


**DO PERFORMANCE MEASUREMENT SYSTEMS MATTERS TO VITALIZE GREEN INTELLECTUAL CAPITAL AND SUSTAINABLE PERFORMANCE? A CONCEPTUAL FRAMEWORK**

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b></p> <p><b>Received</b> 07 April 2023</p> <p><b>Accepted</b> 04 July 2023</p>	<p><b>Purpose:</b> The aim of this study is to propose a conceptual framework in which performance measurement systems potentially play a role in transforming knowledge based resources, e.g., green intellectual capital for sustainable performance in this information intensive economy. The emerging relevance of sustainability creates phenomena to think about green intellectual capital, while little is known about the function of performance management systems to achieve sustainable-based performance.</p>
<p><b>Keywords:</b></p> <p>Green Intellectual Capital; Sustainable Performance; Performance Measurement Systems; Social and Environmental Measures; Management Accounting.</p>	<p><b>Theoretical framework:</b> The underlying premise of the "contingency view" from the "fit as mediation" approach signifies that organizational systems are generated and structured by knowledge-based characteristics, which significantly influence organizational outcomes (Drazin &amp; de Ven, 1985; Venkatraman, 1989).</p> <p><b>Design/methodology/approach:</b> The conceptual framework articulates three components of green intellectual capital, i.e., green human capital, green structural capital, and green relational capital, from the ground of performance measurement systems adding social and environmental measures to contribute to sustainable performance (economic, social and environmental) extracted from the preceding literature.</p>
	<p><b>Findings:</b> The expected results of the study suggest that green-based intellectual capital can foster business sustainability, while a quantitative method will be employed based on prior studies to extract the study's real consequences.</p> <p><b>Research, Practical &amp; Social implications:</b> The study may inspire senior management to exhibit how green intellectual capital is linked in internal operations for dealing with non-financial concerns for economic lineup and to bridge research gaps from different study areas into a holistic model to contribute to the literature.</p> <p><b>Originality/value:</b> The value of the study is to give logical hints about emerging literature that green intellectual capital is significant to achieve sustainable performance. This study contributes to the sphere of accounting and sustainability by suggesting a research framework for practitioners and academicians.</p> <p>Doi: <a href="https://doi.org/10.26668/businessreview/2023.v8i7.3233">https://doi.org/10.26668/businessreview/2023.v8i7.3233</a></p>

**OS SISTEMAS DE MEDIÇÃO DE DESEMPENHO SÃO IMPORTANTES PARA VITALIZAR O CAPITAL INTELLECTUAL VERDE E O DESEMPENHO SUSTENTÁVEL? UMA ESTRUTURA CONCEITUAL**

**RESUMO**

**Objetivo:** O objetivo deste estudo é propor uma estrutura conceitual na qual os sistemas de medição de desempenho potencialmente desempenham um papel na transformação de recursos baseados em conhecimento,

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por exemplo, o capital intelectual verde para o desempenho sustentável nesta economia de informação intensiva. A relevância emergente da sustentabilidade cria fenômenos para se pensar sobre o capital intelectual verde, enquanto pouco se sabe sobre a função dos sistemas de gestão de desempenho para alcançar um desempenho baseado na sustentabilidade.

**Estrutura teórica:** A premissa subjacente da "visão contingencial" da abordagem "ajuste como mediação" significa que os sistemas organizacionais são gerados e estruturados por características baseadas em conhecimento, que influenciam significativamente os resultados organizacionais (Drazin & de Ven, 1985; Venkatraman, 1989).

**Projeto/metodologia/abordagem:** A estrutura conceitual articula três componentes do capital intelectual verde, ou seja, capital humano verde, capital estrutural verde e capital relacional verde, com base em sistemas de medição de desempenho que acrescentam medidas sociais e ambientais para contribuir com o desempenho sustentável (econômico, social e ambiental) extraído da literatura anterior.

**Conclusões:** Os resultados esperados do estudo sugerem que o capital intelectual baseado no verde pode promover a sustentabilidade dos negócios, enquanto um método quantitativo será empregado com base em estudos anteriores para extrair as consequências reais do estudo.

**Implicações sociais, práticas e de pesquisa:** O estudo pode inspirar a gerência sênior a mostrar como o capital intelectual verde está ligado às operações internas para lidar com preocupações não financeiras para o alinhamento econômico e para preencher as lacunas de pesquisa de diferentes áreas de estudo em um modelo holístico para contribuir com a literatura.

**Originalidade/valor:** O valor do estudo é dar dicas lógicas sobre a literatura emergente de que o capital intelectual verde é importante para alcançar o desempenho sustentável. Este estudo contribui para a esfera da contabilidade e da sustentabilidade ao sugerir uma estrutura de pesquisa para profissionais e acadêmicos.

