatives aimed at enhancing sustainability. The present research is regarded as a pioneering study within the Saudi Arabian context, focusing on the influence of environmental governmental policies as a moderating factor and the mediating role of digital entrepreneurship.

Keywords: Environmental Governance, Technology Innovation, Sustainability, Digital Information,

INTRODUCTION

In the contemporary era of globalisation, research plays a crucial role in enhancing the sustainability of economies by promoting social inclusion and environmental preservation, which are key drivers of modern economics (Justus & Uma, 2016; Vasilyeva, Kuzmenko, Bozhenko, & Kolotilina, 2019). The achievement of economic development can be facilitated by the simultaneous pursuit of environmental sustainability (ENS) and social equality. ENS, or the Environmental Nexus System, provides pathways for achieving social equity, enhanced governance, economic progress, and environmental stewardship (Justus & Uma, 2016; Vasilyeva, Kuzmenko, Bozhenko, & Kolotilina, 2019). The concept of sustainable development encompasses the interconnected aspects of environmental, social, and economic stability (Avotra et al., 2021; Dar et al., 2022). The presence of limited

resources, economic and social conflicts, and the pursuit of sustainable environmental goals can often pose challenges to developmental objectives. According to neo-classical growth theories, ensuring economic stability and reaping benefits for future generations are crucial factors in achieving sustainable development. The implementation of sustainable development policies has resulted in the advancement of technology in the broadcasting sector, thereby contributing to an increase in employment opportunities aimed at promoting sustainability performance (Justus & Uma, 2016; Vasilyeva, Kuzmenko, Bozhenko, & Kolotilina, 2019).

Therefore, the significance of ENS has been steadily growing owing to its increasing importance. It serves as a catalyst for efficient utilisation of limited resources and mitigates environmental degradation. Sustainable development has a significant influence on all living organisms, the natural environment, and environmental

resources. In the context of resource allocation, it is imperative to prioritise environmental stability in order to achieve desirable outcomes (Vadivel et al., 2014). In order to adequately address the needs and concerns of future generations, it is imperative to take into account various factors, including the temporal dimension, moral and social systems, biophysical boundaries, human welfare, and technological uncertainties. According to scholarly literature, the preservation of the environment and the effective management of human resources are considered crucial prerequisites for achieving sustainable economic success (Nawaz & Tian, 2022). Various factors, such as government policies, social inclusion, women's empowerment, wealth distribution, and inequality, have been found to significantly influence the Economic and Social Development (ENS) of multiple emerging nations (Azhar, Khalil, & Ahmed, 2007).

It is postulated that once individuals have satisfied their fundamental needs, they exhibit a propensity to conserve the ecosystem. Therefore, under these circumstances, it is possible that natural resources have already been compromised. Therefore, the imperative for environmental conservation is of utmost importance and urgency in developing nations (Azhar, Khalil, & Ahmed, 2007). The deterioration of the environment poses a significant concern, as it adversely impacts global ecosystems and poses health risks to numerous nations. It is imperative to assign equal significance to the outcome. The phenomenon of social polarisation, the rapid proliferation of poverty, the prevalence of urban violence and conflict fanaticism, the occurrence of natural catastrophes, and the impact of climate change collectively contribute to the escalating levels of unpredictable disaster risk. The utilisation of the social context serves to contextualise the prevailing concerns of contemporary times. The aforementioned issues have implications for both planning and practice, necessitating a critical evaluation and modification of existing planning methodologies to effectively address this distressing social predicament (Eizenberg & Shilon, 2016; Jabareen, 2015). The Triad model is widely recommended as a framework for formulating sustainable development, as it recognises the essential interconnections between the ecological, social, and economic pillars. The advancement of these components in isolation has been notably advanced through the implementation of the three-pillar sustainability approach. Previous literature has explored the connection between triadic components, but a comprehensive explanation and evaluation of this relationship is currently lacking. Therefore, further investigation is warranted to gain a deeper understanding of this association (Featherstone, 2013; Hopwood, Mellor, & O'Brien, 2005). The acquisition of this understanding has had a significant impact on the sustainability of the dissertation. However, one aspect of social sustainability, namely the pillar of social sustainability (SOS), lacks a consistent, definitive, and usable explanation at present (Åhman, 2013). Previous research on SOS has demonstrated inconsistent and ambiguous findings within the realm of literature studies (Axelsson et al., 2013).

Additionally, prior research has shown that the chosen indicators of state of security (SOS) are more heavily influenced by current political agendas and pragmatic credibility considerations than they are by theoretical framework. Novel concepts and technological advancements are continuously being introduced and adopted worldwide (Featherstone, 2013; Hopwood, Mellor, & O'Brien, 2005). Various types of organisations, such as universities, research institutions, and business enterprises, engage in projects and research with unwavering and continuous dedication. As a result, a multitude of innovations are created across various levels of ingenuity, expertise, and novelty (Soomro, Mangi, & Shah, 2021). Certain activities have the potential to yield novel findings and discoveries, thereby contributing to the expansion of scientific knowledge and the advancement of technological innovations (Nawaz et al., 2022).

