



Identifying the Internal and External Pressures of Quantifying the Impacts of Sustainability-Oriented Innovation

Abdelaziz Al Owais^{1,2*}

¹PhD Candidate, The British University in Dubai, Dubai, United Arab Emirates, ²Senior Economist, Department of Statistics and Community Development, Sharjah, United Arab Emirates. *Email: abdelaziz.alowais@icloud.com

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ABSTRACT

The sustainability-oriented innovation (SOI) has emerged as a critical approach for an organisation that addresses environmental, social, and economic challenges. The proposed study aims to identify key internal and external pressures by uncovering the main factors within and outside the organisation influencing the quantification of SOI impacts. In the given study's research design adopts a primary qualitative approach to explore internal and external pressures affecting the quantification of sustainability-oriented innovation (SOI) that impacts the economic context. Qualitative research was chosen for its ability to provide an in-depth insight into a complex phenomenon that captures the nuances of the participant's experience, attitudes and perception. The findings show that a leadership team's commitment to sustainability and the proactive mindset of our employees fosters an environment where innovation thrives. The conclusion is that the implementation of internal policies and incentives encouraged sustainable practices and continuous improvement. SOI has been influenced by concepts like a crucial economy that promotes a continuation use of resources through its recycling and remanufacturing and to share economy, emphasizing access to over ownership.

Keywords: Sustainability-Oriented Innovation, Organizational Culture, Resource Based Theory, Social Responsibility, Competitive Pressure.

JEL Classifications: Q5, O3, M14, M15, D22

1. INTRODUCTION

In recent years, sustainability-oriented innovation (SOI) has emerged as a critical approach for an organization that addresses environmental, social, and economic challenges. A concept of SOI extended beyond its traditional innovation by the purpose of integrating a sustainability consideration into its abilities to quantify the impact of these innovations on its economic context becomes an essential practice (Taneja et al., 2023). This provides an ability to quantify the effects of these innovations in the financial context becomes necessary. This ability would be helpful to demonstrate the value of SOI but this is guiding the strategic decision-making to secure stakeholders support. A sustainability orientation and innovation refers to developing new products, products, services, or processes that significantly reduce an environmental impact, enhance social well-being, and

contribute to economic growth (Jarmai, 2022). A given study involves rethinking business models and providing leverage to technological advancements with the purpose of achieving sustainability goals.

The main aim of the SOI was driven by its longer need by purpose to mitigate adversity of the industrial activities globally to ensure a longer-term variability by quantifying the impact of an SOI for a few reasons. This is to allow an organisation by purpose to measure its sustainability as its initiative. Quantifying help is directly related to its sustainability by innovation. The quantification helps compare sustainable innovation performance with conventional alternatives (Edwards and Lawrence, 2021). In addition, this enables companies to communicate the value of their sustainability efforts to their stakeholders, including investors, customers, and regulatory bodies. By purpose to demonstrate the

economic viability of SOI, the organisation can foster a greater acceptance and support for its sustainable practices. Quantifying the impact of SOI is crucial for a few reasons. This also allows an organisation to measure its sustainability initiatives to return on investment, providing a clear picture of its economic benefits (Osuji, 2023). This also quantifies a helpful aspect to compare a sustainable innovation performance with a presenting alternative.

In addition, this also to companies by communicating the value of their sustainability efforts to their stakeholders, including the investors, customers, and regulatory bodies (Chygryn et al., 2020). This also demonstrates an economic variability of an organization's SOI that fosters greater acceptance and support for its sustainable practices. Unlike a traditional innovation, one of the basic challenges in SOI is accurately identifying and measuring its impacts. SOI benefits often span environmental, social, and economic dimensions to make quantification complete (Surkau and Suphellen, 2022). A lacking of standards for metrics and methodologies has further complications to process and long term, and sometimes this is intangible in nature of sustainability to poses difficulties and its reporting (Tsagas and Villiers, 2020).

Understanding the internal and external pressure influences the quantification of an SOI that impacts its internal pressure such as an organizational culture, commitment to leadership commitment, and its resources to availability that plays a significant role in shaping an approach to SOI and its measurements. In the context of an external pressure includes an expectation, industry standards and its technological advancement that directly affects how it quantifies a report to sustainability impacts (Bhatia and Kumar, 2022). There is a comprehensive understanding of these can help develop an effective strategy for SOI measurement to integrate into its business practices (Rocha et al., 2022). The study aims to identify key internal and external pressures by uncovering the main factors within and outside the organisation influencing the quantification of SOI impacts. The aim is to create a structural approach incorporating internal and external pressure to facilitate accurate and comprehensive measures of SOI impacts. The research questions of the study involve what are the primary internal pressures affecting SOI quantification and what are the primary external pressures affecting SOI quantification? And how can these pressures be integrated into a cohesive framework? Finally, proposing models for enhancing policies to change the current Mindset revolving SOIs through well-known universal models adapted for the purpose of this research. Thus, bridging the gap between theory and practice.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Historical Development and Current Trends

The historical development of SOI has been rooted in a broader environmental movement of the late 20th century. So, the initial focus was on pollution control and end-of-pipe solutions. Over time, an approach evolved towards pollution prevention, eco-friendly, and cleaner production methods. An adoption of Brundtland Commission's definition of sustainable development

in the year 1987 marked a significant shift towards integrating environmental and social consideration into its economic activities. In recent years, the SOI has been influenced by concepts like a crucial economy that promotes a continuation use of resources through its recycling and remanufacturing and to share economy that emphasizes access to over-ownership (Henry et al., 2021). Current trends in SOI include using digital technologies by enhancing a sustainability outcome to incorporate sustainability into a corporate strategy, and this increases the importance of social innovation by addressing pressure-pressing societal challenges (Le, 2022).

