GREEN INTELLECTUAL CAPITAL AND SUSTAINABLE PERFORMANCE OF SMES: ROLES OF GREEN ABSORPTIVE CAPACITY AND GREEN DYNAMIC CAPABILITIES

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Abstract

The purpose of this research was to find out the impact of green intellectual capital on the sustainable performance of SMEs. Furthermore, the study also evaluated the mediating role of green absorptive capacity and moderating role of green dynamic capabilities in the relationship of green intellectual capital and sustainable performance. The data for the current cross-sectional quantitative study was collected from the 519 senior executives and managerial level employees of the manufacturing SMEs located in 9 industrial estates of Khyber Pakhtunkhwa province registered with the Small Industrial Board (SIDB), Khyber Pakhtunkhwa, and Small and Medium Size Enterprise Development Authority (SMEDA), Pakistan. Standardized scales were adapted from previous studies to collect the data. The results revealed that green intellectual capital has a positive and significant impact on the sustainable performance of SMEs. Furthermore, the said relationship is further strengthened by the green absorptive capacity. The data also supported the fact that the relationship between green intellectual capital and sustainable performance is higher in the presence of higher green dynamic capabilities and vice versa. The study has multiple theoretical and practical implications including a better understanding of variables, their relationships, and how these variables can be used by SMEs for enhancing sustainable performance.

Keywords: *Green intellectual capital; sustainable performance; green absorptive capacity; green dynamic capabilities; SMEs*

Introduction

In the last two decades, the practitioners and academics have focused on sustainability (Journeault, Perron & Vallières, 2021: Sharma, Govindan, Lai, Chen & Kumar, 2021). Literature is evident in the wider range of debates and discussions of sustainable performance (SP) (Sharma, et al., 2021). SP is significant and provides guidelines to accomplish environmental goals (Alraja, Imran, Khashab & Shah, 2022). The financial outcomes of the business operations result in enhancement of the living conditions and prosperity worldwide; on the other side, it leads directly as well as indirectly to the obliteration of the environment and social inequality (Borah, Iqbal & Akhtar, 2022). Recent studies suggested that almost 60 percent eco-system globally has sullied, and various environmental obliteration occurred. If this problem has not been managed properly, environmental concerns will increase continuously and will be out of control. Still, several enterprises see this problem to be ignored and assert that these

environmental obliterations are not caused through their business operations (Sebhatu, 2021). Moreover, not all enterprises are emphasizing the sustainable performance of enterprises (Muangmee, et al., 2021). In fact, the business environment is not much different for enterprises due to the restrains of resources alteration in technologies, the emergence of new business models, emerging new markets, and commotion of traditional methods of carrying businesses (Borah, Iqbal & Akhtar, 2022; Muangmee, et al., 2021).

The notion of sustainable performance (SP) was first introduced to deal with the obliteration of the natural environment and its negative effects on the health, economic growth, and social well-being of the community (Alraja, Imran, Khashab & Shah, 2022). The World Commission on Environmental and Development (WCED, 1987) defined SP as the type of development that fulfills the requirement of the current generation without compromising on the ability of upcoming generations in order to fulfill their needs which generally and on a larger scale utilized in available body of knowledge and can be applied to three combined consequences explicitly economic, social, and environmental performance. This is an imperative concern to be addressed extensively as several enterprises have begun to take different paths for doing business (Yusoff, Omar, Zaman & Samad, 2019). Enterprises are searching for novel ways to implement in their business operations with the aim to reduce adverse effects of human action upon the environment as well as at the identical time augmenting the well-being of the societies in which they are functional and generate economic value. According to Ullah et al., (2021), still, several enterprises are uncertain about what current needs are and what strategies should be used to fulfill these needs.

Stringent governmental rules, policies, and regulations are not solely sufficient for the implementation of sustainable performance. To address the environmental concerns enterprises irrespective of age, size and nature are needed to develop new strategies which are not optional but necessary as well as significant for all enterprises (Eweje, 2020). In this perspective, research related to green businesses procedures such as green human resources practice (Quintás, Martínez-Senra & Sartal, 2018), green supply chain management (Jermsittiparsert, Siriattakul & Wattanapongphasuk, 2019), green innovations (Aboelmaged & Hashem, 2019) and green intellectual capital (GIC) (Yusoff, et al., 2019) and low carbon emission (Ullah, et al., 2021) has significantly grown. Yusoff, et al, (2019) established that investing in intellectual capital associated with the protection of the environment is acknowledged as GIC not solely fulfilling environmental management, but also facility ate enterprises in accomplishing competitive advantage. Intellectual capital is the summation of entire intangible resources that enterprises possess and is much important than tangible resources (Anik & Sulistyo, 2021). Prevailing research showed repeatedly the association among intellectual capital and enterprise performance. Still, the notion of GIC is not familiar between practitioners and academicians. It is worthy to mention that GIC is the probable resolution for the accomplishment of sustainable performance of enterprises (Benevene, et al., 2021). GIC is described as the summation of an enterprise's knowledge resources related to the protection of the environment or innovations (Shah, Ahmed, Ismail & Mozammel, 2021). Three basic components of GIC are green human capital, green structural capital, and green relational capital. There is a gap in prevailing literature in the context of SMEs in developing economies like Pakistan in the relationship of GIC and SP of enterprises. This study is significant in the context of SMEs in developing economies like Pakistan. According to Shah, *et al.,* (2021), GIC is acknowledged as a significant feature for accomplishing SP regardless of the enterprise's age, size, and nature.

