An analysis of the extent of integrated thinking reflected in key performance indicators disclosed by the Top 40 South African listed entities over time

A research report submitted by

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List of tables and figures

List of abbreviations and acronyms

Abbreviation/Acronym	Description
CDP	Carbon Disclosure Project
ESG	Environmental, Social and Governance
GRI	Global Reporting Initiative
IFRS	International Financial Reporting Standards
IIRC	International Integrated Reporting Council
IR	Integrated Reporting
ISSB	International Sustainability Standards Board
IT	Integrated Thinking
JSE	Johannesburg Stock Exchange
KPI	Key Performance Indicator
MDG	Millenium Development Goal
MIS	Management Information System
MSCI	Morgan Stanley Capital International
RQ	Research Question
SDG	Sustainable Development Goals
SME	Small and Medium-sized Enterprises
TCFD	Task Force on Climate-related Financial Disclosures
TNFD	Taskforce on Nature-related Financial Disclosures

Abstract

This research explores the extent to which integrated thinking is reflected in key performance indicator (KPI) disclosures. A KPI Integrated Thinking Index (KPI-ITI) is developed to gauge the alignment of KPIs with integrated thinking principles. Indicators of integrated thinking from the academic and professional literature are used to develop a schematic for evaluating the alignment of KPIs with integrated thinking. The application of the resulting KPI-ITI is illustrated using a sample of South African organisations' primary reports in 2013, 2017 and 2021. Reports are analysed using a content analysis to identify disclosures dealing with KPIs which are evaluated using the schematic. Results are calibrated using well-established integrated thinking proxies. Ten indicators are identified to develop integrated KPIs. The application of the KPI-ITI reveals that, from 2013 to 2021, KPI disclosures evidenced greater integrated thinking application, primarily driven by the increased use of post-implementation reviews, a shift away from financially-focused KPIs and incorporation of the Sustainable Development Goals (SDGs) and multi-capitals in KPI structures. The index developed is calibrated with other integrated thinking proxies supporting its robustness for assessing integrated thinking in performance evaluation structures. The study is among the first to outline formally the dimensions of integrated thinking specifically in the context of KPIs and detail an index which can be applied to evaluate KPIs to evidence integrated thinking, including insights in an emerging economy context. The study is based on KPI disclosure practices by a sample of companies in a single jurisdiction and findings should be generalised with caution. The index offers practitioners, standard-setters and academics an easy-to-apply technique for examining the extent of integrated thinking which can be expanded further into other publicly available information and jurisdictions. The index can inform stakeholders on the aspects to be investigated when assessing whether management is implementing long-term value creation and sustainability initiatives.

Keywords: Extra-financial reporting, integrated thinking, key performance indicators, multi-capital approach, performance evaluation

Foreword

This dissertation examines the link between key performance indicators (KPIs) and integrated thinking. Sections 1 – 5, outline a schematic for evaluating the extent to which KPIs cover the holistic management of financial or extra-financial resources in accordance with an integrated thinking philosophy is proposed. The schematic is then applied to a sample of listed entities to illustrate its functionality and the extent to which "integrated KPIs" are being included in annual, sustainability or integrated reports. The first five sections of this dissertation have been structured as a research paper. At the time of writing, the paper was under review at "Sustainability Accounting, Management and Policy Journal". Review reports are pending.

Sections 1 – 5 are complemented by three core appendices.

- Appendix A provides the results of a bibliometric analysis on the prior research dealing with the reporting on KPIs. The bibliometric analysis has been structured as a conference paper which was presented at the Centre for Critical Accounting and Auditing Research (CCAAR). The details in Appendix A should be read with the literature review (Section 2) to provide additional detail and context.
- Appendix B provides additional information on how the proposed KPI schematic outlined in Section 2.3 reconciles with earlier research.
- Appendix C supplements Section 4. It provides additional analysis of KPI reporting trends and examples of best and worst practice by the sample of companies reviewed for Sections 1 – 5.
- Appendix D is a technical report. This report provides a practitioner-focused executive summary of certain aspects of Sections 1 – 5. The report was prepared as part of an initiative led by the CCAAR and is due for publication by "Accounting for People, Planet and Profit" (https://www.appp.co.za/).