A sustainability-oriented innovation (SOI) was defined as creating new and improved products, services, or processes simultaneously delivering economic, environmental and social benefits. A conceptual framework for SOI often emphasizes sustainability integration into a core business strategy and innovation process (Harsanto et al., 2022). These frameworks for SOI often emphasized the integration of sustainability into a core business approach that was considered an entire lifecycle of innovation, from designs and development to implementation and disposal.

2.2. Quantification of Impacts

2.2.1. Importance of measuring economic, environmental, and social impacts

Measuring the effects of SOI is important for a couple of reasons and, from an economic perspective, it assists organizations to achieve a rate of return of 'sustainability effort', which aids in decision making in strategic management and resource allocation (Mead et al., 2022). From an environmental perspective it enables companied to quantify a decrease in greenhouse gases, resource usage, and waste products and this offers backup for ecological stewardship and consumption and waste generation offering data stewardship to meeting the regulatory requirements. This makes it possible to assess the Value of benefits which may contain, community heath, employment, and justice. The quantification also facilitated the enhancing of visibility and responsibility as sustainability programs could be justified and explained to customers, different authorities, and investors (Wong et al., 2021). In conclusion, it is possible to quantify various effects of SOI which may be useful for defining the feasibility of its application and the extent of its contribution to the disbursal of change across the organizational sphere that supports sustainable processes.

2.2.2. Methods and approaches for quantification

Sundry techniques and strategies are used in an endeavor to measure the effect of SOI and this lifecycle assessment to an extensive procedure that assesses the environmental repercussions of the products and this procession right from the extraction of raw materials to the disposal channel. An SROI examines overall value creation to green policies based on health impact and other social offerings, possibilities for community enhancement and economic uplift (Kim and Ji, 2020). Other approaches to sustainable development include a cheap benefit analysis (CBA) which estimates the cost of its sustainability products; and a reporting format, similar to a global reporting initiative (GRI), for a sustainable board. This outlines a framework for the ending of sustainability performance and using a variety of tools, these

organizations employ methods to access, measure and report the effects of their SOI efforts to facilitate decision making and improve communication with stakeholders (Wråli and Munkeby, 2022).

2.3. Internal Pressures

2.3.1. Internal commitment for quantification

Organizational cultural values and beliefs taking precedence over SOI are critical in the provisions of the framework putting a premium on the culture that supports sustainability. That includes values such as environmental conservation, social responsibility and creation (Makokha, 2021). Firms with a high sustainability culture also spent more cash on IT sustainability, supported sustainability initiatives and promoted sustainability among their human resource. On the other hand, a culture that does not allow for adjustment of priorities from short-term business-oriented gains at the expense of long-term impact thwarts effective provision of implication and measurement of SOI (Tavanti, 2023).

Cultural commitment at the leadership and management level is key to supporting SOI and indeed leaders enthused on sustainability can champion change within an organization to deliver on sustainability goals. This includes having clear goals that offer essential resources and having incorporation of sustainability in the general corporate management plan (Liakh and Spigarelli, 2020). This commitment is also significant for leadership in shaping a sophisticated system for evaluating the outcomes of SOI. As of fact, if the top management does not back a sustainability initiative over a company this lacks direction, resources, and responsibility to hinder its accomplishment and the assessment of effects.

2.3.2. Resource availability (financial, human, technological)

A major source pressure in the initiatives is the availability of resources; financial, economic, human, and technological. Access to proper finances feed into sustainable Energy technologies as they require capital. It also performs a competent assessment and deploys SOI projects (Rocha et al., 2022). Professionals with specialisation in innovation and sustainability were required in enhancing SOI attempts at establishing the right measurement tools. The availability of highly developed technology such as data analysis and sustainability assessment tools can more adequately and comprehensively contribute to the measurement of SOI and its effects (Rennings et al., 2024). The lack of resource could have seen organisations facing a lot of difficulty when it came to assessing the effectiveness of sustainable initiatives by their organisations.

Furthermore, optimum internal operations and mechanisms facilitate the measurement and integration of SOI, which consists of data acquisition, reporting techniques, evaluation, and a tracking mechanism for sustaining SOI's performance in sustainability. It helps to establish an influence on measurement, to integrate SOI into the business processes, which is feasible and effective. This structure also foster cross functionality with collaboration with increased and communicated provision to SOI processes and its effectiveness.

Availability of resources, including financial, economic, human, and technological, is a key initiative pressure affecting the quantification of SOI impacts. Adequate financial resources are essential for investing in sustainable technologies. This conducts an impactful assessment and implements SOI projects (Rocha et al., 2022). Skilled personnel with expertise in innovation and sustainability were mandatory in driving SOI efforts to develop an effective measurement framework. The accessibility of advanced technologies like data analytics and sustainability assessment tools directly enables to more accurate and comprehensive quantification of SOI and its impacts (Rennings et al., 2024). Without sufficient resources, organizations would have struggled to measure and implement their sustainable initiatives' impact.