These accomplishments may elucidate economic expansion and its import for both developed and emerging nations. The adoption of emerging technologies serves as a distinguishing factor between adversaries and individuals from diverse backgrounds. Businesses and enterprises may encounter challenges when it comes to embracing and adapting to swift changes that have the potential to impact their daily operations (Dardak & Adham, 2014; Henriques & Viseu, 2022). The adoption of unforeseen and innovative technologies has the potential to generate a sense of self-awareness within organisations, resulting in varied attitudes among employees (Luo, Olechowski, & Magee, 2014). The differentiation of these activities has emphasised the crucial factors in the adoption of technological innovation, thereby aiding in the identification of key elements for effective adoption strategies. Furthermore, within an enterprise, these attitudes give rise to diverse levels of technology suitability within the organisational context. Hence, technological innovation (TEI) is primarily associated with scientific knowledge and methodologies, focusing on the incorporation of supplementary features into pre-existing products (Cui, Jiao, & Jiao, 2016; Edsand, 2019). In recent years, there has been a growing body of scientific research dedicated to the study of TEI, primarily due to its significant implications for climate, economics, and society (Huo et al., 2021; Yingfei et al., 2022). Enhanced productivity within an organisation's processes results in the achievement of efficient and effective production, thereby meeting the demands of well-established entities (Oliveira & Martins, 2011).

The advancement of technological innovation has significantly enhanced the body of knowledge (Choi, Narasimhan, & Kim, 2016). The expansion of the industry can be attributed to factors such as globalisation, increased competition, shorter product cycles, and enhanced marketing strategies. Previous research has extensively examined the potential and challenges associated with the adoption of innovative technologies within businesses and enterprises. These factors have been systematically analysed and categorised into three distinct dimensions: (1) societal factors, (2) lifestyle fulfilment factors, and (3) community factors (Pechancová et al., 2019). The

outcomes afford businesses the opportunity to cultivate novel technologies for the purpose of enhancing management and operational procedures. Despite the apparent value of technological innovations, numerous studies have indicated that they can lead to neglected development. These factors exert significant influence on the ecosystem, thereby giving rise to socioeconomic and environmental concerns. Increased resource consumption has a detrimental impact on the environment. However, the scarcity of supplies has a detrimental impact on organisational performance, particularly in the process (da Silva Neiva et al., 2020; Mansour & Alsulamy, 2021).

The loss of natural resources, the degradation of the environment, and the presence of pollutants have changed the path of technological, economic, and industrial (TEI) progress, which has led to the development of sustainable alternatives (Nawaz & Tian, 2022). Enterprises have a strong inclination towards the production and development of sustainable products and services in order to mitigate environmental degradation. The desire to satisfy the needs of discerning customers in the fiercely competitive global market is what motivates this strategic approach (Desha, Robinson, & Sproul, 2015). The use of the Total Economic Impact (TEI) framework has a significant influence on the overall performance of the global vehicle and automotive parts manufacturing industry. This study opted to examine the independent relationship between these two factors (Zahoor, Donbesuur, Nwoba, & Khan, 2021).

Despite considerable focus on the influence of technology-enabled innovation (TEI) in facilitating a sustainable society, existing literature on this subject exhibits numerous theoretical and practical constraints. Previous researchers have devoted greater attention to theoretically weaker questions, that is, questions that possess less theoretical significance. Instead of conducting a comprehensive examination of the impact of sustainable development, the researchers focused solely on analysing the individual effects of TEI on each factor. Consequently, there exists a notable disparity in the capacity of technological advancements to achieve both social and ecological sustainability within an integrated framework. The rationale for this is that only a limited number of developing and developed nations are actively engaged in the pursuit of technology-enhanced instruction (TEI). Many developing nations are encountering a multitude of obstacles in their efforts to embrace contemporary technologies and foster innovation. A significant independent relationship exists between TEI and the presentation of vehicle and automotive parts manufacturing (Zhou, Xu, Chen, & Sun, 2022). However, there is still a gap in understanding the mediating linkages between these factors and the achievement of environmental and social sustainability in the context of vehicle and automotive parts manufacturing. Digital entrepreneurship (DIE) serves as a platform for engaging in entrepreneurial endeavours. Previous research has demonstrated that the dynamic innovation environment (DIE) plays a crucial role in facilitating the relationship with technological innovation (TI) in order to achieve sustainability. Hence, in the current investigation, the

dependent intervening effect (DIE) could potentially serve as a mediating variable.

Moreover, the existing literature on the association between attitude towards technology innovation (ATTI), environmental sustainability (ENS), and social sustainability (SOS) has yielded inconsistent results (Kennedy & Marting, 2016; Mousavi, Bossink, & van Vliet, 2019; Zhang, Khan, Lee, & Salik, 2019). Thus, it is imperative to allocate sufficient time for future research endeavours involving alternative associations. According to (Baron & Kenny, 1986), it has been posited that in cases where there are inconclusive findings regarding the relationship between exogenous and endogenous variables, the inclusion of a moderating variable becomes necessary in order to enhance said relationship. Additional research has also suggested that the association between ATTI and the environment could be examined in conjunction with other moderating factors. Hence, the utilisation of environmental government policies (ENGP) may serve as a moderating variable, as it has been observed that when government policies align with innovative practices, organisations experience enhanced sustainability from both environmental and social standpoints (Chien et al., 2021; Khan et al., 2020). The positive and significant impact of environmental government support on ENS has been observed in previous studies (Laurian, Walker, & Crawford, 2017). Hence, drawing upon the preceding arguments, contemporary research has employed the ENGP as a moderating variable. Hence, the present study aims to examine the influence of ATTI on the environment and SOS while considering the mediating effect of DIE and the moderating effect of ENGP.