**Palavras-chave:** Capital Intelectual Verde, Desempenho Sustentável, Sistemas de Medição de Desempenho, Medidas Sociais e Ambientais, Contabilidade Gerencial.

## ¿SON IMPORTANTES LOS SISTEMAS DE MEDICIÓN DEL RENDIMIENTO PARA VITALIZAR EL CAPITAL INTELECTUAL ECOLÓGICO Y EL RENDIMIENTO SOSTENIBLE? UN MARCO CONCEPTUAL

### RESUMEN

**Objetivo:** El objetivo de este estudio es proponer un marco conceptual en el que los sistemas de medición del rendimiento desempeñen potencialmente un papel en la transformación de los recursos basados en el conocimiento, por ejemplo, el capital intelectual verde, hacia un rendimiento sostenible en esta economía intensiva en información. La relevancia emergente de la sostenibilidad crea fenómenos para pensar en el capital intelectual verde, mientras que se sabe poco sobre el papel de los sistemas de gestión del rendimiento en la consecución de un rendimiento basado en la sostenibilidad.

**Marco teórico:** La premissa subyacente de la "visión contingente" del enfoque del "ajuste como mediación" significa que los sistemas organizativos se generan y estructuran mediante características basadas en el conocimiento, que influyen significativamente en los resultados organizativos (Drazin & de Ven, 1985; Venkatraman, 1989).

**Diseño/metodología/enfoque:** El marco conceptual articula tres componentes del capital intelectual verde, a saber, el capital humano verde, el capital estructural verde y el capital relacional verde, basándose en sistemas de medición del rendimiento que añaden medidas sociales y medioambientales para contribuir al rendimiento sostenible (económico, social y medioambiental) extraídas de la bibliografía anterior.

**Conclusiones:** Los resultados esperados del estudio sugieren que el capital intelectual verde puede promover la sostenibilidad empresarial, mientras que se empleará un método cuantitativo basado en estudios previos para extraer las consecuencias reales del estudio.

**Implicaciones sociales, prácticas y de investigación:** El estudio puede inspirar a la alta dirección a mostrar cómo el capital intelectual verde está vinculado a las operaciones internas para abordar las preocupaciones no financieras para la alineación económica y para llenar los vacíos de investigación de diferentes áreas de estudio en un modelo holístico para contribuir a la literatura.

**Originalidad/valor:** El valor del estudio consiste en aportar pistas lógicas sobre la literatura emergente de que el capital intelectual verde es importante para lograr un rendimiento sostenible. Este estudio contribuye al ámbito de la contabilidad y la sostenibilidad sugiriendo un marco de investigación para profesionales y académicos.

**Palabras clave:** Capital Intelectual Verde, Rendimiento Sostenible, Sistemas de Medición del Rendimiento, Medidas Sociales y Medioambientales, Contabilidad de Gestión.

## INTRODUCTION

The Brundtland Report, by the United Nations World Commission on Environment and Development, has been the foundation for the proliferation of eco-friendly tactics and procedures. This report states it is "a development that meets the needs of the present without compromising future generations"(WECD, 1987). Governments worldwide are enacting stricter environmental rules due to the worsening environmental conditions and rising global temperatures (Benevene et al., 2021). The consideration of the privileges of stakeholders associated with them through the establishment of constant and relevant remuneration has emerged as a new goal for economic units in response to the developments and challenges of the modern business environment over the last quarter of the twentieth century (Mahdi & Abass, 2022). Additionally, Businesses face increasing pressure to adopt a greener approach and implement sustainable practices from two cornerstones: to adopt international agreements and legislation on environmental protection (Chen, 2008). Secondly, depending on their recognition of sustainability as a critical factor in their development to gain competitive advantage, organizations demonstrate a multitude of involvement in environmental concerns (Yusoff et al., 2019). In this day and age of the new economy, intangible resources play a pivotal role in determining an organization's economic potential, which can lead to sustainable performance. A company's market value is its financial capital plus intellectual capital (Johnson, 1999), while its intellectual capital is always more valuable than its financial capital in a knowledge-intensive economy. With the appearance of stringent natural control mechanisms and mainstream ecological awareness, the concept of "Green intellectual capital" was proposed by (Chen, 2008), which presents expertise, capabilities, and connections related to green innovation and prevention, contributing to the possibility of sustainable development and enhancing firm performance. More pertinently, under these circumstances, there is less evidence released about the organizational procedures that businesses may utilize to maximize the efficiency of their environmental assets. In this panorama, the significant role of performance measurement systems is indispensable to measuring green intellectual capital to enhance sustainable firm performance (Asiaei et al., 2022). However, traditional performance measurement techniques have the prevalent flaw of prioritizing financial indicators while ignoring non-financial factors (Kalender & Vayvay, 2016). From the vantage point of view, businesses cannot achieve their benefits if their strategic resources, especially intellectual capital and knowledge assets, are not adequately measured and managed (Kaplan & Norton, 1996). With this stream, Figge et al. (2002) argued that the lack of integration between strategic aspects and the economic,