2.4. External Pressures

2.4.1. Stakeholder expectations (customers, investors, NGOs)

The stakeholder's expectations are a significant pressure influencing SOI, and customers are raising demands for sustainable products and services, prompting companies to demonstrate their sustainability performance (Rodríguez-Espíndola et al., 2022). Investors seek transparency and accountability in sustainability practices that influence an organisation by measuring and reporting to impacts of its initiatives. The NGOs and several advocacy groups also pressured companies by adopting and quantifying sustainable practices, driving a need for comprehensiveness that impacts measurement. Meeting the stakeholder's expectations becomes crucial for maintaining trust, reputation, and competitive advantages in the market (Islam et al., 2021).

2.4.2. Technological advancements and industry standards

These lead to external pressure directly impacting quantification of SOI impacts in a technological and industry standard. A new approach to information processing, IT, and sustainability evaluation tools are opening new potential for greater precision and effectiveness in measuring the impacts of SOI (Krasodomska et al., 2021). When there are industrial standards and guidelines available then regulatory bodies and professional associations have standards for credibility, sustainability and reporting. These standards make sure that an organisation is sustainable and very productive (Loza Adauí, 2020). Thus, compliance with these standards allows an organisation to maintain a relevant presence in the market, as well as technological progress necessary to enhance a methodological procedure and tools for increasing the effectiveness of impact indicators.

2.5. Theoretical Framework

2.5.1. Resource-based view theory

A resource-based theory provides a strategic framework suggested as an organization's competitiveness to advantage primarily derived through its uniqueness to an internal resource and capabilities. This perspective contrasts with external focusing strategies, emphasizing a sustainable competitive advantage achieved by an effective internal strength that the competitors cannot replace or replicate easily (Nayak et al., 2023). These resources and technologies are tangible, like financial capital and a physical asset, or intangible, like technological expertise, the brand's reputation, and organizational culture. So, the RBV is the ideal resource that should possess several characteristics

that provide These factors summarized by its VRIO framework including Valuable, Rare, Inimitable, and Organized (Karedza and Govender, 2020). In sustainability-oriented innovation (SOI), the RBV theory provides internal leverage to drive sustainable innovation. Technological expertise, for instance, allows companies to develop advanced sustainable products and different processes that reduce environmental impact to meet evolving regulatory standards (Sahoo et al., 2023). Financial capital is crucial for investing in research and development, acquiring sustainable technology, and scaling to sustainable innovation.

2.5.2. Triple bottom-line theory

The tripe bottom theory was proposed by John Elkington in 1904, and this provides a sustainable framework that was expanded to a traditional reporting framework to include social and environmental financial performance. The TBL approach posited that a business should commit to measuring its impacts on people and its profits (Jääskeläinen, 2024). Comprehensiveness and evaluation aim to ensure companies that operate sustainability, sustainability balancing economic growth with environmental stewardship and social responsibility. In an economic dimension, TBL is very familiar and pertains to traditional financial metrics like revenue, return to profit, return on investment, and market share (Edelman, 2023). Under a TBL framework, economic performance encompasses a market share that encourages companies to go beyond their short-term financial gain, and this is to consider the long-term impact of its operation in the environmental dimensions of TBL (Farooq et al., 2021).

In other words, concern with ecology entails organizational processes. This comprises managing and minimizing the carbon dioxide emission and making the most out of waste and pollution. There are positive encouragements for businesses to minimize or isogenic ill-effects on the environment and maximize benefic effects. The social dimension of TBL focuses on the impact of organizational activities towards those in an organization and those in the community in general (Tseng et al., 2020). This is including a protecting fair labor practice, interacting with the community, promoting the well-being for employees as well as contribution to social equity (Tseng et al., 2020). Business entities were supposed to look at another aspect, that of the social impact of the business and of the decisions it takes. This may entail paying employees daily wages for safety at workplaces, defending diversity, gaining the confidence of companies to build, improving an image and making business environments better endowed both for men and women (Gómez-Prado et al., 2022).

3. METHODOLOGY

3.1. Research Design

The present investigation incorporates a main essential qualitative study design by examining the internal and external pressures that influence the quantification of sustainability-oriented innovation (SOI) that affects the economic environment. The reason why qualitative research was selected is because it allows to get an

understanding of a given phenomenon in its complexity, while embracing variations of the participant's focus, opinion and perception. This approach is graduated and tuned for the comprehension of the polysensorial character of SOI and the multiple pressures that organize to confront in evaluating its effects. Specifically, the study proposes to generate a holistic framework through qualitative data collection from professionals in/out of SOI and organizations that are currently involved in SOI.

3.2. Data Collection

Data collection was primarily involved by gathering primary data through interviews with an industry expert (surveys of businesses). Semi-structured interviews were conducted with experts in the sustainability and innovation field that includes academics, consultants, and a senior executive from a leading company. An interview provided a detailed insight into internal and external pressure that influences SOI by challenging quantification best practices for addressing the challenges. A semi-structured format allows flexibility, enabling interviewees to elaborate on their experiences and perspectives to ensure they covered key topics refer to Appendix 1. Interview surveys were distributed to a diversified range of businesses involved in SOI across different industries. A survey included both open-ended and closed-ended questions for capturing quantitative data on the prevalence of types of pressure an organisation faces and qualitative data on their experience and strategies for quantifying SOI impacts. This combination of interviews and surveys provided a comprehensive understanding of the subject matter, balancing depth and breadth. The selected participants were 10 in number to answer the interview questions, and all the respondents were industry experts and the specified age of the respondents in between 20 years and 40 years.