Signed

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1: Introduction

Organisations have historically favoured financially-focused key performance indicators (KPIs) over extra-financial ones. The former are the easiest to define, quantify and evaluate (Herbert & Graham, 2021) unlike environmental and social metrics which are, accordingly, overlooked (Bellucci et al., 2020; Ecim et al., 2021; Grassmann et al., 2019; Herbert & Graham, 2021). This is despite the emphasis being placed on a more holistic approach to managing financial and extra-financial metrics by the Global Reporting Initiative (GRI), the Task Force on Climate-Related Financial Disclosures (TCFD), the International Integrated Reporting Council (IIRC) and, most recently, the International Sustainability Standards Board (ISSB) (Grassmann et al., 2019; Herbert & Graham, 2021; Rodríguez-Gutiérrez et al., 2019). That companies KPIs may not include a balanced focus on economic, environmental and social factors provide the basis for the current research. A schematic for evaluating the extent to which KPIs cover the holistic management of financial or extra-financial resources in accordance with an integrated thinking philosophy is proposed. The schematic is then applied to a sample of listed entities to illustrate its functionality and the extent to which "integrated KPIs" are being included in annual, sustainability or integrated reports.

Integrated thinking is:

> "the active consideration by an organization of the relationship between its various operating functional units and the capitals that the organization uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short, medium and long term" (IIRC, 2021, p. 53).

The inclusion of economic, environmental and social dimensions in KPIs should play a key role in promoting integrated thinking (FSB, 2017, 2022). There is, however, limited guidance of how to adopt an integrated approach to KPI determination and the suitability of "integrated KPIs" for specific industries (Liu et al., 2019; Pigatto et al., 2023). As a result, this paper proposes a KPI Integrated Thinking Index (KPI-ITI) which can be used to analyse the KPIs used by organisations and the extent to which they are aligned with integrated thinking principles as evidenced by facts, circumstances and behaviours explicated by codes of best practice (IIRC, 2021; VRF, 2022), good governance (Solomon, 2013) and applicable academic research (Alrazi et al., 2015; Herbert & Graham, 2021; Maroun et al., 2023; Oshika & Saka, 2017). To illustrate the application of the KPI-ITI, the research analyses how South African listed companies report on KPIs in primary[1] reports in 2013, 2017 and 2021. The extent

[1] Different types of reports deal with extra-financial information and have different naming conventions depending on the jurisdiction. Examples include corporate reports, integrated reports, sustainability reports and corporate

to which these organisations' KPIs cover the integrated thinking indicators per the KPI-ITI is determined. The resulting scores for the integrated KPIs are compared with other integrated thinking proxies per the prior research as a type of calibration check.

This research makes, at least, four contributions. Firstly, the study is among the first to outline formally the dimensions of integrated thinking specifically in the context of KPIs and detail an index which can be applied to evaluate KPIs for evidence of integrated thinking. The index may be used by investors uncertain about whether KPIs are superficial or embody a proactive approach to performance incentives. It can inform stakeholders on the aspects to be investigated when assessing whether management is implementing initiatives aimed at long-term value creation and sustainability. The index may also be useful for academics studying the types and quality of KPIs in various jurisdictions.

Secondly, integrated KPIs may assist with comprehensive stakeholder analyses and engagements to help organisations tackle pressing social and environmental challenges (Rao, 2007). By exploring these areas, policymakers and other stakeholders are able to gain a deeper understanding of the challenges and opportunities faced by organisations and how to incorporate this into performance evaluation structures to incentivise a multi-capital outlook.