Anik and Sulistyo (2021) highlighted those enterprises develop their interior capabilities in line with basic facets of environmental strategies as the consequence of GIC for the accomplishment of SP. Still, this conjecture does not expose and describe the rationale that enterprises in developing economies are emphasizing the augmentation of their SP and use GIC efficiently. GIC is a significant component; it is the established fact that solely GIC is not enough to use distinctive resources and accomplished knowledge through networks for SP. So, it is further important to examine the internal mechanism that may be involved in the association of GIC and SP. Prevailing literature in line with GIC has established

several outcomes of GIC that consequently facilitate the enterprises in the accomplishment of SP (Khan, et al., 2021). One of these components of GIC that predict the explicit bases for enterprise SP is Green Absorptive Capacity (GAC) (Zhou, Govindan, Xie & Yan, 2021). Zhang, Liang, Feng, Yuan, and Jiang (2020) suggested the significance of enterprises' abilities to create, transfer, assemble, integrate, and exploit knowledge assets that is described as GAC. Enterprises green products/services and knowledge management are globally acknowledged, and it is imperative for enterprises to devise strategies to augment green absorptive capacity. GAC is defined as the combination of enterprises' capabilities, developments, and routines, through which enterprises acquire, integrate, transform, and use knowledge for the generation of several capabilities to address environmental concerns (Pacheco, Alves & Liboni, 2018). Not every enterprise follows the policies and uses its capabilities to address environmental concerns. In line with the view presented by Jiang, Chai, Shao, and Feng (2018), this research examines the antecedents and consequences of GAC, it is coherent to entail GAC as a mediating variable in the association among GIC and SP. Thus, this study anticipated that inclusion of GAC as mediators may formulate the relationship between GIC and SP further strengthen manner.

This research also tests the moderating effects of green dynamic capabilities (GDC) on the relationship of GIC and SP. It is an established fact that the use of unique resources supports enterprises in acquiring and using the knowledge in relation to environmental concerns which is the basic component is addressing environmental concerns is important for enterprises (Singh, Del Giudice, Chiappetta Jabbour, Latan, & Sohal, 2022). Joshi and Dhar (2020) postulated that GDC are the enterprise's abilities of utilizing knowledge resources in the processes of integration, configuration, and implementation of resources. According to Qiu, Jie, Wang, and Zhao, (2020), GDC relates to the enterprise's abilities of assimilation, developing, and reconstructing the internal as well as external abilities to address the continuously changing environmental concerns.

This study is imperative in the context of SMEs of developing countries like Pakistan. The significance of SMEs to the economic development of the countries is acknowledged globally including the developing economy like Pakistan (Javed, Raza, & Nawaz, 2021; Khan, *et al.,* 2020). SMEs in Pakistan are dominant and add more than 50 percent to the GDP of Pakistan (SMEDA, 2021) and almost 70 percent of the workforce of Pakistan is deployed in SMEs (Shah *et al.,* 2019). The majority of SMEs in the sector are manufacturing SMEs. Shah et al., (2021) argued that empirical investigation in relation to distinctive resources, capabilities, and SP in the context of manufacturing SMEs is unexplored and found hardly in the available literature. Additionally, Omar, Yusoff, and Zaman, (2019) argued that there is little focus provided to GIC in manufacturing SMEs in comparison to large enterprises in developing economies.

Objective of research

In order to fill the above-mentioned gaps in the literature, founding on the Resource-Based View, Dynamic Capability View, and strategic management view, this research has a threefold objective. Firstly, this study examined the influence of GIC in accomplishing the SP of SMEs. Secondly, this research also evaluated the mediating effects of GAC in the association of GIC and SP of SMEs. Lastly, this research checked the moderating role of GDC on the association of GIC and SP of SMEs. This paper comprises different parts. The coming part discussed the literature review and hypotheses formulation. In the next section to the literature review, the methodology of the study is discussed. The section proceeding to methodology discusses the results of the study. The last section discusses the discussion, managerial and practical implications along with future research directions.

Literature Review and Hypotheses Development

GIC and SP

SP is described as the configuration of the enterprises objectives related to economic performance, social performance and environmental performance while carrying out fundamental business operations with the aim to enhance enterprises value (Vale, Miranda, Azevedo & Tavares, 2022). SP concept is developed as a mechanism between the main attributes that are in general concerned in balancing economic, social and environmental performances at different level (Khan, *et al.,* 2021). Yusliza, *et al,.*

(2020) suggested that the need of sustainable processes within enterprises becomes open, sustainability reporting advocates the values that are original for those who are responsible for the evaluation of enterprises current economic position as well as predicting the future performance of the enterprises.

Ullah, *et al., (*2021) described SP as the reconfiguration of three dimensions of the enterprise's performance which are categorized as economic performance, social performance, and environmental performance. Economic performance of the enterprises comprises of the entire components of economic transactions of enterprises that include traditional indicators used in financial management and accounting as well as also comprises the intangible facets which are usually not measured in financial terms (Javed, Yasir, & Majid, 2019; Vale, *et al.,* 2020). Social performance of the enterprises is explained as the degree up to which an enterprise does value creation in the form of contribution to society, job creation for the public, and providing social services to society and community (Khan, *et al.,* 2021). SP is related to the enterprise's consequences which influence the social systems in which enterprises are functioning (Borah, Iqbal & Akhtar, 2022). The measurement of social performance is done through the evaluation of the enterprise's impacts on the various stakeholders at the community, national as well as the international level (Muangmee, et al., 2021). Environmental performance is related to the influence of enterprises upon the natural resources of the environment that contain earth, water, air, and ecosystem (Alraja, et al, 2022). The majority of the enterprises operations that advocate reporting of social and environmental outcomes are certified by the environmental management system such as ISO 14001 certifications.