3.3. Data Analysis

A thematic analysis was employed to analyze qualitative data collected from interviews and surveys, and this method involves identifying, analyzing, and reporting patterns (themes) within data (Terry and Hayfield, 2020). This process of thematic analysis was carried out in a few steps. The data was analyzed by immersing oneself in the data to read and re-read a transcript of interviews and survey responses. Afterward, the coding was generated manually to identify important aspects of data regarding placing a wider range of patterns and insights. Moreover, a theme is the broader category captured to its coherent meaning pattern in data related to research questions. Each theme was clearly defined and named by providing a concise description of what the theme encompasses, and this step directly involves and considers a nuance each time. A theme was compiled in coherent and narrative to address research questions involving selected vivid and compelling data that was extracted to illustrate each theme by providing a piece of evidence for analysis. Thematic analysis enabled us to identify key internal and external pressures that influence a quantification of SOI impacts that develop a framework for addressing these pressures. A qualitative approach ensures a comprehensive understanding of the complexities involved and provides an actionable insight into business and its policymaking.

4. FINDINGS

4.1. Thematic Analysis

1. What are the key internal and external factors that drive your organisation to adopt sustainability-oriented innovations?

“Yes, of course, several internal and external factors help drive an organisation to adopt sustainability-oriented innovation” (p1, p4, p7, p8).

Most respondents depicted that internal factors drove our organisation to adopt sustainability-oriented innovation, including the company’s core values and mission, emphasizing environmental stewardship and social responsibility. In addition, a leadership team’s commitment to sustainability and the proactive mindset of our employees fosters an environment where innovation thrives by implementing internal policies and incentives that encourage sustainable practices and continuous improvement. Most respondents depicted the experience that regulatory requirements and compliance with environment standards play a significant role in driving sustainability initiatives. Market demand and customer expectations for environmentally friendly products and services influence strategy. Moreover, competitiveness under pressure and the need to differentiate ourselves in the market pushes us to innovate sustainability. Finally, the NGOs and collaboration with industry peers provided external motivation and support for sustainability efforts.

2. Describe the economic impacts you have observed from implementing sustainability-oriented innovations in your organisation.

“Yes, the economic impact of implementing sustainability-oriented innovation in an organisation becomes multi-faceted” (p2, p3, p5, p9).

The economic impact of implementing sustainability-oriented innovation in our organisation has been multi-faceted. Initially, the participant observed a significant reduction in its operational cost because of energy efficiency and waste reduction. An example is our investment in renewable energy sources and energy-saving technologies, leading to sustainable savings in our utility bills. Furthermore, a sustainable practice has enhanced brand reputation, increased customer loyalty and attracting new clientele with a prioritized environmental responsibility. In addition, sustainability-oriented innovation has opened a new revenue stream. For instance, our development of eco-friendly products has allowed us to enter the new market for catering and provide growth to the segmentation of environmentally conscious customers. There are also various government incentives and subsidies to promote a sustainable practice. Overall, an initial investment in sustainability was considerable for the long-term economic benefits that have contributed substantially to the bottom line.

3. How do you measure the success and effectiveness of sustainability-oriented innovations within your organisation?

“A success and effectiveness of sustainability-oriented innovation involves a combination of quantitative and qualitative metrics” (p4, p5, p7, and p10).

Most respondents depict that success and effectiveness in sustainability-oriented innovation involved a combination of qualitative and quantitative metrics because of tracking the key performance indicators (KPIs) such as reducing energy consumption, greenhouse gas emission, and waste generation. In addition, for the effectiveness in measurement, they monitor a cost saving results from increasing efficiency and resources to the organisation. Customer feedback and responses to the market and our sustainable products are important indicators of success. They conducted a regular sustainability audit and assessment to evaluate progress and identify areas for improvement. An involvement rate program measured employee engagement and participation in sustainability initiatives. Furthermore, achieving certification and recognition from a reputable environmental organization validated our efforts to provide an external benchmark. There a comprehensiveness measures that are helpful to ensure sustainability innovation that is effective and aligned with an overall business.

4. What challenges and barriers have you encountered in quantifying the impacts of sustainability-oriented innovations, and how have you addressed them?

“Yes, there are some challenges we faced like lack of standardized metrics, long term nature of sustainability impacts is prominent” (p5, p7, p8, p9, and p10).

The quantifying impact of sustainability-oriented innovation poses several challenges, and one of the main barriers is lacking standardized metrics for measuring sustainability and its outcomes. That variability makes it difficult to compare results to different projects and industries. By addressing these challenges, these adopted a recognition in standards and frameworks like Global Reporting Initiatives and a carbon disclosure project by guiding measurement practices. Another challenge is the long-term nature of sustainability impacts that can take years for full materialization, and this temporal gap complicates an assessment for immediate benefits and ROI. However, the respondents tackled setting short- and long-term goals that allow progress and incrementally adjusting our strategies as needed. In addition, the collection and analysis of accurate data can be resourced-intensive. By overcoming this, they have been invested in an advanced data management system that trains our staff for the data collection and analysis of techniques. Securing stakeholders’ buy-in, including employees, investors, and customers, can be difficult. Clear communication of the benefits of transparent reporting has been a key strategy in garnering support to demonstrate the value of sustainability initiatives.