Thirdly, previous studies on KPIs have discussed how KPIs can be used to set targets, drive continuous improvement and develop standards for the assurance of sustainability reporting (Wallage, 2000). Others explore the link between KPIs and sustainability performance (Oshika & Saka, 2017) and how KPIs can support a circular economy (Moraes et al., 2020). Prior research has not yet explored the link between KPIs and integrated thinking, particularly in the context of how organisations report on performance evaluation. The proposed KPI-ITI can be applied irrespective of whether entities prepare a sustainability report under the GRI or ISSB, an integrated report per the IIRC[2] or a report informed by multiple frameworks. In each case, a tool to analyse performance evaluation in a broader context is important in light of the growing emphasis on both suitability and integrated reporting by key user groups (FSB, 2021; IFAC, 2023) and the efforts of international standard setters to "base line" and harmonise how companies report on sustainability-related issues (see ISSB, 2021a). The proposed KPI-ITI can assist management to incorporate aspects of various sustainability-related frameworks or guidance into performance evaluation structures.

social responsibility reports. For the purposes of this paper, the report which deals with non-financial reporting with a multi-capital perspective and value generation for a broader stakeholder group will be referred to collectively as "primary reports". Secondary reports are excluded.

[2] The International Integrated Reporting Framework (the Framework) specifically advocates the application of integrated thinking and approaching business, including performance evaluation, with a holistic mindset that considers the multi-capitals (see VRF, 2022). The six multi-capitals referred to include financial, human, social and relationship, intellectual, natural and manufactured capital (ibid).

Finally, studies on KPIs in the broader corporate reporting sphere have been limited. Prior research has focused on understanding KPIs generally and the benefits of sustainability-related metrics (Agbali et al., 2017; Akhtar & Wani, 2016), the use of management information systems (MIS) to support data collection and analysis of extra-financial information (Alrazi et al., 2015; Boccardi et al., 2019) and incorporating holistic performance evaluation as part of a broader integrated thinking logic (Maroun et al., 2023). Researchers have found that the degree of integration of sustainability disclosures with financial information has improved as a result of sustainability-related frameworks gaining prominence but there has not been an equivalent change in KPI disclosures incorporating extra-financial considerations (Herbert & Graham, 2021; Mans-Kemp & Viviers, 2018; Roberts et al., 2020). The findings of this study will be useful to understand the changes in, and development of, KPI disclosures from an emerging economy which has a well-developed reporting environment. These findings can be used to compare with other jurisdictions and identify insights which can be applied to a broader audience.

The remainder of this paper is organised as follows. Section 2 provides background and draws on the academic and professional literature to develop an index for gauging the extent of integrated thinking in KPI disclosures. Section 3 details the methodology and computation of the KPI-ITI. Section 4 presents the results and discussion. Section 5 provides the conclusion and identifies areas of future research.

2: Literature and background

In order to conduct a comprehensive review of the existing KPI literature, a bibliometric analysis was performed. Appendix A details the bibliometric analysis performed over peer-reviewed academic sources which addressed KPI-related research. The articles underwent a detailed review to assess the state of literature on performance evaluation metrics. A search was performed for peer-reviewed articles on the Scopus database from 2013 to 2023 with “key performance indicator”; “performance indicator”; “KPI” or “performance evaluation” in their title, abstract or keywords. The search produced 979 documents dealing with KPIs within an integrated reporting context. Refer to Appendix A for the results and analysis. Based on the thematic analysis, three core themes of KPI research were identified which will be used to develop the KPI-ITI:

(1) management information systems;
(2) benefits of, and barriers to, integrated KPIs and
(3) an integrated thinking logic and proactive approach to KPI structures.