It is evident that SMEs like large enterprises take into account SP as the fundamental strategy for their operation continuity (Muangmee, et al., 2021). Literature supports the fact that SP is augmented through the appropriate management of intangible resources and distinctive capabilities such as intellectual capital (Zhang, Liang, Feng, Yuan & Jiang, 2020; Vale, et al., 2020). Various determinants of the SP of enterprises have been discussed in the literature as Omar, Mohd Yusoff and Kamarul Zaman (2019) highlighted the importance of enterprises knowledge resources in ensuring SP of enterprises. Anik and Sulistyo (2021) discussed the critical role of difficult to intimate knowledge resources like GIC for the augmentation of SP while addressing environmental related concerns. Shah, et al., (2021) argued that SMEs are emphasizing upon the need of formulating new mechanisms and strategies for the replacement of policies which are affecting negatively the society, community, and natural environment. Various factors are advocated as the impending determinants for the SP of SMEs. However, the pertaining problem for SMEs is that majority of SMEs have overlooked the importance of GIC for ensuring SP by addressing the environmental concerns. Although Yusliza, et al, (2020) in recent past acknowledges the critical role of GIC for ensuring the survival of enterprises in developed economies.

GIC is defined as the summation of enterprises all knowledge components that enable and leverage an enterprise in the processes of managing the environment in order to accomplish a competitive edge (Malik, et al., 2020). In general, GIC is acknowledged as a multi-faceted concept that validates it as the intangible and non-financial resource for enterprises founded upon experiences, knowledge, and practical abilities for creating value of the enterprises (Yong, Yusliza, Ramayah & Fawehinmi, 2019). Sabir, Rehman, and Asghar (2020) suggested that knowledge prevails within the enterprises in various shapes like the individual, enterprises databases, internal or external relationships, systems, and business operations. The three main components of GIC are green human capital, green structural capital, and green relational capital. Green human capital is described as the assets of the enterprise's employees in terms of employees' knowledge, abilities, experiences, creativities, skills, and commitments jointly related to protecting the environment (Malik, et al., 2020). Enterprises are continuously investing in green human capital to accomplish higher performance (Sabir, Rehman & Asghar, 2020). Green structural capital is defined as the assets of enterprises that suggest concerns related to the protection of the environment and green innovation within the enterprises and these assets are acknowledged as strategies associating organizational capabilities, commitments, organizational culture, reward mechanisms, enterprises image, information technology, trademarks, and copyrights (Young, et al., 2019). Enterprises with strong green structural capital perform far better as compared to

others (Anik & Sulistyo, 2021). According to Khan, *et al.,* (2021), GIC is described as the enterprise intangible assets which are created through the association between enterprises stakeholders such as customers, suppliers, social networks, green innovation, and partners related to the management the of corporate environment with the basic aim of accomplishing competitive edge.

GIC facilitates the SMEs in establishing and formulating knowledge, competencies, and relationship with partners and stakeholders in order to create value and sustainable development (Omar et al., 2019). Particularly, the relational dimension of GIC is beneficial for SMEs in acquiring new knowledge by establishing a social relationship that creates social value through the enhancement of trust and cooperation between employees, the community, and end-users. Green human capital enables and motivates employees of enterprises to use novel knowledge in managing environmental concerns (Ying, Hassan, & Ahmad, 2019). In line to Resource Based View, GIC as a distinctive resource accumulates the information relating to the management of environmental concerns through its components of green human capital, green structural capital, and green relational capital which helps in the reduction of adverse environmental effects along with the creation of economic and social value for SMEs which in results ensure and augment SP of SMEs (Malik, et al., 2020: Young, et al., 2019). Founding on the above argument this study tested the following hypothesis;

H1: There is a positive relationship between GIC and SP.

GIC and GAC

GAC is the capability of enterprises to perceive the significance on new data, integration of new data, and application of this data for accomplishing commercial purposes related to environmental concerns (Zhou, Govindan, Xie & Yan, 2021). Zhang, Liang, Feng, Yuan and, Jiang (2020) argued that GAC is the series of enterprise's daily routines and development through which enterprises acquire, integrate, convert and use environmental knowledge for the development of enterprise's capabilities. GAC theory focuses on knowledge innovation, enterprise learning, and knowledge assets application along with the integration of dynamic capabilities integration. In this study in line with Pacheco, Alv,es and Libon (2018) the GAC is described as the enterprise's capability of understanding, communicating, combining, identifying, and commercializing knowledge related to the environment. GAC is the consequence of the enterprise's knowledge resources (Chen, Lin, Lin & Chang, 2015). GAC enable the human capital of enterprises to cope with environmental concern by enhancing their abilities and motivation to address the environmental issues. It is evident from the available literature that augmented knowledge resources such as GIC enhances the abilities of employees to acquire, store and utilize environmental knowledge for ensuring the survival of enterprises irrespective of age, size, and nature (Chen, et al., 2015: Qu, et al.,2022). On the basis of the above arguments this study postulated the following hypothesis:

H2: There is a positive relationship between GIC and GAC.

GAC and SP

Enterprises performance directly or indirectly in both contexts is influenced through absorptive capacity. Additionally, Qu, et al., (2022) advocated that absorptive capacity adds to the performances of enterprises irrespective of age, size, and nature. GAC enlightens the abilities of enterprises of comprehending, combining, connecting, identifying, and applying environment related knowledge (Chen, et al., 2015). GAC is the capability of the enterprises of green knowledge acquisition as well as understanding suggesting the capability of recognizing and obtaining exterior green knowledge that is the pre-requisite for carrying enterprises business operations (Zhou, et al., 2021). Green knowledge acquisition enables enterprises in evaluation, processing, deducing, and realizing environmental information acquired from exterior sources. The application of green knowledge towards enterprises products permits the enterprises in differentiating their products to fulfill the needs of customers through combining external knowledge (Alves & Libon, 2018). The GAC of enterprises can augment the enterprises profitability, social value creation, and environmental management with respect to going green (Xue, Boadu & Xie, 2019). This study anticipated that GAC directly influences enterprise's sustainability. On the basis of the above arguments, the following hypothesis was formulated.