4.2. Thematic Coding Table 1

The findings revealed that the internal factors are driven by motivation, core values and employee mindset which are interpersonal besides other factors such as internal policies. This shows that the intrinsic factors weigh more than the policies set by the company to govern their intuition. Furthermore, external factors that drive employees towards SOI could be either from the market demand or competitive pressures. It seems that organizations don’t want to be left out in the race for sustainability. Although partnership with NGOs seem to present SOI more of an obligation than a strategic tool which could be a front of green washing if publicized.

Table 1: The theme, descriptions and codes

Theme	Description	Example from Responses (Codes)
Internal Factors	• Motivation within an organisation to drive sustainability efforts	• Core values • Leadership • Employee Mindset • Internal policies
External Factors	• External Pressure and Influence on Driving Sustainability Efforts	• Regulatory requirement • Market Demand • Competitive Pressure • Partnership with NGOs
Economic Impacts	• Financial benefits and cost association with sustainability innovation	• Cost reduction • Brand reputation • New revenue • Government incentives
Measurement of success	• Methods and metrics by the use of access and effectiveness of sustainability initiatives	• KPIs • Sustainability • Employee engagement • Certifications
Challenges in Quantification	• Difficulty in measuring sustainability impacts and strategies to overcome them	• Lacking standardized metrics • The long-term nature of impacts • Data collection • Stakeholders buy-in
Regulatory Compliance	• Adhere to laws and regulations as drivers for sustainability	• Environmental standards • Compliance requirement
Customer Expectations	• Influence of customer demands for sustainable products and services	• Market response • Customer loyalty
Competitive advantage	• Differentiation and market positioning	• Competitive pressure • Market difference
Partnership and Collaboration	• Role of external partnership and its collaboration in supporting sustainability efforts	• NGOs • Industry peers
Operational Efficiency	• Improvement in efficiency and resources to optimize resulting from sustainability initiative	• Energy efficiency • Waste reduction • Resource Optimization

Financial returns and governmental incentives are drivers of SOI as it is perceived within the organization that SOI cuts cost and improves the brand image at the same time. The economic impacts are crucial in this linear economy. It is only natural to prioritize the economic impacts as it is logical to draw that a company can't survive if the financial streams are reducing thus, if implementing SOI can improve the financial situation it will be adopted. Moreover, managers can measure the success of SOIs through KPIs although they are not clear or standardized. The sustainability metrics needs to be updated as per company's goals and will differ from place to place and in our study from a manager to another. Thus, for now managers can measure the KPIs through employee engagement. It is fair to mention that due to lack of standardized metrics, it is difficult to measure the impacts on the long run. It is suggested that longitudinal studies can measure the impacts in the long run and get conclusive results rather than cross-sectional studies which are at one point in time.

The environmental standards are to some extent hard to follow as the national standards are not clear yet thus following the current environmental laws for now seems sufficient. It is perceived that if companies follow the regulatory standards, customer demands will increase and can positively impact customer loyalty. Consequently, building competitive advantage from the loyal customer base. Finally, partnering with NGOs can be vital but it should be driven by a strategic adaptation of SOI instead of a public image criterion. It is recorded that Sustainable initiatives can and will lead to energy efficiency, waste reduction, and resource optimization.

5. FINDINGS INTERPRETATIONS AND POLICY IMPLICATIONS

5.1. Discussion and Synthesis

The study's findings illuminated a multi-faceted internal and external pressure influencing In terms of internal factors like organisational culture, commitment related to leadership, and availability of resources, which played a vital role in shaping SOI practices. An organisations with stronger sustainability leading to a culture and commitment to leadership that was often likely to invest in sustainable technologies (Sharma et al., 2021). In an external factor like stakeholders, expectations, a regulatory requirements, demands of the market and technological advancement have significant driven organisation that adopts a measure of SOI (Pasqualino et al., 2021). The stakeholders are mainly including an investor, NGOs that demands a transparency and an accountability for compelling the companies to adopt it's comprehensive practices to quantifying its impacts of their sustainability initiatives. A result aligns with a present literature on SOI, that emphasizing an importance of its integrity and sustainability. Previous studies by Assoratgoon and Kantarbutra, (2023) depicted the role of leadership and organisational culture in driving sustainability initiatives, echoing the importance of its internal pressure that was identified in the survey (Assoratgoon and Kantarbutra, 2023).

An influence to external pressure, like the stakeholder's expectations and regulatory requirements, are also known and documented in

the literature, reinforcing the study. The study's findings expanded to previous research that provided a detailed analysis of how internal and external pressure interacts with quantifying SOI impacts, offering an understanding of the outcomes. The study results provide valuable insights for the business by aiming to manage its internal and external pressure associated with SOI. Effective quantification is reporting the impacts of sustainability initiatives (Hamad et al., 2020). Organizations should foster a strong sustainability culture, enabling a leadership commitment and allocating adequate financial and technological resources.

Moreover, a business should actively engaging with stakeholders to understand its expectations by providing a leniency to a technological advancement to industry standards by enhancing its measurement policies. This address an internal and external pressure, in which the organisations improves its sustainability performance that enhances a competitive advantage by securing the stakeholders support (Bhatia and Kumar, 2022). Findings are also significant to policy implications, and policymakers should be considered to develop standardised metrics and frameworks for guiding organisations to measure and report the impact of sustainability initiatives. Moreover, this addresses the challenge of variability in measurement practices to facilitate comparability across different projects and industries (Berger et al., 2020). In addition, policies that promote transparency and accountability in sustainability reporting can incentivize organisations to adopt comprehensive measures and practices (Hamad et al., 2020). This provides a financial incentive by purpose to support a sustainable technologies and practices that was further encourages a business for the investment in sustainability-oriented innovations, that is ultimately contributed to social goals and the broader environment.