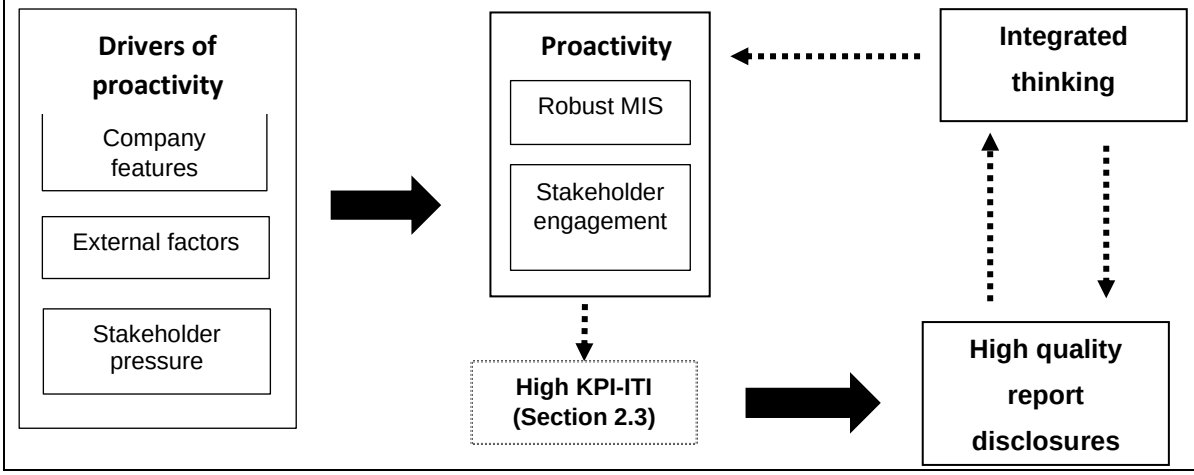
Each is discussed in more detail below.

2.1: Management information systems

KPIs can play a key role in advancing integrated thinking by setting appropriate targets against which management performances in economic, environmental and social terms can be evaluated.

Figure 1 illustrates how MIS assist in ensuring that an integrated thinking logic is applied when drafting performance incentives.

Figure 1: The relationship between proactivity, KPI IT Indices and integrated thinking3



"Proactivity" is "the voluntary implementation of practices and initiatives aimed at improving environmental performance" (Gonzalez-Benito & Gonzalez-Benito, 2006, p. 88). The drivers of proactivity include company factors, external factors and stakeholder pressure (Gonzalez-Benito & Gonzalez-Benito, 2006). Company factors include, for example, company size, position in the value chain and strategic attitude (Glennie & Lodhia, 2013).

Larger companies have the financial resources to implement robust MIS and commit to sustainability. External factors include industrial sector and geographical location (Alrazi et al., 2015). Companies with greater environmental risks are likely to be more proactive on environmental issues (Summerhays & De Villiers, 2012). Lastly, companies under greater stakeholder pressure are more likely to be proactive and improve their environmental performance (Bebbington & Larrinaga-Gonzalez, 2008; Hopwood, 2009; Rankin et al., 2011).

Proactivity is a function of environmental management systems, operational practices and reporting practices (Gonzalez-Benito & Gonzalez-Benito, 2006). The first two categories may be amalgamated into a single component: MIS. A robust MIS may help entities develop appropriate policies and goals to address stakeholders' needs (Bui & De Villiers, 2017).

[3] This diagram was adapted from the Environmental Legitimacy, Accountability and Proactivity (ELAP) Framework developed by Alrazi et al. (2015).

Additional benefits include the execution and monitoring of policies, compliance with legislative requirements, achieving goal congruence and maintaining communication with respective stakeholders (Alrazi et al., 2015). The implementation of robust information systems and continuous stakeholder engagement enable management to integrate decision-making with reporting (Maroun et al., 2023). To ensure the integrity of the data collected and processed, internal controls need to be robust. Reliable data enhance stakeholder accountability as well as reporting quality (Alrazi et al., 2015).

Higher levels of proactivity result in better quality reporting (Alrazi et al., 2015) which cannot be attributed only to impression management (Haji & Anifowose, 2016). The more robust accounting and management infrastructure contributes to more accurate and complete data which can be used to identify risks more effectively; highlight operational weaknesses and inform strategic decisions. This, in turn, leads to higher quality reporting on financial and extra-financial issues (Alrazi et al., 2015; Maroun et al., 2023). As explained by the IIRC (2021, p.3):

> "The more that integrated thinking is embedded into an organization's activities, the more naturally will the connectivity of information flow into management reporting, analysis and decision-making. It also leads to better integration of the information systems that support internal and external reporting and communication, including preparation of the integrated report".