The present study makes a valuable contribution to the existing body of research by examining and analysing findings from both theoretical and empirical perspectives. Historically, numerous research studies have examined the intersection of technological innovation with various conceptual domains. However, as proposed by previous scholars, there has been a lack of investigation into the interaction between these two variables. The findings of this study demonstrate a significant association between the two variables under investigation. Furthermore, the development of attitudes towards specific objects is influenced by attitudes regarding the impact of technology-enabled innovation (TEI) on economic growth (DIE) and environmental sustainability (ENS). The behavioural aspect is a focal point of scholarly inquiry, as attitudes play a substantial role in fostering a sense of creativity. Consequently, numerous academics have devoted their attention to studying this phenomenon. However, prior investigations into these specific relationships were nonexistent. This study aimed to examine the relationship between attitudes towards technological innovations, digital information ecosystems (DIE), and socioeconomic sustainability. Previous studies have predominantly concentrated on examining the impact of governmental environmental policies on the interplay between individuals' perspectives on technological advancement, environmental concerns, and societal obligations.

THEORETICAL AND EMPIRICAL REVIEW

Theoretical Background Diffusion of Innovation Theory

The research framework presented in this study is grounded in the diffusion of innovation theory (DOT). The Diffusion of Innovations Theory (DOIT) was introduced by E.M. Roger as a framework for understanding the adoption and dissemination of new ideas within the field of social sciences in 1962. Initially, the term was employed within the realm of marketing to elucidate the process by which businesses disseminate and establish a presence within a social system or population over a period of time. The ultimate consequence of diffusion is the assimilation of novel habits, products, or concepts into the social fabric. Acceptance encompasses various activities that deviate from customary and formal practices or routines, such as engaging in novel behaviours, acquiring or utilising new products, and so forth. The process of adoption is influenced by the perception, commodification, and unique behaviour associated with a particular concept. Therefore, the possibility of diffusion exists (Yingfei et al., 2022). Rogers defines diffusion as the process by which novel findings are gradually disseminated among individuals within a social system. The hypothesis regarding the dissemination of innovations encompasses a broad range of sources that extend across various domains (Silva, Braz, Cavalcante, & Alves, 2022). Numerous studies have integrated extensive diffusion models of technological innovation (TI), which are based on Roger's theory, to encompass and facilitate the adoption and dissemination of TI at both the micro and macro levels within higher education institutions. The theory proposed by Rogers has been widely utilised in order to elucidate the factors that contribute to the differentiation in the creation and diffusion of innovations across societies. According to Rogers, diffusion refers to the process by which innovations are disseminated among members of a social system over a period of time, typically through specific channels. The recognition of innovation as novel by adopters can be attributed to certain factors. Roger's theory identified four key factors that contribute to the dissemination of innovation: communication channels,

social structure, inventions, and timing (Rogers, Singhal, & Quinlan, 2014). This rule serves as the foundation for numerous hypotheses, models, and investigations pertaining to the phenomenon of diffusion. Several studies have employed Rogers' theory to elucidate the factors contributing to differential levels of technology immersion among individuals. In the words of Rogers, it is advisable for individuals to closely monitor the statistical distribution in this context. During the ongoing processes of dissemination and acceptance This demonstrates a bias towards the imperative of technology dissemination without adequately considering the potential consequences associated with such endeavours (Sahin, 2006).

Furthermore, within the context of the diffusion process, it is common for the primary adopters to be held accountable for the failure of an invention, rather than attributing it to other factors such as the social structure in which they operate or the capabilities of the technology they employ. According to Rogers, technological advancement demonstrates a tendency to align with lifelong learners who advocate for innovations rather than catering to a predisposed audience. This observation highlights the presence of individual blame bias. Rogers proposes that the acceptance of an idea within a social system is not necessarily uniform among all participants, as it may differ from the manner in which individual adopters personally embrace it. The change initiatives prioritise the rapid adoption and diffusion of strategies in order to attain immediate outcomes without adequately considering the influence of the social structure. The three primary focal points or key concepts in Rogers' social system encompass individuals who are enthusiastic about technology and the process of adapting to technology (Dintoe, 2019). Consequently, the aforementioned approach provided a basis for technological advancement (Cho, Hwang, & Lee, 2012; Swinerd & McNaught, 2014), thereby stimulating organisational innovation and leading to enhanced social and environmental sustainability (ENS) (Xiao & Su, 2022). Hence, considering these identified gaps, the present study aims to examine the influence of advanced technology and technological innovation (ATTI) on the environment and social outcomes (SOS), while considering the mediating role of digital entrepreneurship (DIE) and the moderating role of environmental government policies (ENGP). The variables depicted in Figure 1 below are anticipated.

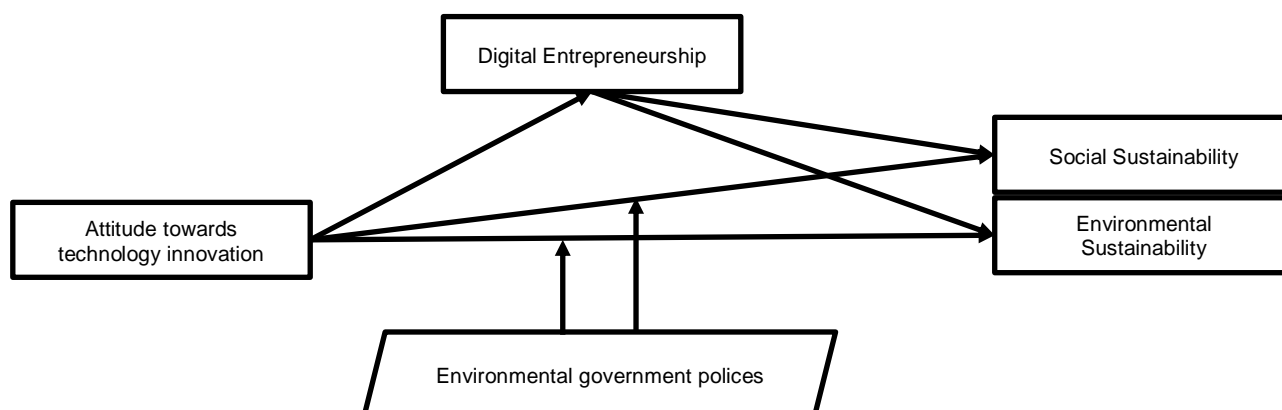


Figure 1: Theoretical Framework

Attitude toward Technological Innovation, environmental sustainability, and social sustainability