H3: There is a positive relationship between GAC and SP.

Mediating Role of GAC

Absorptive capability entails the capability of implementing enterprises strategies in an efficient manner (Gluch, Gustafsson & Thuvander, 2009) because the augmented capacity acquired by connecting exterior created knowledge with interior knowledge (Galbreath, 2019). This improves the enterprises prevailing capabilities and consequences in augmented enterprises SP (Zhou, et al., 2021). In continuously altering the environment (for example, considering management of the environment) GAC entails enterprises with the capacity to explore and acquire exterior knowledge (that are various environmental policies, regulations and policies and demands) significant for enterprises functioning and operations (Chen, et al., 2015). GAC also entails strategic flexibility fundamentally needed for evolving in a continuously altering environment (), for example, planning programs of environmental training, setting assessable targets related to environmental management and environmental actions plans, etc (Xue, Boadu & Xie, 2019). It is established that GAC entails enterprises with a sense of the right direction. Additionally, it is also established that only having competencies like green basic capabilities will not be sufficient to effects the mindset of innovative employees. Nonetheless, employees are needed to possess the capability of recognizing new opportunities and giving new vision from environmental clues (Alves & Libon, 2018). For better use of enterprises basic capabilities in order to shape the mindsets that are innovative, it is further important for enterprises to implement new knowledge into their processes and operations on regular basis (Qu, et al., 2022). So, it is postulated that GAC is imperative to lead and entail force to the enterprise unique green resources for the SP of the enterprises. So on the basis of the above arguments following hypothesis was formulated.

H4: The relationship between GIC and SP is mediated by GAC.

Moderating Role of GDC

Joshi and Dhar (2020) postulated that GDC is the enterprise's ability to utilizing knowledge resources in the processes of integration, configuration, and implementation of resources. GDC relates to the enterprise's abilities of assimilation, developing, and reconstructing the internal as well as external abilities to address the continuously changing environmental concerns (Qiu, Jie, Wang & Zhao, 2020). Earlier literature entails that GDC is related positively to the development of new products and services (Strauss, Lepoutre, & Wood, 2017), enterprises change (Beuter Júnior, Faccin, Volkmer Martins & Balestrin, 2019) and innovation performance (Pacheco-lari & Liboni-lara, 2017). GDC is correlated positively to the performance of enterprises (Qiu, Jie, Wang & Zhao, 2020). Additionally, GDC can augment enterprises' sustainable development and survival while addressing the environmental requirements in current environment-oriented scenarios. GDC can craft a green competitive edge if managers of the enterprises utilize the environmental system to enhance environmental benefits (Yousaf, 2021). Moreover, sustaining a competitive advantage can resultantly augment an enterprise's sustainable performance. So, this study postulated that GDC may further strengthen the association of GIC and SP of enterprises. The following hypothesis was deduced on the basis of the above arguments:

H5: The relationship between GIC and SP is moderated by GDC in such a way that higher is the GDC stronger is the bind between GIC and SP.
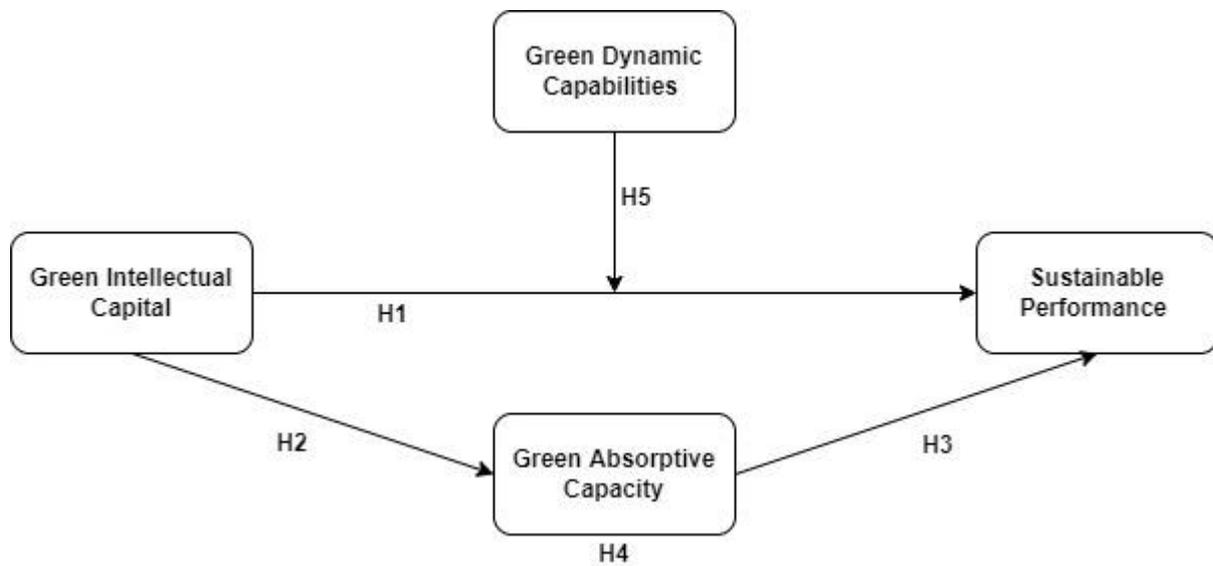
Figure.1.   Theoretical framework