environmental, and social factors of a company's performance is a fundamental roadblock to sustainability. These arguments provide a solid foundation for evaluating the sustainability of a company's performance in light of its green-related strategic assets, e.g., green intellectual capital utilizing performance evaluation systems.

The current research aims to comprehend the dimensions of green intellectual capital in a comprehensive framework for achieving business sustainability through the mediating role of performance measurement systems. This study highlights the exclusive preceding literature on intellectual capital connected with green, business sustainability, and management accounting. This research delineates how green intellectual capital can be measured and managed through performance measurement systems for enhancing sustainable performance. The foremost reason is that research on external reporting or disclosure is abundant rather than how firms might use internal management systems, such as performance measurement systems, to execute sustainability goals. Besides, performance measurement systems consist of social and environmental factors with traditional aspects vitalizes a bridge between the conception of green intellectual capital and sustainable firm performance. This research will present a comprehensive guideline outlining a solid connection with external organizations to satisfy the stakeholders' desires. The study can be a solid foundation for top management to align the non-financial aspects with financial matters to achieve long-term performance.

## **LITERATURE REVIEW**

### **Sustainable Performance**

The performance of an organization includes the iterative actions of creating organization objectives, evaluating key performance indicators, and implementing changes to attain these aspirations in a manner that is more productive and effective (Sunarta & Astuti, 2023). In an era of globalization and competition, businesses cannot undervalue the significance of social and environmental considerations, which should rank on the scale with financial regard. Beginning with the premise that business activity directly affects economic, social, and environmental factors, it is crucial to consider sustainability. The fundamental justification for sustainable development activities is balancing their potential benefits and costs (Ratnasari et al., 2023). Although sustainability is the greatest priority in corporate organizations, it isn't easy to discern a benchmark for measuring sustainable performance (Goyal & Rahman, 2014; Hourneaux Jr et al., 2018) because it's a global challenge. The United Nations created the term "global challenges" for the accumulation of humanitarian affairs (UN-OCHA)-policy

development and studies branch (PDSB), which means that any significant direction, collapse, or improvement has the potential to cause global instability (OCHA, 2010). These include fast depletion of natural resources, climate changes, overconsumption of goods and resources, aggregation of toxic chemicals, and improper balance between the demands of resources within a confined planet (Moore & Rees, 2013). The amount of sustainable performance reporting has dramatically increased in the last decades due to international regulations/ standards, social accountability (the SA8000 standard), and the Dow Jones sustainability index (2008) worldwide. For example, The Dawei deep-sea port is a project in Myanmar to help it become more industrialized. At the same time, it will be the best industrial infrastructure in South Asia. Still, this area is terrible for the environment because of pollution (Dawei project at Asia News Monitor, 2012). Furthermore, (World Economic Forum, 2020) reported that economic, environmental, societal, geopolitical, and technological are the top five global risks in the current world. With this stream, sustainability concerns are gaining significance among organizations, stakeholders, industry, and the government. Sustainable performance is realistic and logical if a company wants to stay in business or thrive. The term "sustainability" has several definitions, ranging from a multigenerational philosophical view to a phrase with multiple dimensions and scales (Ali et al., 2019). The multifaceted focus encompasses themes connected to the "triple-bottom-line" paradigm of harmonizing corporate social responsibility, such as balancing sustainability's economic, environmental, and social components (Iranmanesh et al., 2019). Besides, a company's financial success is no longer the sole criterion for evaluation; instead, social and environmental factors—are collectively known as sustainable performance (San et al., 2018). The primary purpose of the sustainable performance is to ensure a company's success through monetary characteristics and environmental and ecological factors (Yong et al., 2020). A staggering 60% of the biosphere has been degraded due to various ecological calamities. If action is not taken, environmental concerns will worsen and spread. Going "green" has become increasingly widespread in companies concerning conventional business methods and the distribution of resources (Yadiati et al., 2019).