5.2. Kotter's 8-Step Change Model

John Katter's 8-step Change Model is one of the significant frameworks to guide the change of organisations and this model is effective in enforcing policy changes. This model aims to manage sustainability-oriented innovations (SOI) (Laig and Abocejo, 2021). The steps of Kotter 8 step model are as follows,

5.2.1. Establishing a sense of urgency

In this step, the involvement of stakeholders is to be aware of the acute requirements for change like increasing the pressure from stakeholders to appliance the practices of sustainability. This may stem from internal issues such as increased operational costs because of inadequacies of external pressure like the demand of customers and the regulations of government for eco-responsible practices and the increases in costs of operational (Hahn, 2022).

5.2.2. Creating a guiding coalition

To effect change, one must gather a group of powerful supporters within the organizational structure. For SOI it could be a strategic stage that implies the creation of a board with members from top management, innovational departments, and specialists in sustainable practices for the change of an organisation's practices towards sustainability (Lewis, 2019). The leading group must not only be unified but must also be made up of influential people in the target community.

5.2.3. Developing a vision and strategy

This involves the need for good management to ensure that sustainability goals are positively directed so that their impact will be felt in the future. This step, includes carbon emissions, environmentally friendly methods of production, or fluctuations in the economy (Chams and García-Blandón, 2019). The strategic approach would also present how the organisation would integrate the SOI into its operations especially as regards the use of resources and attainment of sustainability.

5.2.4. Communicating the change vision

It is important to efficient communication is necessary to ensure that stakeholders and employees properly comprehend their communication. The goals for sustainability and the case for SOI need to be relayed through internal communication methods, training events and clearly stated summaries of progress (Kalogiannidis, 2020). For the vision to inspire staff to back the change, consistent communication is crucial.

5.2.5. Empower Broad-Based Action

Guarding against roadblocks to transformation is key to giving employees the ability to act. For example, it could involve making changes to corporate policies that allow for a broader array of decision-making regarding sustainability programs or supplying the essential resources, knowledge, and tools to enable employees to take part in sustainable practices (Volberda et al., 2021).

5.2.6. Generating short-term wins

Sustaining energy is important for realizing quick success. Accomplishments that sustainable organic initiative (SOI) initially made, such as lowering energy expenses through groundbreaking methods or earning sustainability certificates, could act only as fleeting successes (Glavič et al., 2021). The achievements might be brought to attention to exhibit the true benefits of making alterations to the overall organization.

5.2.7. Consolidating gains and producing more change

Integration of technology can enhance the effectiveness of social movements while wasting energy without achieving real progress is a waste of energy (Tisi et al., 2023). In this phase, the alignment of the company's basic strategy and operations with SOI allows for both the extension of sustainable programs and the adoption of innovative procedures for minimizing waste and enhancing energy efficiency.

5.2.8. Anchoring new approaches in the culture

This change must ultimately transform into a basic feature of the organizational culture, for enduring success. SOI should be seen clearly in contemporary operations and decision-making processes (Wráli and Munkeby, 2022). For institutionalized change, frequent measurement, acknowledging sustainability champions, and aligning sustainability objectives with organizational policies are critical.

5.3. Resistance Management Techniques

Resistance is one of the significant elements in organisational change, particularly in fluctuating sustainability-oriented innovations (Lozano, 2024). There are different techniques to manage the resistance efficiently.

5.3.1. Education and communication

Education is one of the significant ways to manage the resistance. Workers of the organisations can resist the change since the workers of the organisations do not well understand the rationale or the benefits behind it. Reducing the level of resistance when implementing the strategies of SOI is done by informing the employees of the strategies and their advantages to the company and the environment (Harlow and Carter, 2023). This means when dealing with perceived barriers such as job insecurity or new work processes, it is possible to make the information provided regarding the long-term economic and environmental advantages of SOI much clearer.

5.3.2. Participation and involvement

The implication of on-the-subject people as participants in the change process ensures compliance rather than resistance. Engagement can be a situation where people from different departments join sustainable task forces, meet and carry out workshops, or focus on discussions of newly received goals for the company's sustainable performance (Chams and García-Blandón, 2019).

5.3.3. Support and facilitation

It is helpful to be of support to employees as they transition to change. This support includes extending further training, initiating the use of mentors, or offering counselling services. If the employees accept the notion that the management is supporting them, they will not hesitate to change to the new sustainability initiatives (Faupel and Süß, 2019).

5.3.4. Negotiation and agreement

In where such resistances are high then one has no option but to engage with the stakeholders. Friendly dispute resolution means to those who do not wish to change their interests and rightful yielding is done to the adversaries (Araujo et al., 2019). For instance, where some departments may not be in a position to participate due to the high capital costs associated with the new technologies in sustainability, bargaining may mean the announcement of the cost of such programs in the long run.

5.3.5. Manipulation and co-operation

In the process of applying the technique intended change seeks to make the resisters feel like strategists by trying to convert them to become champions of the change (Sistare, 2022). This approach, however, is quite dangerous if poorly executed but can prove very useful if resistance is coming from a powerful person or a powerful group in the organisation.