Methodology

This part provides the details of the methodology applied in this study. This study undertakes the quantitative research design as Habes, Ali, and Pasha (2021) suggested that utilization of quantitative research design using quantitative data entails significant proof to the investigation by contributing to research effectiveness. Thus, an analytical loom has been undertaken to measure specific established relationships, which are postulated and detailed in the hypotheses formulation section. For the accomplishment of this research objective data was gathered from the senior executives and managerial level employees of the manufacturing SMEs located in 9 industrial estates of Khyber Pakhtunkhwa province registered with the Small Industrial Board (SIDB), Khyber Pakhtunkhwa and Small and Medium Size Enterprise Development Authority (SMEDA), Pakistan. Manufacturing SMEs are predicted to be over 13 billion US dollar industry and have more than 70 percent share of total SMEs. Moreover, manufacturing SMEs were chosen for this study because of three reasons. Firstly, manufacturing SMEs are more than 70 percent of SMEs functional in Pakistan (SMEDA, 2021). Secondly, manufacturing SMEs are employing over 5 million of workforce. Thirdly, manufacturing SMEs are the major contributor to the country's GDP; however, manufacturing SMEs also lead to negative effects on the natural environment (Shafique, Kalyar & Mehwish, 2021). So, it is imperative for manufacturing SMEs to consider environmental concerns while implying the strategies of SP through the management of GIC. Hence, manufacturing SMEs are undertaken as an ideal unit of analysis in this study. In the current study, all 1168 manufacturing SMEs in 9 industrial estates were contacted and accessed, and data was gathered from the CEOs and managerial level employees to craft a sampling frame. The sample frame for this study comprised the respondents who were CEOs and managerial level of employees of manufacturing SMEs.

Sampling

For the selection of respondents, a systematic random sampling technique was undertaken, and 991 respondents were selected from manufacturing SMEs of 9 industrial estates of Khyber Pakhtunkhwa. This study undertaken the survey approach and data was gathered by structured questionnaire taken into account the key informant approach, which is in line with existing literature (Zafar, Fiaz, Ikram, Khan & Qamar, 2021). The study informants were well aware of the enterprise's strategies to deal with environmental concerns for the enhancement of SP.

Data collection

The process of data collection was based on three rounds. In first-round questionnaires along with covering letters were mailed to respondents. In the second round, after a time frame of almost four months, the respondents who did not respond were contacted through phone calls and emails. In the third round of data collection, the three research associates were hired and researchers along with research

associates personally paid visits to the study respondents. As a result of all the above-discussed efforts 519 valid and utilizable questionnaires were received back. For this study response rate was recorded 52 percent, which is acknowledged as a good rate of response considering the research environment in developing economies such as Pakistan. 19 percent of SMEs were dealing in pharmaceutical products, 23 percent of SMEs were dealing in the manufacturing of Edible Oil, 28 percent were dealing in soap manufacturing, 11 percent were dealing in sports items manufacturing, 12 percent SMEs were dealing in the manufacturing of electrical cables and 7 percent SMEs were dealing in manufacturing of garments. 37 percent of the SMEs were operational from last 10 years, 48 percent of SMEs were in operation from above 10 years to 20 years and 15 percent of enterprises were operational from above 20 years. Additionally, 33 percent of enterprises were having less than 100 employees, 41 percent of enterprises were having employees 100 to 150 employees, and 26 percent of enterprises were having more than 150 employees.

Ethical consideration

Various ethical considerations were taken into account during this research. In the process of data collection, it was made sure that all the respondents of this research should possess a comprehensive understanding of the research objectives and questions. The consent of the study respondents was taken prior to the data collection. The research participants anonymity and confidentiality were also ensured by keeping the respondents' details anonymous.

Measures

In this study, the questionnaire was comprised of two parts. The first part of the questionnaire was based upon the information related to enterprises' age, enterprises' size, and other demographic information. The second part was comprised of the 44 items for measuring the study variables. The responses of study respondents were recorded 5-points Likert's scale ranging from 1 to strongly disagree to 5 strongly agrees. Detail is also given in Appendix A.

GIC

The construct of GIC was measured with its three components that are green human capital, green structural capital, and green relational capital. The 19 items scale was adapted from Yusoff, et al., (2019) to measure three items GIC. 19 items scale computed the value of Cronbach's α .715. Items used to measure GIC were reliable.

SP

The construct of GIC was measured with its three components that are green human capital, green structural capital, and green relational capital. The 19 items scale was adapted from Yusoff, et al., (2019) to measure three items GIC. 19 items scale computed the value of Cronbach's α .715. Items used to measure GIC were reliable.

GAC

The construct of GAC was measured with its two components that are employee ability and employee motivation. The 5 items scale was adapted from Mady, et al., (2022) to measure three-dimensional GAC. 5 items scale computed the value of Cronbach's α .869. Items used to measure GAC were reliable.

GDC

The construct of GDC was measured with 5 items. The 5 items scale was adapted from Singh, et al., (2022) to measure three-dimensional GDC. 5 items scale computed the value of Cronbach's α .811. Items used to measure GAC were reliable.

Control variables

In this research enterprise age, enterprise size and enterprise nature, respondent education, and respondents experience are utilized as control variables.

Results

Analysis and results

This study evaluated the hypothesis using descriptive analysis, correlation, and hierarchical regression (Baron and Kenny tests). First, confirmation factor analysis was performed to confirm the validity of the scale. Both CR and AVE have confirmed the effectiveness of convergence. The CR results exceed the

0.7 thresholds, the CR exceeds the AVE score, and the AVE score also exceeds 0.5, indicating that the scale is convergently valid. Details are shown in Table I. Table I contain additional information.