### **Green Intellectual Capital**

The growing environmental awareness and sustainability have evolved according to international norms. The significance of environmental awareness has grown. The "green" issue has become global (Chaudhry et al., 2016). In today's knowledge economies, where value is added to intellectual capital instead of physical assets and money, how firms deal with

environmental management issues while trying to be sustainable depends significantly on how they use their intellectual capital (Wasiluk, 2013). Indeed, management of ecological management expertise that can deliver higher added-value of green products and services contributes to the rise in the market value of the firms (Huang & Kung, 2011). Besides, the value of a firm's intangible assets is massive in increasing performance because corporate investments and resources drive company productivity and growth (Barney, 1991). The concept of sustainable business focuses on future performance as opposed to current success, and there is a desire to comprehend sustainability issues through knowledge (López-Gamero et al., 2011); hence the idea of green intellectual capital has emerged for boosting environmental consciousness (Chen, 2008). Green intellectual capital is the amalgamation of intangible assets like knowledge, skills, and relationships with a focus on environmental concerns at the organizational or individual level (Chang & Chen, 2012; Chen, 2008). Recently, Sabir et al. (2020) suggested that the term "green intellectual capital" refers to investments in intellectual capital that consider environmental protection and other goals, such as increasing a company's competitiveness. While Shah et al. (2021) also asserted that green intellectual capital consists of internal intangible qualities that can improve a company's operational efficiency to advance its goals. If environmental challenges are proactively identified, businesses will grow their operations based on stakeholders' interests and invest a substantial amount of their finances in green intellectual capital. The green performance of an organization depends on how to utilize green-related knowledge through different approaches (Yusliza et al., 2020) because knowledge exists in numerous forms within the organization, including business systems, personnel, external or internal linkages, business systems and procedures (Yong et al., 2019). Briefly, green intellectual capital emphasizes the firm's knowledge resources to solve environmental challenges as part of normal business operations.

### **Performance Measurement Systems**

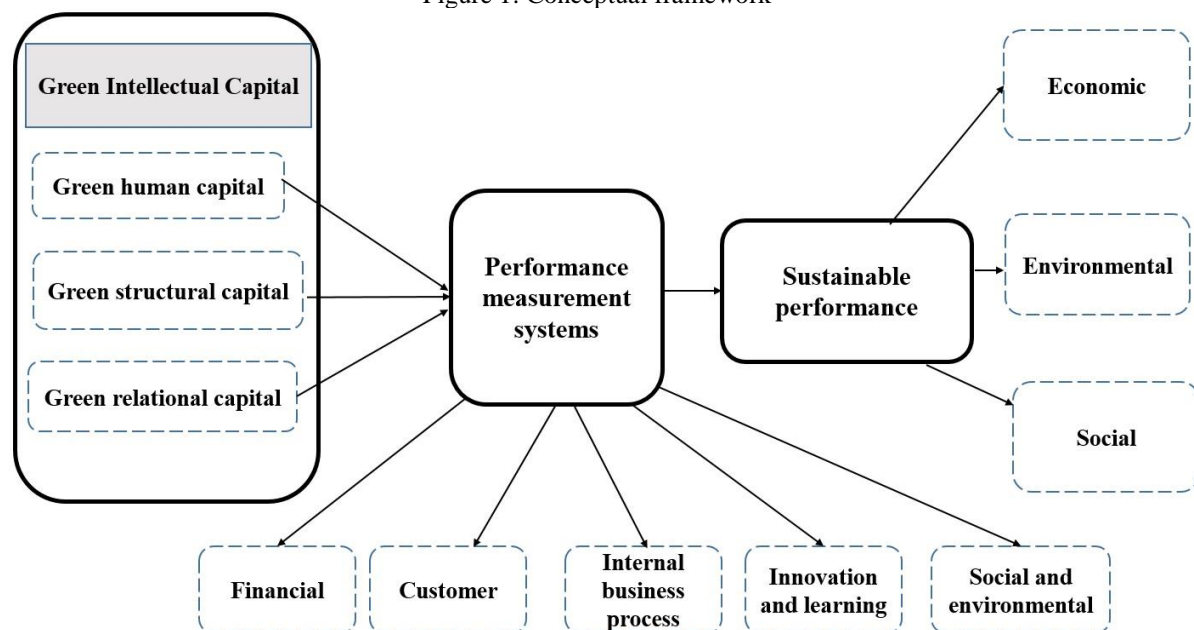
In performance management systems, the balanced Scorecard (BSC) is a strategy developed by Kaplan and Norton in the 1990s for integrating financial and non-financial factors. The BSC method entails identifying critical operational components, establishing goals, and determining measures to monitor their success (Leon-Soriano et al., 2010). The performance measurement system is significant because it determines the objectives and assists in the execution of planning, management, assessment, reward, and learning procedures (Galabova & Daskalova, 2020). A survey conducted by (Collins et al., 2011) concluded this