In general, it is possible to alter attitudes either internally or socially through a sufficient investment of time and effort (Shrum, Liu, Nespoli, & Lowrey, 2012). Internal attitudes are the means by which actions, emotions, and opinions are expressed, and these factors collectively shape attitudes in the process of making judgements (Iveroth & Bengtsson, 2014). The central theme of the story pertains to the utilisation of personal gains to advance individual concepts, commonly referred to as an internal disposition (Jepson, Brannstrom, & Persons, 2012). The utilisation of external factors such as logical reasoning, empathy, and persuasive techniques can effectively refine and reinforce individuals' attitudes, thereby influencing their sense of moral responsibility (Higgins & Walker, 2012). In addition to the aforementioned factors, it is posited that extrinsic variables such as benevolence and egocentrism may exert influence on perspectives (Bakar, Talukder, Quazi, & Khan, 2020). Within the realm of sustainability research, there exist a multitude of diverse viewpoints regarding technology. Diverse viewpoints exist regarding environmental issues, ranging from those who perceive innovation and productivity improvements as means to draw attention to these problems to individuals who believe that such advancements are now the root cause. The latter group argues that these developments contribute to a rise in overall resource consumption, leading to the disruption of natural ecological cycles due to the introduction of increasingly foreign particles. Within the context of these two scenarios, there exist countless and initially perplexing variations and combinations of cognitive frameworks (Ehlers & Kerschner, 2013).

The process of converting information into an activity can be understood as a manifestation of innovation. Innovation is widely recognised as a multifaceted process encompassing the acquisition of knowledge, exploration, and integration of novel technologies and their associated methodologies. The primary driving factor that enhances the economic performance of enterprises is the main catalyst for improving the standard of living for individuals (Tang, 2006). Joseph Schumpeter is credited with being the initial proponent of the concept of innovation. His work focused on the separation of innovation into different stages, the characteristics of technological innovation, and its significant role in society. The correlation between geographical location and innovation is widely recognised as a crucial determinant of economic growth in the present era. The automotive industry and its associated parts manufacturing sector are currently experiencing intense competition from both domestic and international markets, as well as from the export sector. Therefore, it is imperative to implement the rules of the World Trade Organisation (WTO) and embrace the concept of globalisation. The implementation of fundamental competencies in industrial technology is imperative. Technological innovation (TI) exerts a significant impact on fostering economic growth. Therefore, these aforementioned factors are the primary drivers of technological progress (Tang, 2006).

Organisational innovation (OI) refers to the utilisation of novel and enhanced ideas and methodologies both within and beyond the confines of an organisation. This encompasses the implementation of innovative management and marketing systems with the aim of augmenting value for stakeholders while simultaneously reducing production costs and streamlining processes. In contrast, TI focuses on directly meeting customer satisfaction through the implementation of novel processes and products (Gunday, Ulusoy, Kilic, & Alpkam, 2011; Kyläheiko et al., 2011). Contemporary scholarly investigations elucidate the characteristics of organisational and technical innovation as the primary factors that exert influence on the efficacy of an organisation. There is a need for further investigation into how the automobile sector utilises these two capacities for profit generation during the process of internationalisation. By leveraging organisational advancements and integrating technology, businesses can effectively explore the dynamics of foreign markets and establish a platform for continuous learning among entrepreneurs. The use of technology and organisational innovation (TEI and OI) plays a significant role in facilitating the growth of international business in the vehicle and automotive parts automobile sector (Zahoor, Donbesuur, Nwoba, & Khan, 2021). As indicated by various correlations that could have been established among attitudes towards technological advancement, online commerce, and socio-environmental sustainability (Brandão Santana et al., 2015; Satalkina & Steiner, 2020). Consequently, we created the following hypothesis.

H1: Social sustainability significantly affected by attitude towards technological innovation.

H2: Environmental sustainability significantly affected by attitude towards technological innovation.

H3: Digital entrepreneurship significantly affected by attitude towards technological innovation.

Mediating Role of Digital Entrepreneurship

Governments, businesses, and firms continue to adapt and enhance their utilisation of digital technologies, encompassing various advancements such as cloud computing, machine learning, 3D printing, and edge computing (Thoma et al., 2021). Digital possibilities refer to the novel opportunities for engagement with consumers and environmental processes that are harnessed by organisations, particularly entrepreneurs, due to the distinctive attributes of digital innovation (Meurer et al., 2022; Nambisan, Wright, & Feldman, 2019). The digitization process gives rise to new institutional mechanisms that bring about unique values, practices, and institutions. These mechanisms challenge traditional logical configurations and modify the norms of the game (Heinz, Hunke, & Breitschopf, 2021). Digital components that are extensively utilised and possess adaptabilities, such as enterprise resource management (ERP) systems, as well as structures that establish standards for player engagement, such as product websites and blockchain technology, exemplify these configurations. These configurations effectively coordinate the interaction among players. The profound digital transformations exert

a substantial impact on organisational frameworks, thereby carrying considerable significance. Scholars assert that digital infrastructures and components offer technological benefits that expand the possibilities for generating, distributing, and acquiring value, thereby creating novel avenues for these activities (Hylving, Rydström, & Bergquist, 2022; Schwarz, Gregori, Krajger, & Wdowiak, 2021). The emergence of new business models in response to economic transformations necessitates the cultivation of distinct organisational capabilities in order to achieve success (Rialti, Marzi, Caputo, & Mayah, 2020). Digital technologies possess a distinct and evolving logic that operates alongside existing interpretations, exerting influence on their perception and implementation by introducing novel behaviours, attitudes, and processes (Tumbas, Berente, & Vom Brocke, 2018).