Table 1.

Cronbach's alpha value, CR, and AVE

	Items	Cronbach's Alpha	Factor Loading	CR	AVE
GIC	19	0.715	0.710-0.911	0.97	0.64
SP	15	0.732	0.716-0.881	0.95	0.60
GAC	5	0.869	0.765-0.891	0.91	0.69
GDC	5	0.811	0.712-0.910	0.89	0.63

Note: GIC= Green intellectual capital; SP= Sustainable performance; GAC= Green Absorptive Capacity; GDC= Green Dynamic Capabilities; AVE= Average Variance Extracted; CR= Composite reliability

AMOS v.7 was used to test the overall model fitness. Confirmatory Factor Analysis was used to verify model fitness (CFA). The chi-square goodness-of-fit test, goodness-of-fit index (GFI), comparative-fit-index (CFI), and root mean square error of approximation (RMSEA) were among the other indicators utilized. The values of GFI, CFI, and RMSEA reasonably satisfied the conventional norms as GFI and CFI were higher than 0.9 as advised by Hu and Bentler (1999), and RMSEA was less than 0.05 (GFI= 0.95; CFI=0.94; RMSEA=0.041; $\chi 2$ = 1371.23)which is an acceptable value as described by Brown and Cudeck (1992).

Descriptive analysis
The results of descriptive analyses and correlation analyses are presented in table 2. The results demonstrated that GIC, SP, GAC, and GDC are associated positively and significantly respectively. Correlation analyses are also shown in the same table. The findings revealed that all of the controlled variables have a minimal relationship with the study's key variables. GIC is positively and moderately associated with SP (r=0.32**), GAC (r=0.422**), and GDC (r=0.23**). Furthermore, SP is also positively, significantly, and moderately associated with GAC (r=0.371*) and GDC (r=0.41*). Lastly, GAC and GDC are also positively and significantly associated with each other (r=0.39*). These results are also consistent with Baron and Kenny's (1986) norms for mediation studies.

Table 2

The details of Mean, SD, and correlation

Variables	Mean	SD	1	2	3	4	5	6	7	8	9
Enterprise' Nature	1.196	.39	1								
Enterprise' Age	1.652	.99	.12*	1							
Enterprise' Size	2.124	1.1	.10	.02	1						
Respondents' Education	3.004	1.4	.02	.03	.02	1					
Respondents' Experience	2.307	.61	.03	-.14*	.02	.12	1				
GIC	3.93	.61	.14	.11	.21	-.24	.21	1			

SP	3.72	.49	.12	.07	.18	.25	.23	.32**	1	
GAC	3.55	.61	.14	.12	.26	.19	.34	.422**	.371*	1
GDC	3.85	.53	.32	.33*	.12	.31	.22	.23**	.41*	.39*	1

Note: * $p < 0.05$, two tailed; ** $p < 0.01$, two tailed; GIC= green intellectual capital; SP= sustainable performance; GAC= green absorptive capacity; GDC= green dynamic capabilities

Mediation analyses

Mediation was tested using Baron and Kenny (1986) approach which is based on four steps. The results of three independent regression tests are shown in Table II. The results confirmed the direct relationship between GIC and SP ($\beta = 0.17$, t = 9.32, p <0.001). This also confirmed that H1 is supported by data. Furthermore, the direct relationship between GIC and GAC is also supported by the data ($\beta = 0.26$, t = 13.92, p<0.001). The third step is also approved as the relationship between GAC and SP is also supported by the data ($\beta = 0.13$, t = 9.12, p<0.001). Hence, H3 is also accepted.

Table 3

Regression analysis

Independent factors	GAC					SP				
	R^2	B	S.E	Sig.	t-value	R^2	β	S.E	Sig.	t-value
GIC	0.17	0.19	0.043	<0.00	9.32	0.10	0.26	0.043	<0.00	13.92
GAC(**Mediator**)	--	--	--	--	--	0.13	0.22	0.038	<0.00	9.12

Note: GIC= green intellectual capital; SP= sustainable performance; GAC= green absorptive capacity; GDC= green dynamic capabilities

To test the fourth step, three models (A, B, and C) were developed. Model-A tested the direct relationship of GIC with SP (β=0.17**; SE=0.043). Model-B tested the impact of controlled variables in the relationship of GIC and SP (β=0.17**; SE=0.047). The results revealed that still the relationship between GIC and SP was significant and none of the controlled variables was having a significant relationship with the independent variable of the study. Model-C captured the mediation effect of GAC in the relationship of GIC and SP. The results showed that GAC mediates the relationship of GIC and SP ($\beta = 0.23$, SE= 0.091), which confirmed mediation. Thus, H4 is also supported by the data. Further detail is shown in the Table-4 below.

Table 4

Details of Multiple regression analysis

	Model-A		Model-B		Model-C	
	β	SE	β	SE	β	SE
Main Independent Variable						
GIC	0.17**	(0.043)	0.15**	(0.047)	0.023	(0.091)
<u>**Control Variables**</u>						
Enterprise Nature			0.09	(0.045)	0.11	(0.061)
Enterprise Age			0.10	(0.054)	0.019	(0.053)
Enterprise Size			0.22	(0.034)	0.16	(0.062)
Respondent Education			0.07	(0.041)	0.14	(0.061)
Respondent Experience			0.05	(0.021)	0.04	(0.014)
<u>**Mediating Variable**</u>						
GAC					0.19**	(0.043)

Note: ** $p < .001$; * $p < .01$ (two-tailed test)

GIC= green intellectual capital; SP= sustainable performance; GAC= green absorptive capacity; GDC= green dynamic capabilities

Baron and Kenny's approach just shows the assurance of mediation but does not provide detail about the strength of mediation. The normal test theory approach is used to evaluate the strength of mediation. Results are presented as under.