message that businesses need management accountants in strategy-setting positions to achieve the best sustainability outcomes. The research also demonstrated that more accountants were involved in sustainability strategies at CIMA members than at non-member companies. However, the number was still small (12%) compared to the roles of the managing director, environmental, human resources, and marketing managers. Businesses cannot achieve their benefits if their strategic resources, especially intellectual capital and knowledge assets, are not adequately measured and managed (Kaplan & Norton, 1996). With this stream, Figge et al. (2002) argued that the lack of integration between strategic aspects and the economic, environmental, and social factors of a company's performance is a fundamental roadblock to sustainability.

## CONCEPTUAL FRAMEWORK

Based on existing literature research, the conceptual framework has outlined the green intellectual capital for sustainable performance through performance measurement systems. Sustainable performance comprises three components, 1) Economic, 2) Environmental, and 3) Social; Green intellectual capital presents three dimensions 1) green human capital, 2) green structural capital 3) green relational capital; Performance measurement systems depict five components 1) financial 2) customer 3) internal business process 4) innovation and learning 5) social and environmental measures.

Figure 1: Conceptual framework



Source: Prepared by the authors

## Green Intellectual Capital

Green intellectual capital is the amalgamation of intangible assets like knowledge, skills, and relationships with a focus on environmental concerns at the organizational or individual level (Chang & Chen, 2012; Chen, 2008). The increased consumer knowledge of environmental issues has compelled organizations to devise better ways to comply with environmental trends. More specifically, green intellectual capital assists organizations in complying with stringent international environmental requirements, adds value to the organization, and satisfies the high ecological needs of customers (Huang & Kung, 2011). This research incorporated three components to illustrate green intellectual capital: green human capital, green structural capital, and green relational capital (Chen, 2008; Yusoff et al., 2019).

**1. Green human capital-** Human capital is a key resource determining an organization's viability in today's fast-paced business environment because its employees' expertise and knowledge contribute to its success. More succinctly, corporations can boost their "triple bottom line" performance by investing in their human capital (Eisenstat, 1996). Organizations cannot disregard environmental considerations (Yusoff et al., 2019). Hence, Green human capital is "the sum of employees' environmental protection or green innovation-related knowledge, skills, capacities, experience, mind-set, expertise, creativity, and values, etc." (Chen, 2008). Additionally, human capital is significant for achieving the goal of sustainability (Akhtar et al., 2015; Ullah et al., 2021). Hence, numerous emerging economies have adopted green human capital globally because of its great benefits. In recent years, most of the world's emerging economies have prioritized training their workforces in environmentally friendly practices (Geng et al., 2017).

**2. Green structural capital-** A company's "Green Innovation and Environmental Protection Capabilities" include its copyrights, patents, inventions, reputation, corporate culture, organizational policies, dedication, and strengths (Ullah et al., 2021). Besides, Wang et al. (2014) argued that green structural capital is a package of "institutionalized knowledge about the shape of business structure, systems, technological advances, regulations, and traditions." Together, it is beneficial for businesses in developing countries worldwide to emerge as sustainable businesses on the environmental element since the company can utilize this as a strategy for the long-term manufacture of products that will not harm the environment. Companies must ensure the implementation of green structural capital because it favors business sustainability in the industry (Yong et al., 2019).



**3. Green relational capital-** Green relational capital is how a company works with key environmental management and green innovation stakeholders to generate profits and stay ahead of the competition (Benevene et al., 2021). Nonetheless, most companies in emerging economies prioritize green relational capital, establishing long-term partnerships with suppliers to maintain organizational sustainability and working under environmental sustainability. Yu & Huo (2019) suggested that green relational capital significantly enhances the company's performance.

### **Sustainable Performance**

The growing consensus in society regarding the degradation of the environment, such as global warming, environmental damage, globalization, limited resources, and their increased efficiency and deterioration, encourages society to transform traditional economic growth into more sustainable social and environmental growth (Saba et al., 2023). The United Nations (2005) defines sustainable development as social development, economic growth, and environmental protection. The report describes these pillars as "interrelated and mutually supportive" (Faezipour & Ferreira, 2011). Nonetheless, these three aspects were the most often examined in the literature. Other components, for instance, Haanstra et al. (2017) asserted that sustainability relies partly on technological advancements. Specifically, three interrelated elements comprise sustainable development: environmental integrity, social equality, and economic prosperity. The performance in one area drives the other two. At the level of an organization, sustainability presents "meeting and satisfying the demands of its stakeholders without sacrificing its potential in the future (Hockerts, 1999). Although several scholars and organizations have offered their definitions of sustainability, the Brundtland Commission considers the most comprehensive and accurate presenting the "triple bottom line" (TBL) approach to economic, environmental, and social factors (Elkington, 1998). At the same time, the phrase "TBL" and "sustainability" are interchangeable (Alhaddi, 2015).