The fundamental aspects that shape the evolution of digitization include connectivity, accessibility, affordability, access, flexibility, and inheritability (Caputo, Fiorentino, & Garzella, 2019; Keller, Ollig, & Rövekamp, 2022). Hence, digital entrepreneurship (DIE) holds significant promise in addressing social and environmental concerns, as it represents a contemporary advancement in assessing the sustainability of businesses from both societal and ecological perspectives. As proposed by Prasetyo and Setyadharma (2022), entrepreneurial businesses have leveraged digital technology to address societal challenges that appear to be difficult to resolve by implementing innovative strategies. The issues at hand pertain to the sustainable longevity of the internet. This study agenda proposes an examination of the digital toolkit employed by innovative enterprises, highlighting unique considerations for entrepreneurship, marketing strategies, and organisational contexts. Additionally, it suggests novel perspectives on the concepts of confidence and institutional logic. The role of DIE as a mediator within various organisational structures (Alosani, Yusoff, & Al-Dhaafri, 2020). The proposition has likely been put forth that the utilisation of technologies has the potential to facilitate the attainment of our objective of socio-environmental sustainability. The existing body of research has predominantly concentrated on examining the mediating roles of digital technology rather than exploring the potential of DIE as mediators. Hence, in the present study, the direct influence effect (DIE) could potentially serve as a mediating variable between attitude towards technology and innovation (ATTI) and environmental sustainability (ENS), as well as social sustainability (Xiao & Su, 2022). Hence, the following hypothesis is formulated below.

H4: Social sustainability significantly affected by digital entrepreneurship.

H5: Environmental sustainability significantly effect by digital entrepreneurship.

H6: Digital entrepreneurship significantly mediates concerning attitude towards technological innovation and social sustainability.

H7: Digital entrepreneurship significantly mediates concerning attitude towards technological innovation and environmental sustainability.

Moderating role Environmental government policies

The existing literature on the association between attitude towards technology innovation (ATTI), environmental sustainability (ENS), and social sustainability (SOS) has yielded conflicting results, as indicated by the diverse findings reported in studies conducted by Kennedy and Marting (2016), Mousavi, Bossink, and van Vliet (2019), and Zhang, Khan, Lee, and Salik (2019). Hence, it is imperative to allocate sufficient time for future research endeavours involving alternative associations. In cases where there are inconclusive findings regarding the relationship between exogenous and endogenous variables, the inclusion of a moderating variable is necessary in order to enhance said relationship (Baron & Kenny, 1986). Additional research has also suggested that the association between ATTI and the environment could be examined in conjunction with other moderating factors. Hence, it can be argued that ENGP may serve as a moderating variable, as government policies that support innovation have the potential to enhance the sustainability of organisations from both environmental and social perspectives (Chien et al., 2021; Khan et al., 2020). The provision of governmental support for environmental initiatives also yields positive and substantial impacts on the Environmental Sustainability Index (ENS) (Laurian, Walker, & Crawford, 2017). Therefore, based on previous arguments, current research has used the ENGP as moderating variable and following hypothesis are formulated below;

H8: Environment governance significantly moderates concerning attitude towards technology innovation and environmental sustainability.

H9: Environment governance significantly moderates concerning attitude towards technology innovation and social sustainability

RESEARCH METHODOLOGY

The present study aims to examine the influence of attitude towards technology innovation (ATTI) on environmental and social sustainability (SOS), while considering the mediating role of digital entrepreneurship (DIE) and the moderating role of environmental government policies (ENGP). The data was obtained from the employees working in automobile sector in the Kingdom of Saudi Arabia. The study employed the Likert questionnaire as a data collection instrument, suggesting that it adopted a quantitative research methodology. This choice of using a questionnaire aligns with the principles of quantitative research and a cross-sectional research design, as noted by Apuke (2017). A structured, self-administered questionnaire continues to be employed for data collection. The research questionnaire comprised four variables. One of the independent variables in this study was ATTI, which was measured using ten items derived from the research conducted by Dwivedi, Choudrie, and Brinkman (2006). The concept of digital entrepreneurship (DIE) serves as a mediating variable in this study. It was assessed using a set of ten items derived from the research conducted by Soto-Acosta, Popa, and Palacios-Marqués (2016). The measurement of environmental sustainability (ENS) was

conducted using a set of five items that were derived from the research conducted by [Ren, He, Zhang, and Chen \(2019\)](#). The measurement of social sustainability (SOS) was conducted using a set of five items that were derived from the research conducted by [Johnson and Chattaraman \(2019\)](#). Both of these variables are employed as dependent variables. In essence, the study has incorporated the utilisation of environmental government policies (ENGP) as a moderating variable, which has been assessed through three distinct items. The survey was assessed using a five-point Likert Scale, where a rating of 1 indicated strong agreement and a rating of 5 indicated strong disagreement. The researchers employed a convenient sampling technique to distribute the adopted questionnaire among a sample of 300 employees. This technique was chosen based on the researchers' convenience, as it is deemed suitable for data analysis ([Taherdoost, 2016](#)). Out of a total of 300 research instruments, 230 were returned.