Table 5

Details Normal test theory approach

	Direct effect			Indirect effect (Normal test approach)			Total effect		
Mediation model	β	T	*P*	B	T	P	β	Z	P
GIC→GAC→SP	0.17	5.81	<0.001	0.03	2.17	0.45	0.20	7.21	*<.001*

The findings revealed that GIC and SP are positively related (β =0.17, t=5.81) and that the outcome normal test theory (Z=7.21, p<0.001) supports the mediation outcome of GAC (β=0.20-0.03=0.17) in the relationship of GIC and SP.

Moderation Analyses

To test the moderation effect of green dynamic capabilities, hierarchical regression was used. and the results are presented in Table 6.

Table 6 Moderation analysis via hierarchical regressions

	Step 1	Step 2	Step 3
(a) Moderating effect of GDC			
Respondents' experience	0.017	0.015	0.013
Age	0.021	0.018	0.021
Gender	0.015	0.013	0.017
Education	0.019	0.011	0.013
GIC		.21**	.18**
GDC		.14**	.16**
GIC x GDC (interaction term)			.09**
R^2	.007	.117	.124
Adjusted R^2	.005	.109	.161
ΔR^2	.002	.141	.031
ΔF	4.812	71.32	11.17

Note: GIC= green intellectual capital; SP= sustainable performance; GAC= green absorptive capacity; GDC= green dynamic capabilities

The first two models are base models and the third provides information about the moderation effect. In the table, the interaction term is also provided which is the product of green intellectual capital and green dynamic capabilities. As the table shows that green dynamic capabilities moderate the GIC --> SP relationship (β=0.09**, p<0.001). The results support the H5 of the study, thus it is also accepted. Furthermore, following the recommendation of Aiken et al. (1991), slope analysis is also conducted and shown as below:
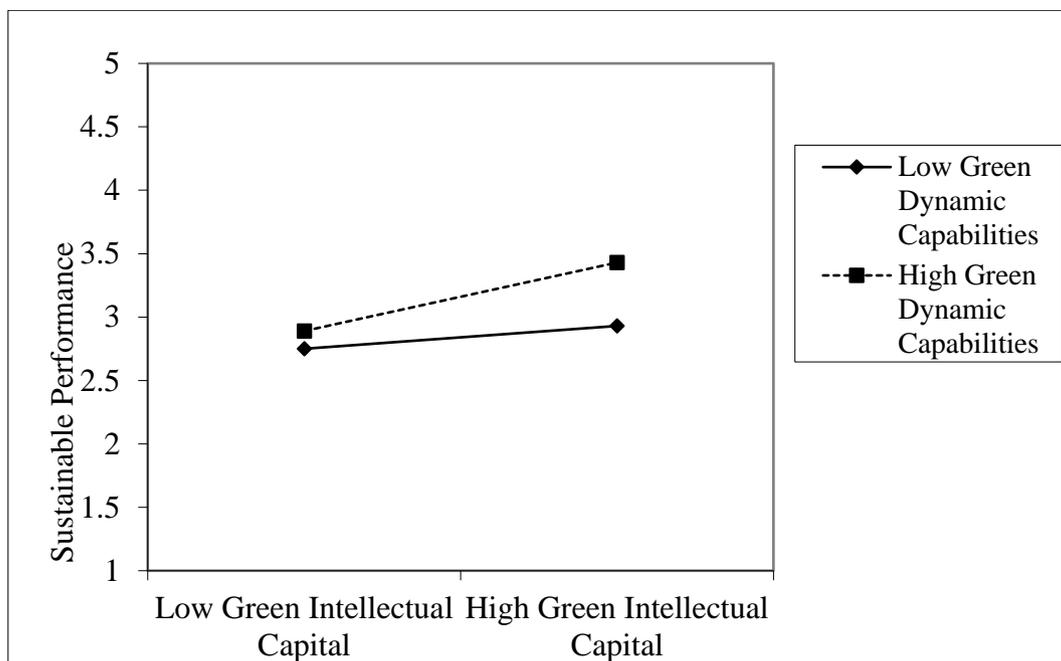
Figure 2, Slope Analysis

According to figure 2, when green dynamic capabilities are high, the relationship between green intellectual capital and sustainable performance becomes further strengthen and vice versa.

Discussion and Conclusion

SMEs involved in manufacturing contextualizing the developing economies like Pakistan are facing the institutional pressures to address the environmental concern in their core strategies. The manufacturing SMEs are causing damage to the ecosystem through the emission of carbon dioxide. In order to address environmental-related concerns, SMEs are striving to reorganize their resources to create new knowledge and altering path dependence to reduce the adverse effects on the environment. In this regard, the results of this study contribute to the prevailing theory by empirically testing the model combining GIC, SP, GAC, and GDC in the context of developing economies like Pakistan. Using positivist epistemology and objective ontology this study deduced and tested five hypotheses. For H1, the result predicted that GIC is positively related to SP of SMEs was supported by data. This finding of the study was in-line with the findings of Ying, Hassan, and Ahmad (2019) and Omar, *et al.,* (2019). This study advocated that appropriate management of GIC leads to the creation of knowledge, and trust and further strengthen channel of communication that facilitate SMEs in ensuring their SP.