**1. Economic performance-** As the first dimension, economic performance indicates the capacity of a firm to generate benefits and improve its financial bottom line (Leaniz & Bosque, 2013). When discussing the TBL framework, the economic line addresses how the company's actions affect the economy (Elkington, 1998). Accordingly, Ali et al. (2019) identified economic, environmental, and social spheres are the cornerstones of sustainability. Therefore, improving economic, environmental, and social performance via practice is essential to achieving sustainable performance. Differently, Muchran

(2020) focused on economic metrics to emphasize sustainable financial performance. The study suggested that measuring performance builds employee confidence, encouraging them to take steps to achieve the organization's goals and objectives.

**2. Environmental performance-** With this argument, Savitz (2013) contended that the three facets of sustainability are intertwined, with alterations to one affecting the others. The study defined that sustainability generates advantages for its stakeholders, enhances the lives of those with whom it interacts, and safeguards the environment. Hence, the environmental line of TBL refers to actions that do not damage future generations' access to ecological resources. It relates to the efficient use of energy resources, the reduction of greenhouse gas emissions, and the reduction of the environmental footprint, among other things (Goyal & Rahman, 2014). Recent research by Malik et al. (2020) indicates that environmental performance decreases ecological harm and resource exploitation. In environmental sustainability, Yong et al. (2020) briefly defined the influence of business on the environment, while sustainable economic production and intergenerational equality need the conservation of natural resources.

**3. Social performance-** In the field of sustainability, environmental performance is exemplary, whereas social performance is supplementary. The social line of TBL refers to conducting economic and ethical business practices toward labor, human capital, and the community (Elkington, 1998). Besides, organizations that engage in community welfare-oriented projects, such as addressing social issues, partnering on cultural and social events, and committing to enhancing the welfare of communities, would gain a competitive edge (Leaniz & Bosque, 2013). More recently, Yusoff et al. (2019) stated that social performance focuses on the interest of employees, customers, and stakeholders. Notably, Yong et al. (2020) highlighted that social sustainability encompasses the ethical aspect of business, promoting justice in allocation and opportunity and relating to health and education issues, income disparity, and poverty. In a nutshell, the TBL, or three-pillar approach, is a view of sustainability that scholars, society, and organizations have widely accepted and played an inevitable performance in measuring the current pace of the organization.

## Performance Measurement Systems

One of the most critical aspects of any modern business plan includes sustainability and related environmental challenges. Hence, businesses and organizations worldwide strive for

sustainability in their strategic planning, from manufacturing to the non-profit service sectors. The originality of using BSC to evaluate a company is to do it from four different viewpoints: financial, customer, internal, and learning (Kalender & Vayvay, 2016; Kaplan & Norton, 1996).

**1. Financial perspective-** Financial perception assesses revenue growth, enterprise value, and cost savings using financial data and business performance.

**2. Customer perspective-** The customer perspective comprises metrics about the most desired service users. This viewpoint emphasizes sales volume, customer satisfaction, service quality, and development.

**3. Internal business process-**Thirdly, the perspective of internal business processes typically reveals more efficient methods by which the corporation can accomplish its goals. Both short- and long-range goals and the incorporation of novel process development can be used to encourage progress.

**4. Learning and growth approach-** This method includes the expertise and training of employees and the management of routine procedures. In other words, this approach focuses on an organization's internal abilities and strengths to match them with its strategic objectives.

**5. Social and environmental measures-** Since the conventional BSC method disregards environmental and social considerations, performance assessment methods like BSC can aid in taking all elements appropriately (Figge et al., 2002). The Sustainable BSC shows potential as a framework for measuring and reporting the success of businesses' efforts to be more sustainable (Schaltegger & Wagner, 2006). This fifth perspective method may enhance transparency. Social and environmental performance measures are a part of the sustainability strategy, emphasizing the importance of being socially, ecologically, and economically responsible in business (Adams et al., 2014; Kalender & Vayvay, 2016). On the contrary, Figge et al. (2002) stated that the market prices of goods and services may not effectively represent environmental and social concerns. Moreover, isolating sustainability measures from a single perspective may hinder environmental initiatives due to the absence of clear connections to the other views because management objectives should be measurable, observable, and comprehensive (Butler et al., 2011). Similarly, Wagner (2007) stated that several monetary benefits would spring up when businesses integrate environmental considerations into their management processes. With a sustainable BSC strategy, intangible assets can contribute to a business's long-term viability. Researchers and practitioners have attempted to comprehend how these

intangible characteristics might assist sustainability solutions. Sustainable performance measurement systems have great potential to address a pressing issue in modern business life: how to integrate environmental and social considerations into company management at the highest levels (Kalender & Vayvay, 2016). Besides, incorporating sustainability into organizational control and performance measurement systems can result in favorable firm outcomes (Asiaei et al., 2022; Lisi, 2015).