5.3.6. Explicit and implicit coercion

If all other techniques are failed then it is necessary to change by direct means like implementing other policies that help in change and give clear and easy results for non-compliance (Ali et al., 2021). This will involve the restructuring of the roles of the job that help to achieve the goal of sustainability or to introduce the emergent metrics performance in which the target of sustainability is included. However, this can be a last resort that leads to further resentment as if this will also not be handled with proper care.

5.4. Policy implications

- Organizations should develop policies that specify the desired future state for sustainability and integrate them into the strategic plan of the organization. Such measures could consist of mandatory sustainability checks, carbon emission reporting, and waste minimization plans (Kabeyi, 2019). Moreover, the other organisations include tangible incentives such as bonuses or gifts that can be given to the workers in recognition of their performance on the sustainable development goals as a way of reminding them of the importance of SOI.
- Decision makers can also contribute to the achievement of sustainability in organizations through the development of guidelines for self-reporting of sustainability gains and missions as well as the provision of incentives in the form of tax exemptions for companies adopting SOI (Tauringana, 2021). Moreover, the legal demands of the government may compel certain organisations to report on their sustainability performance to the next level of accountability. It would ideally end up in the growth of use and the deployment of SOI in different segments.
- Additional essential notes which must be taken into consideration while applying sustainability policies are the called resources, the time and money to be allocated to the new technologies, and also, the leadership commitment to these policies (Söderholm et al., 2019). Managers should promote SOI by being committed to presenting the organization's commitment to sustainability and motivating new ideas.
- The organizations should ensure full commitment towards ensuring sustainable developments receive integration into existing as well as new organizational policies through consistent policy review (Moldavska and Welo, 2019). These are in the aspect of technology and strategy transformation in the business alongside social factors including demand in the customer market.
- These policy implications, when combined with Kotter's 8-step model and other measures to deal with the problem of resistance, ensure that there is a systematic approach to enforcing change towards sustainability-oriented innovations.

6. CONCLUSION

SOI has been influenced by concepts like a crucial economy that promotes a continuation use of resources through its recycling and remanufacturing and to share economy that emphasizes access to over ownership. From an environmental perspective, this allows companies to measure a reduction in greenhouse gas emission, resource consumption, and waste generation, and this provides data support for ecological stewardship consumption and waste generation to provide data stewardship and regulatory compliance.

The purpose of this study was to identify and understand what internal and external factors shape the measurement of Sustainability-Oriented Innovation (SOI) effects within organizations. By articulating the internal forces including the organizational culture, leadership commitment and resource availability and the external forces including stakeholder expectations, regulatory demands, and technological changes about the measurement of SOI, the study offers a noble

understanding of this phenomenon. The outcomes correlate well with the study objectives regarding the interaction of these factors, which shows that sustainability initiatives are not a simple matter of measurement.

The study demonstrates that active support and involvement of top officials in conjunction with an actively seeking culture are the prerequisites to the incubation of sustainable measures within an organization. Some recommend that where sustainability is integrated into the business strategy, company or organization SOI implementation and measurements will be effective. Furthermore, sufficient funding and technological support is also vital to achieve the goals of sustainability. All of these findings contribute to the research concerns of this paper concerning the internal pressure for SOI.

customers, investors and NGOs' expectations which are highlighted in the research also place immense pressure on organizations to integrate and apprehend SOI quantitatively. Other reasons that make it necessary to make a correct sustainability report include the legal requirements of businesses also stem from regulations in operations also called the need to balance social, economic and environmental responsibilities in business. Further, technological developments have offered instrumentations of measuring SOI still, the fact that sustainability impacts are long term in nature hinders immediate assessment. These results help achieve the study aim of identifying external forces influencing the assessment of SOI.

The implied conclusion of the study as to the present state of SOI metrics is that there is a deep need for creating clear sets of key performance indicators, which would be a universal yardstick for SOI evaluation in various industries and scientific projects. Incipiently, there are several factors that organisations need to align to about internal and external drivers and blunders, they stand the chance of being regressed in their sustainability agenda. The findings also extend existing knowledge by indicating that incorporating these pressures into a single framework may enhance the pragmatic enactment and communicative disclosure of sustainability activities. This conclusion therefore addresses the research objectives and offers a practical insight to organisations that wish to improve their sustainability practices.

Based on the conclusions made in this paper, policymakers must consider the need to develop reference models in the measurement of SOI impact across a broad range of industries. Such policies would also enhance accountability and increase the abilities of organizations to address stakeholder and regulatory requirements. Positive incentives like tax exemption for those industries that accept SOI practices could extend the additional practice of SOI.

6.1. Limitations of the Study

Quantifying Sustainability Impacts of Sustainability-Oriented Innovation (SOI) on organisations: External pressure, Internal pressures, Environmental pressures, Resourcing pressures, Innovation pressures. However, it still has some shortcomings, and these should not be overlooked to ensure that the results are properly located in the context of extant sustainability studies.