DATA ANALYSIS

The study encompassed both descriptive and inferential analyses. The descriptive analysis was conducted using the Statistical Package for the Social Sciences (SPSS), while the inferential analysis was performed using Analysis of Moment Structures (AMOS). Both analyses will be discussed in the following sections.

Descriptive statistics

Descriptive analysis was conducted using the Statistical Package for the Social Sciences (SPSS). [Table 1](#) displays the descriptive analysis of each variable. The findings of the analysis provide insights into the perceptions of the respondents regarding the variables. The analysis was conducted by summing all the scores of the individual items. The average scores of all the variables range from 3.1695 to 3.8485. The observed moderation of the mean scores for the aforementioned variables suggests that the respondents exhibit a high level of engagement in the activities associated with the independent and dependent variables. Furthermore, the standard deviations (S.D.) of all the variables fall within the range of 0.53 to 0.73. [Table 1](#) presents the average score and standard deviation for each variable.

Table 1. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ENS	300	1.00	5.00	3.1695	.71202
SOS	300	1.00	5.00	3.6256	.83663
ATI	300	1.00	5.00	3.7329	.83303
DIE	300	1.00	5.00	3.8485	.62204
ENGP	300	1.00	5.00	3.2393	.7377

Note=ENS-environmental sustainability, SOS-social sustainability, ATI-attitude towards technology innovation, DIE-digital entrepreneurship, ENGP-environmental government policies.

Common Methods Biased

According to [Rodríguez-Ardura and Meseguer-Artola \(2020\)](#), the utilisation of a single source for data collection increases the susceptibility of results to common method bias (CMB). [Kock \(2015\)](#) conducted an analysis of CMB's complete collinearity using the PLS-SEM method. Harman's single-factor test was employed to screen for CMB problems. The findings of the study indicate that the

collective variance explained by all items was 45.204%, which fell below the critical threshold of 50%. Therefore, based on the current data, there is no reason to doubt the credibility of the Cosmic Microwave Background (CMB). Hence, based on these findings, it can be concluded that the cosmic microwave background (CMB) is valid.

Table 2. Common Method Biased

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.972	45.204	45.204	4.972	45.204	45.204
2	2.479	22.533	67.737	2.479	22.533	67.737
3	.731	6.641	74.378	.731	6.641	74.378
4	.674	6.125	80.504	.674	6.125	80.504
5	.453	4.114	84.618	.453	4.114	84.618
6	.424	3.859	88.477	.424	3.859	88.477
7	.353	3.205	91.682	.353	3.205	91.682
8	.316	2.869	94.550	.316	2.869	94.550
9	.265	2.406	96.957	.265	2.406	96.957
10	.206	1.874	98.830	.206	1.874	98.830
11	.129	1.170	100.000	.129	1.170	100.000

Extraction Method: Principal Component Analysis.

Reliability and validity

The present investigation utilised the Structural Equation Modelling (SEM) methodology to examine the conceptual framework put forth by prior scholars ([Ahmad, Farhan, & Fareed, 2019](#); [Ahmad, Ahmad, Farhan, & Arshad, 2020](#); [Bhatti, Farhan, Ahmad, & Sharif, 2019](#)). Other scholars like [Arshad et al. \(2020a\)](#) and [Arshad et al. \(2020b\)](#) have proposed that a strong correlation between all components of a research document structure is of paramount importance. To ascertain the attainment of the objective, a convergent validity assessment was conducted, which demonstrated a significant correlation among the entirety of the articles. The strength of this correlation is deemed significant when all variables exhibit alpha and composite reliability values exceeding 0.70, as observed in our analysis. Furthermore, the average variance extracted (AVE) for all structures is found to be 0.5, which suggests the meaningfulness of the relationships among the variables. The results indicate that the average variance extracted (AVE) values, alpha values, and composite reliability values fall within acceptable ranges. Hence, the construction of the study meets the requirements for convergent validity, as indicated in [Table 3](#), presented below.

In addition to assessing convergent validity, the subsequent stage involves evaluating discriminant validity. The study examined the discriminant validity by evaluating the Fornell and Larcker criteria, which involve the calculation of the square roots of the average variance extracted. The diagonal values of this test should exhibit greater magnitudes compared to the other diagonal values, indicating the presence of discriminant validity in the construct. According to the predicted values presented in [Table 4](#), it can be observed that all of the diagonal values are higher than the corresponding values below them. This pattern suggests that the construct under consideration exhibits discriminant validity.

Table 3. Convergent validity

		Loadings	R ²	AVE	CR.
Attitude towards Technology innovation	ATTI1	0.78	0.92	0.86	0.92
	ATTI 2	0.81	0.59		
	ATTI 3	0.87	0.97		
	ATTI 4	0.80	0.88		
	ATTI5	0.78	0.78		
	ATTI6	0.81	0.67		
	ATTI7	0.83	0.78		
	ATTI8	0.71	0.89		
	ATTI9	0.67	0.67		
Digital Entrepreneurship	DIE1	0.77	0.88	0.72	0.89
	DIE2	0.82	0.87		
	DIE3	0.88	0.89		
	DIE4	0.68	0.78		
	DIE5	0.79	0.71		
	DIE6	0.70	0.61		
	DIE7	0.64	0.72		
	DIE8	0.56	0.62		
	DIE9	0.59	0.72		
Environmental Sustainability	ENS1	0.79	0.92	0.82	0.83
	ENS2	0.75	0.88		
	ENS3	0.78	0.95		
	ENS4	0.78	0.78		
	ENS5	0.71	0.83		
Social Sustainability	SOS1	0.82	0.91	0.821	0.827
	SOS2	0.79	0.82		
	SOS3	0.89	0.61		
	SOS4	0.78	0.78		
	SOS5	0.90	0.35		
Environmental government policies	ENGP1	0.71	0.84	0.82	0.849
	ENGP2	0.68	0.83		
	ENGP3	0.76	0.81		

Note=ENS-environmental sustainability, SOS-social sustainability, ATTI-attitude towards technology innovation, DIE-digital entrepreneurship, ENGP-environmental government policies.