### **Relationship Between Green Intellectual Capital, Performance Measurement Systems, and Sustainable Performance**

A substantial amount of literature seeks to explain the structural issues of green intellectual capital from various angles. For instance, green intellectual capital concerning competitive advantage (Ahmad Yahya et al., 2019; Chen, 2008; Susandya et al., 2019), green human resource management (Yong et al., 2020), financial performance (Chaudhry et al., 2016), environmental performance (Shah et al., 2021) economic performance and green performance (Wang & Juo, 2021) have critically scrutinized by the preceding researchers. Although significant studies endeavor multiple consequences on the subject matter, the association between green intellectual capital and organizational sustainability has elicited inconsistent findings and criticism (Malik et al., 2020; Omar et al., 2017; Ullah et al., 2021; Yadiati et al., 2019; Yusliza et al., 2020; Yusoff et al., 2019). More pertinently, under these circumstances, there is less evidence released about the organizational procedures that businesses may utilize to maximize the efficiency of their environmental assets. In this panorama, the significant role of performance measurement systems is indispensable to measuring green intellectual capital to enhance organizational sustainability (Asiaei et al., 2022). However, traditional performance measurement techniques have the prevalent flaw of prioritizing financial indicators while ignoring non-financial factors (Kalender & Vayvay, 2016). In this context, this study has looked at performance assessment methods from a social and environmental perspective, in addition to the four standard dimensions, thereby elucidating the visions and techniques for sustainability (Rabbani et al., 2014). In particular, considering societal and ecological factors may yield an overarching familiarity with performance measurement frameworks with many assessment options (Adams et al., 2014). These inclinations accentuate the significance of shaping a conceptual framework regarding green intellectual capital to aid academics and practitioners in comprehending and performing sustainable firm performance through performance measurement systems.

Previous scholars have observed green intellectual capital's persistent contribution to sustainable firm performance in the last decades (Yong et al., 2020). Although the agenda of sustainable business performance distinctively is to keep equilibrium in corporate growth, the definition is ambiguous (Bansal & DesJardine, 2014). Therefore, intangible assets, specifically knowledge-based resources, are critical strategic capital for sustaining long-term organizational performance in a knowledge-based economy (Yusoff et al., 2019). Thus, the question can arise: "how to measure the intellectual capital embedded with green for managing sustainable performance?"

However, a persistent competitive advantage requires more than just strategic choice. Organizations necessitate comprehensive performance measurement systems to compare outcomes to performance targets and draw on enhancements to convert green knowledge resources into practical value more efficiently (Asiaei et al., 2022). Traditionally, Gond et al. (2012) focused on the increased incorporation of sustainability concerns into the strategy resulting from implementing management control systems. In the same vein, Wijethilake (2017) also highlighted that the strategic application of performance management as a response to institutional restrictions to ensure sustainability has significant consequences for the progression and transformation of organizations. Specifically, (Pryshlakivsky & Searcy, 2017), for illustration, offered a heuristic model for contingency approaches to constructing, merging, or extending environmental management systems in the sphere of sustainability. The notion of contingency implies that accounting should be flexibly built and associated with specific predefined situations to account for the environment and organizational structure (Otley, 2016; Otley, 1980). However, Kaplan & Norton (1996) suggested that it is possible to make a significant prediction regarding the performance of a corporation through the appropriate management and monitoring of the underlying essential success determinants, e.g., green intellectual capital. Following this traditional footprint, Drazin & de Ven (1985) provided the importance of knowledge accumulation at organizational levels for creating other fit patterns in analyzing contingency theory. In this same vein, Venkatraman (1989) focused on the "fit as mediation" approach specifying the presence of an effective mediating mechanism (e.g., organizational structure) between an antecedent variable (e.g., strategy) and the subsequent variable (e.g., performance). The rationale behind the assumption is that knowledge is not worthwhile until it is measured and managed effectively (Kaplan & Norton, 1996; Widener, 2006). As strategic resources, green intellectual capital is a critical knowledge-based asset for enhancing sustainable business performance through the intervening instrument of performance

measurement systems. These existing studies and theoretical groundwork stipulate the following propositions:

- **Proposition 1: Performance measurement systems mediate the connections between green intellectual capital and sustainable performance**

## DISCUSSION

For achieving sustained competitive advantage, alignment between proactive sustainability strategy, e.g., green intellectual capital, and operations of other internal functional divisions, such as performance measurement systems, is indispensable. Hence, the internal alignment will aid senior management in addressing external sustainability challenges systematically. Theoretically, specific organizational strategies and tactics, such as green-related intellectual capital, can influence the structure and affirmation of particular corporate systems, such as performance assessment systems, and also facilitates the achievement of firms' objectives (Asiaei & Jusoh, 2017; Drazin & de Ven, 1985; Venkatraman, 1989). This conceptual study might have a few theoretical and practical repercussions in the future. This study is articulated on the literature review findings and predicted implications that make significant and unique contributions to knowledge management, management accounting, and sustainability. Since sustainability concerns have garnered attention, matching strategic decisions with organizational structure is necessary to execute the long-term performance.

The managerial ramifications of this study for decision-makers and financiers are wide-ranging. This paper presents a conceptual framework to improve the returns on green intellectual capital and the utilization of green human capital, green relational capital, and green structural capital. To fulfill the business sustainability goals, companies should emphasize green human capital practices and provide green training to employees to raise their awareness about green human capital issues and structures. In addition to highlighting the role of green relational capital and green structural capital on business sustainability, the study proposes the importance of developing a relationship of relational capital with suppliers to achieve sustainability goals. This paper also takes a closer look into sustainability-based performance measurement systems by examining how to incorporate the fifth dimension of social and environmental indicators for a company's operations. Pertinently, it gives insights that social and environmental measures of performance measurement systems play a crucial role in combining the strategic resources for sustainability by adapting to the strategic changes of the organization. The three components of sustainable firm performance into a single strategic

management tool, performance measurement systems, e.g., BSC, assists organizations in overcoming the drawbacks of traditional approaches to environmental and social management systems. Although performance measurement systems are a promising approach to including environmental and social aspects into the firm's primary management systems, the relationship between performance measurement systems and organizational sustainability remains insufficiently articulated (Danish et al., 2021; Egbunike et al., 2014; Widener, 2006). In addition to shedding new light on the topic, this approach also presents a guiding framework that emphasizes performance measurement systems in sustainability.

In addition to that, the study provides valuable managerial implications for boosting environmental consciousness. Therefore, an integrated strategy is imperative since generating transparency targets external and corporate internal stakeholders and is related to those responsible for managing and accumulating sustainability performance. This framework can assist senior management and managers in integrating these three unique concepts and determining how to extract the full potential benefits of green intangible resources for sustaining an organization's long-term performance (Omar et al., 2017). The rationale is that the internal alignment will assist top management in systematically addressing any significant external issues regarding sustainability. When the internal actors of a company strive to gain performance, they need management tools that align with the organization.

Moreover, collaboration is an attractive asset because it encourages companies to pursue opportunities jointly, which is impossible to do alone. All parties involved in a collective approach can reap substantial rewards in return. Robust network connections are essential for strengthening and expediting sustainability. Hence, the proposed model can also show how professionals and businesses decide which metrics to use to learn more about an enterprise's fundamental strategic initiatives and success determinants (Kaplan & Norton, 1996) to achieve sustainable firm performance.

## CONCLUSION

This conceptual study comprehensively portrays how performance measurement systems are utilized as a cornerstone of management accounting systems to translate green intellectual capital into sustainable firm performance by promoting environmental, social, and economic sustainability. Besides, the current study's anticipated findings have several drawbacks due to the nature of the research approach. First, the phrase "sustainability" is a nebulous notion for which there is no clarity regarding the specific qualities and limits of assessing green strategy,

sustainable-based performance measurement systems, and sustainable firm performance. Secondly, this study is a conceptual paper that primarily relies on postulations about the existing research and doesn't offer any real-world evidence to back up the conclusions. There is a great deal of potential space for improvement in our understanding of how green intellectual capital is dealt with in an organizational setting and what connections exist between performance measurement systems and sustainable firm performance to extract the highest benefits in the firm. However, the research setting of the current study is a cross-sectional study; thus, the future study can investigate a more profound analysis using the case study method. Future research might test the model in more financial or non-financial sectors and conduct cross-national comparisons to increase the generalizability of the results. Besides, Future studies can identify other knowledge-based factors by combining more theories for examining sustainable firm performance. Further studies can include novel items such as mediator environmental management systems, environmental accounting, or strategies connecting with sustainability affairs.

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