- The first major limitation is that the study uses a qualitative perspective and is based on interviews with a small number of industry players and businesses. Although this approach provides rich information about pressures affecting organizations, its results may not apply to all fields and regions. The conclusion therefore is that these findings are not representative of organisations in other geographical locations or industries that could have different regulatory and market environments. It will be advisable for future studies to extend the sample population and increase its variability to increase the external validity of the study.
- The research uses the qualitative method which means the biased results are found. In this study, the interviews are conducted and the participants give their responses according to their perceptions, therefore the results will not be objective. Thus, thematic analysis as a method, despite its reliability, may introduce certain biases to the data, so the difference between the researchers' perception of the problem and the generalisation of the results can be blurred. Since the research is quantitative oriented at times this might have created a biased view of the mean scores; incorporating both quantitative and qualitative data would help in eliminating the above menace.
- The study also presents long-term sustainability impacts as an area of difficulty in measuring the SOI. This inherent limitation is in line with the fact that it is costly to quantify the ripple impacts of sustainable activities, most of which manifest themselves over time. More future research could include, cross-sectional study designs to establish the effect of SOI in the long run hence establishing both the pros and cons, recommended that future studies employ further longitudinal research designs to discover the long-term effects resulting from the implementation of SOI.

6.2. Suggestions for Future Studies

One of the significant approaches for future study is the use of the Triple Bottom Line (TBL) theory in the estimation of SOI. Thus, the TBL approach that rests on the tripod of economic, environmental, and social performance returns is growing more relevant in terms of sustainability (Dos Santos and Da Cunha Reis, 2024). However, its practical application for measuring the effects of SOI has not received as much attention in the literature, mainly because many linear economies dismiss sustainability as a long-term non-revenue generating solution without considering its overall benefits in the meantime. Subsequent research could focus on exploring recommendations as to how organizations can improve the incorporation of TBL into the measurement of SOI to guarantee that sustainable measures are in harmony with social and environmental objectives.

By extending the focus on environmental and social profitability in addition to financial sustainability, the TBL theory replaced the traditional linear economy. Over time sustainability has almost become standard among various organizations that present the challenge of quantifying sustainability impacts (Kruger et al., 2022). Subsequent research could help explicate how such social and environmental benefits as betterment of the standard of living of the population, a decrease of inequality, and environmental

sustainability can be quantified. These metrics could then be added to current reporting frameworks within organisations, for a better understanding of the data set, within the context of SOI.

One of the research gaps in the current sustainable development is that the shift from a linear economy to a circular one goes unnoticed. A circular economy different from the linear economy involves an economy that tries to recycle, remanufacture and share assets. But the sad reality of today's commerce world, most businesses are under a one-way economy, they produce end-use goods and disposal is the final way (Tambovceva et al., 2022). Subsequent studies need to investigate under which aspects SOI can support this shift by analyzing concrete, sustainable earnings of circular approaches in detail.

A challenge experienced with circularity is the absence of coherent benchmarks for its evaluation. Subsequent research can build up those tools and techniques for converting the circularity of products and processes into financial figures like ROI and cost savings. The assessment of circularity impacts highlights how the lack of circularity is a large cost to companies transitioning away from the linear business model.

Among the key exploration of this research is the role played by stakeholder expectations in the formulation of SOI. However, existing measurement standards predominantly do not provide a more or less accurate picture of engaged stakeholders regarding sustainability activities. Future research can reveal what aspects of SOI, can be quantified and how these measurements can be applied in the relationship with stakeholders to manage their expectations. This might mean trying to find measures that examine the measures of benefits that SOI brings to the environment in economic terms, as well as the returns it delivers to society in human, social, and emotional terms.

According to stakeholder theory the business especially the management has responsibilities for many stakeholders such that it has to meet their needs include the customers, employees and shareholders (Dmytriiev et al., 2021). Nevertheless, the measurement of social factors that constitute sustainability is still difficult. Further research could be called for, to identify the most promising approaches to social impact measurement that would make sense for firms and organisations to implement. For instance, customer satisfaction and employee commitment can be associated with sustainable development projects to offer the needed proof of the effectiveness of SOI for diverse stakeholders.

An important issue highlighted in this research is the conceptual nature of the benefits associated with SOI and in particular the capability to measure these impacts. Executive management is now aware of the advantage of developing sustainability measures but such a concept take time to produce results in the organization today. The future research can devote increased attention to improving the reliability of measuring the prospects of economic returns of SOI. This could mean the merging of financial performance with sustainability measures or even the use of value added accounting to enable companies to know the rate of return on the sustainability investments they have made over time.

Two other approaches which could be further examined in the context of the given framework are cost-benefit analysis (CBA) and social return on investment (SROI). CBA is used to determine how much it will cost to introduce sustainability solutions against how much it can bring while SROI measures more than the revenue many sustainability practices generate for their companies (O'Mahony, 2021). Subsequent studies could explore how these methodologies can be applied to SOI allowing companies to gain a better appreciation of the sociopolitical realisation of their stakeholders regarding sustainability.

Promising sources for drafting a set of analytic and comparable metrics can be pulled from several global frameworks for sustainability reporting, including the GRI and the CDP. Subsequent research could and should focus on how these frameworks can be tailored for application in SOI as desired by the businesses to enable the measurement and reporting of the management's sustainability efforts. Furthermore, the adoption of these metrics within current systems of financial reporting would enable businesses to report on the value of SOI with the interest groups such as investors more efficiently.

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APPENDIX

Interview Schedule

- Q1: What are the key internal and external factors that drive your organization to adopt sustainability-oriented innovations?
- Q2: Describe the economic impacts you have observed from implementing sustainability-oriented innovations in your organization?
- Q3: How do you measure the success and effectiveness of sustainability-oriented innovations within your organization?
- Q4: What challenges and barriers have you encountered in quantifying the impacts of sustainability-oriented innovations, and how have you addressed them?