Table 4. Discriminant Validity

	ENS	SOS	ATTI	DIE	ENGP
ENS	0.893				
SOS	0.143	0.845			
ATTI	0.372	0.313	0.893		
DIE	0.767	0.639	0.389	0.921	
ENGP	0.581	0.522	0.485	0.324	0.834

Note=ENS-environmental sustainability, SOS-social sustainability, ATTI-attitude towards technology innovation, DIE-digital entrepreneurship, ENGP-environmental government policies.

Hypothesis testing results

The subsequent step involves conducting a structural analysis to test the hypothesis, provided that the measurement model satisfies the established criteria. The findings from the analysis of structural equation modelling (SEM) reveal that there is a positive and statistically significant relationship between attitude towards technology innovation (ATTI) and social sustainability (SOS). Additionally, the results demonstrate that ATTI also has a positive and statistically significant impact on environmental sustainability (ENS), thereby providing support for the proposed hypotheses 1 and 2. In essence, it can be stated that ATTI exhibits a favourable and noteworthy impact on digital entrepreneurship (DIE), thereby providing support for hypothesis 3. However, the Digital Innovation Environment (DIE) exerts a positive and substantial impact on both the Service Offering Strategy (SOS) and the Employee Nurturing Strategy (ENS), thereby providing support for the proposed hypotheses 4 and 5. The findings suggest that there is a positive and significant mediating effect between ATTI and SOS, specifically in relation to ENS. This indicates a partial mediating effect, which supports the proposed hypotheses 6 and 7. The study found that environmental government policies (ENGP) play a significant and positive moderating role in the relationship between attitudes towards the environment (ATTI) and both subjective well-being (SOS) and environmental sustainability (ENS). This finding is consistent with hypotheses 8 and 9. The obtained results demonstrate that all of the hypotheses have been substantiated by significant findings. The aforementioned outcomes are anticipated and presented in the subsequent [Table 5](#).

Table 5: Hypothesis Results

		β	t-value	Sig.	R ²
SOS	<-- ATTI	0.69	7.011	0.000	0.73
ENS	<-- ATTI	0.71	4.477	0.000	0.73
DIE	<-- ATTI	0.62	4.272	0.000	0.71
SOS	<-- DIE	0.43	3.434	0.000	0.82
ENS	<-- DIE	0.59	2.871	0.005	0.83
SOS	<-- DIE <-- ATTI	0.45	2.512	0.005	0.60
ENS	<-- DIE <-- ATTI	0.45	2.072	0.038	0.81
SOS	<-- ENGP*ATTI	0.78	7.128	0.015	0.83
ENS	<-- ENGP*ATTI	0.81	4.542	0.000	0.76

Note=ENS-environmental sustainability, SOS-social sustainability, ATTI-attitude towards technology innovation, DIE-digital entrepreneurship, ENGP-environmental government policies.

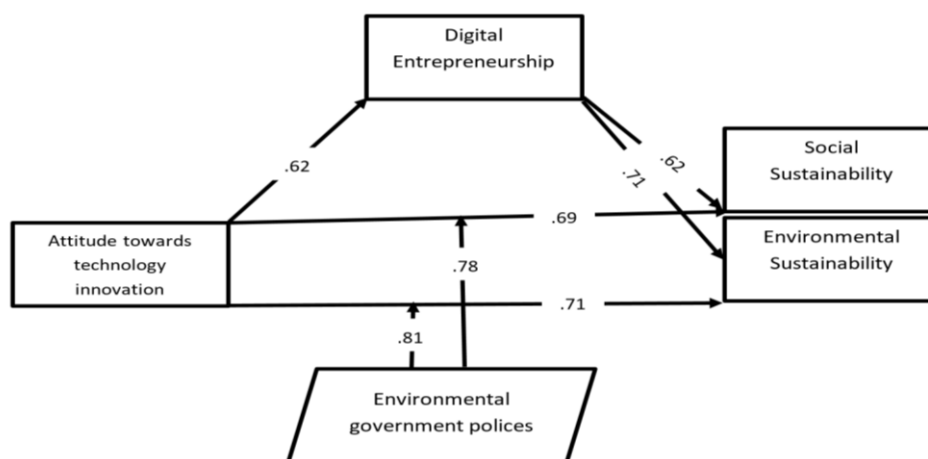


Figure 2. Hypothesis Results

DISCUSSION AND IMPLICATIONS

This ground breaking research in technological innovation (TEI) establishes a solid basis for digital entrepreneurs (DIE) operating within Saudi Arabia's automobile sector. Additionally, it provides valuable insights to diverse organisations worldwide, enabling them to effectively pursue their social and environmental objectives. In the present study, an evaluation was conducted consisting of two distinct components. In the initial section, an examination was conducted of the direct correlations among organisational processes. In the subsequent section, an examination was conducted of the indirect and mediated associations. The results unveiled compelling data and showcased the efficacy of this particular approach to studying. The affective disposition of individuals towards technology, as well as emerging technological advancements, significantly influences the utilisation of technology by innovative enterprises. Given that technological innovation is widely recognised as a catalyst for economic growth, it is pertinent to consider the potential contributions of automobile sector of Saudi Arabia. Technological progress is propelled by the innovation exhibited by small and medium-sized enterprises (Tang, 2006).