In the same manner, H2 of this study was also supported by the data as GIC positively influences the GAC that enables and motivates the employees of the SMEs in utilizing new knowledge, skills, and competencies for the sustainable development of SMEs by addressing environmental concerns. These findings are in-line with the findings of Chen, et al., (2015) and Qu, et al., (2022). Similarly, H3 of this study that GAC is positively related to SP of SMEs was also supported by the data of the current study. The ability and the motivation of the SMEs employees augment the processes of sustainable development through appropriate management of the environment by adding value for the community, society, and SMEs as well. This finding is consistent with the results of Xue, Boadu, and Xie (2019). This study also tested the mediating role of GAC in the association of GIC and SP of SMEs. Statistical results entailed the support for H4 of this study in-line with mediating effects. This finding is supporting the finding of Alves and Libon (2018). Appropriate management of GIC enhances the abilities of employees and also motivates employees to utilize acquired knowledge, which is suggested as the pre-requisite of SMEs SP. In line with the moderating role of GDC on the association of GIC and SP, findings entailed that GDC strengthens the relationship between GIC and SP of SMEs. Although in prevailing literature no study focuses on the moderating role of GDC on the association of GIC and SP of SMEs, on the other side, the result of this study approves the argument of Pacheco-lari and Liboni-

lara (2017) and Strauss, Lepoutre, and Wood (2017).

Theoretical Contribution

This study contributes to theory in several ways. *First*, this study adds to the theory by deducing and empirically examining the theoretical model through entailing the procedures of accomplishing SMEs SP by appropriate management of unique resources and capabilities such as GIC, DAC, and GDC contextualizing the SMEs of developing economies; earlier such relationships were not explored. This research adds to the prevailing theory by considering that enterprises with GAC are far better position to achieve the SP of SMEs, whereas, GAC are the consequence of the unique resources such as GIC. *Second*, this study enhances the understanding of GIC through predicting GAC as a distinctive mechanism to achieve SMEs SP. This study adds to the theory by evaluating the mediating role of GAC in the relationship of GIC and SMEs SP. Resultantly, this research verifies GAC as a major outcome of GIC which ensures SMEs SP. *Third*, this study opens new endures for academia and researchers of sustainability by testing moderating role of GDC. The extent to which GIC influences the SP of SMEs will be further strengthened when GDC moderates the association of GIC and SP of SMEs. The critical moderating role of GDC on the relationship of GIC and SP of SMEs entails that GDC can facilitate the acquisition, reorganization, and application of knowledge for the environmental management that augment the sustainability of SMEs in long run. *Finally*, this research uniquely contributes to the sustainability of firms by providing a holistic view to measure the SP of SMEs by enhancing the understanding of green practices, green knowledge management, and green policies through the management of green resources and green capabilities.

Practical Implication

This study entails several managerial implications for practitioners. Founding on the findings of this study, it is accomplished that the top-level management of the SMEs are required to put emphasis on considering the appropriate management of green resources and green capabilities for the development of strategies to address the environmental concern in their core strategies of survival in long run. This study advocate that top management and policymakers of SMEs should recognize several combinations of resources and capabilities in devising the strategies to reduce the negative effects of the enterprises business operations by producing value for the community, society, and environment. This study recommends CEOs, owners, and managerial level employees to focus on the management of green human capital, green structural capital, and green relational capital for a better understanding the society, community, and environmental needs and how these needs can be satisfied, and sustainability of the SMEs can be accomplished in a current intensively competitive environment. *Finally,* this research suggested the owners, CEOs, and managerial level employees of the SMEs to remain proactive in identifying the environmental needs, reducing carbon dioxide emissions, preserving the eco-system, and effective utilization of limited resources which in result will add positively to the economic, social and environmental performance of the SMEs which confirm the long-term survival of the businesses.

Limitations and future research directions

This research has several limitations that are needed to be addressed. First, while conducting this study data was gathered using a single informant technique from respondents of manufacturing SMEs. Resultantly, the results of this study might experience the issue of CMV (common method variance). This study evaluated these issues by the technique suggested by Podsakoff et al. (2003). The finding suggested that results are not likely to be affected by CMV. Second, the generalization of the results is limited because in this research data was collected from solely manufacturing SMEs in the context of a developing economy like Pakistan. It will be a useful addition to test established model in other sectors of the economy. Furthermore, as the cross-sectional design does not allow the basic casual interpretations amid several components. Thus, the present research may not ascertain at what point of time components of GIC are critical for SMEs SP. In relation to these constraints, this study opens numerous endures for carrying out research in the future. The first theory of sustainability postulated in this study needs more exploration. This study strives to augment the conception of SP and GIC through recommending resources-based view and dynamic capability view. Yet, research in line with SMEs SP rests

underdeveloped. To elude the SP concept misconception and mop of the doubts of its utilization, evaluators are needed to put more effort for further development of research in this field. The researchers and academia can pay their efforts to explore the arrangements for ensuring SMEs SP. Contributing to GIC; in future research can pay attention to other potential organizational components such as green entrepreneurial orientation, green knowledge management, and green human resource management (Da Giau, Foss, Furlan, & Vinelli, 2020). The present study also enhanced the importance of GDC and GAC for SP of SMEs. So, in future research, the evaluation of the association amid SP and other environment-associated facets can be carried out is a systematic manner.

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Appendix A

Detail of scale development

S. No	Variable Name	No. of items	Source
1.	Green intellectual capital	19	Yusoff, Omar, Zaman, & Samad, (2019)
2.	*Sustainable performance*	15	Khan, Yasir, Shah, & Majid, (2021)
3.	*Green absorptive capacity*	5	Mady, Abdul Halim, Omar, Abdelkareem, & Battour, (2022)
4.	*Green dynamic capabilities*	5	Singh, Del Giudice, Chiappetta Jabbour, Latan, & Sohal, (2022)