The initial major research hypothesis pertained to the impact of technological advancements on the educational navigation system (ENS). Historically, numerous scholars have examined the integration of technological innovation and environmental sustainability (ENS) as a cohesive entity. The significance of technological innovation was deemed integral to the field of environmental and sustainability studies. Nevertheless, there exists dissent among numerous scholars regarding this association, as they posit that these phenomena are distinct entities (Aboramadan, Albashiti, Alharazin, & Zaidoune, 2020; Sun, Sarfraz, Turi, & Ivascu, 2022). Neither study examined the reciprocal influence between the two variables. The findings of our study may serve as a valuable resource for future researchers seeking to establish a connection between the two phenomena. The second hypothesis pertained to the impact of individuals' attitudes towards emerging technologies on their sense of subjective well-being. The findings indicated a significant impact of the first variable on the second variable. This suggests that modifying behaviour to embrace a specific stance towards Technology-Enabled Innovation (TEI) may yield positive outcomes for businesses and lead to the emergence of Socially-Oriented Startups (SOS). Furthermore, such behavioural changes can contribute to the regulation of societal structures, ultimately fostering an environment conducive to entrepreneurship. Previous research has not established a significant correlation between individuals' attitudes towards emerging technologies and the overall sustainability of society. The third hypothesis examined the impact of individuals' attitudes towards emerging technology on digital information engagement (DIE). This theory was subsequently validated, and the findings held significant implications. This finding demonstrated a significant

correlation between individuals' attitudes towards technological innovation and all four variables. One crucial aspect to contemplate is the process of altering one's perspectives towards particular entities, which can be understood as a behavioural phenomenon. The role of attitudes in shaping perceptions of creativity has been a subject of considerable research interest, with numerous previous studies focusing on this aspect. Previous research has not examined these connections; however, the present study has identified additional associations between ATTI, DIE, and socio-environmental sustainability (Brandão Santana et al., 2015; Satalkina & Steiner, 2020). This study would benefit from investigating the interconnections between these phenomena.

The fourth hypothesis stated a direct correlation between DIE and ENS. The findings of this hypothesis were also significant and demonstrated a robust association with ENS. Subsequent experimentation revealed a significant and favourable impact of digital innovations on the state of social support (SOS). The concept of decentralised impact enterprises (DIE) presents a promising avenue for organisations to achieve social and environmental sustainability. Given its recent emergence, DIE holds considerable potential for addressing climate change and various social challenges. Entrepreneurs have utilised digital technology to devise innovative resolutions for seemingly insurmountable challenges (Xiao & Su, 2022). Previously, the topic of decoupling economic growth from environmental degradation has been examined from the perspective of both social and ecological sustainability. However, the findings indicate that the impact of digital innovation and entrepreneurship (DIE) on the Chinese vehicle and automotive parts manufacturing industry varies in terms of promoting environmental sustainability and facilitating organisational processes. There is a potential indirect association between DIE and various other factors (Kee, Khin, & Ho, 2021). This study investigated the role of DIE as a connecting mechanism, drawing upon the aforementioned concepts. The direct relationship was of significant importance, as it demonstrated the tangible efficacy of the DIE approach in promoting organisational sustainability and environmental stewardship. The utilisation of digital tools on a large scale by DIE results in significantly lower environmental pollution compared to conventional organisations that do not employ such technologies.

Historically, numerous research studies have examined the intersection of technological innovation with various conceptual domains. However, there have been opposing views from researchers on this matter (Damanpour, 2014; Hamel, 2006). The interrelationship between these two factors had not been previously investigated. The findings of this study demonstrate a significant association between the two variables. Furthermore, the impact of attentional training and task interference (ATTI) on the dual-task interference effect (DIE) and the executive network system (ENS) serves to impede the expansion of attitudes towards particular outcomes. The behavioural aspect is of considerable importance in understanding creativity, as attitudes play a crucial role in shaping perceptions.

Consequently, numerous scholars have directed their focus towards this area. However, prior to this investigation, no scholarly examination had been conducted on these specific relationships. This study aimed to investigate the potential relationship between ATTI, DIE, and socioeconomic sustainability. Previous studies have primarily concentrated on examining the impact of governmental environmental policies on the interplay between individuals' attitudes towards technological innovation, environmental concerns, and social responsibility.

LIMITATIONS AND FUTURE DIRECTIONS

Despite the novelty of the study, there were only a limited number of concerns associated with it. Initially, the study employed small and medium business owners as representative samples of the population. However, in order to achieve the goal of obtaining objective and unbiased responses regarding these factors, it is imperative to expand this study to include the viewpoints of individuals working in various business settings. Furthermore, the concept of assessing attitudes towards organisational innovation appears to be a novel approach that previous scholars have considered to have overlapping characteristics. Further validation is required to ascertain the veracity of the current study's proposition that these processes are distinct. Furthermore, it is imperative for future studies to address the crucial aspect of sustainability that has been overlooked in this particular study. Specifically, these studies should place greater emphasis on investigating the potential impact of the predictor variables utilised in this research on economic sustainability. The potential moderating influences of organisational environment, brand equity, job satisfaction, and self-efficacy were not taken into account in the present study. However, it is recommended that future research explore these factors to gain a more comprehensive understanding of their impact.

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