A robust MIS and effective stakeholder engagement enable proactivity and support an integrated evaluation of data across different capitals. This allows organisations to use extra-financial information as part of a broader performance evaluation strategy to develop a positive corporate culture to achieve sustainable and long-term goals. Having accurate and complete data of performance across financial, environmental and social dimensions, can be incorporated into KPI setting, determination and evaluation to align individual and organisational goals. Similarly, the objectives of sustainability-related frameworks and codes of corporate governance can be integrated into the performance evaluation structures to incentivise management and stakeholders to adopt integrated thinking as part of the achievement of their performance metrics. Put differently, integrated KPIs involve moving away from financially focused metrics to sustainable and long-term metrics, incorporating extra-financial considerations. This will incentivise a balanced approach to performance evaluation which should, over time, promote a stronger integrated thinking logic.

2.2: Benefits of, and barriers to, integrated KPIs

Integrated KPIs allow an organisation to manage financial and extra-financial considerations as part of the performance evaluation structure which can promote balanced and responsible business practices and long-term sustainable development (Herbert & Graham, 2021).

Additionally, integrated KPIs can be used to address key needs of stakeholders and enhance effective collaboration between divisions, assisting in breaking down organisational silos and aligning individual and organisational goals (Raji & Hassan, 2021). However, complexities involved in the implementation of integrated KPIs, such as, for example, the use of multiple sustainability frameworks and extra-financial metrics which are difficult to quantify, hinder the ability of organisations to operationalise such practices (Alrazi et al., 2015).

Analysing and reporting on both positive and negative performance results across a multi-capital dimension enable informed decision making, strategic alignment and transparent communication with stakeholders (VRF, 2022). Actively addressing negative performance indicators drives corrective action, resulting in positive organisational change and a broader perspective on the organisation's risks, opportunities and impacts (VRF, 2022). Nonetheless, entities may limit their disclosure of under-performing KPIs on the premise that such information did not qualify as material (Di Vaio et al., 2020). Additionally, the risk of integrated KPI disclosures becoming a compliance or "tick-box" exercise cannot be precluded (Haji & Anifowose, 2016; Massa et al., 2015; Samkin, 2012). This would contradict a multi-capital approach and may result in management obfuscating results to achieve the financial incentives provided as part of the KPI. In other words, integrated KPIs are subjected to the same level of "greenwashing" risk as other extra-financial information included in primary reports.

Another barrier to the development of integrated KPIs is that management may have difficulty understanding the interdependencies between capitals and value creation within the context of a specific business model (Dumay & Dai, 2017). Additionally, resource constraints can hinder the implementation of integrated KPIs as information systems are underdeveloped resulting in data which is not complete nor accurate and a lack of established ESG practices may translate into ceremonial performance metrics (Herbert & Graham, 2021). The establishment of MIS which can assist to collect and analyse data can assist in managing some of the barriers to implementing integrated KPIs. Once this is in place, an integrated thinking logic can more naturally be incorporated into performance evaluation. How specific aspects of integrated thinking can be incorporated in performance evaluation is discussed next.

2.3: An integrated thinking logic and proactive approach to KPI structures

Integrated thinking is characterised by assessing progress towards a pre-determined goal and taking remedial action based on the outcome of performance evaluations (Maroun et al., 2023). Entities should ensure that KPIs are reliable and complete (IIRC, 2021). One option is to have KPIs assured. For example, ISO 14001/26000 certification can be used to verify

aspects of companies' performance management systems and associated KPIs in the interest of improving internal processes and ensuring credible reporting on KPIs to stakeholders (Rankin et al., 2011; Sumiani et al., 2007). Other assurance standards like AA1000AS and ISAE3000 may also be useful. In each case an external expert examines how KPIs are developed; the integrity of the underlying data and the accuracy and completeness of information reported to stakeholders (Wallage, 2000). Assurance is not only the result of testing by external parties (Prinsloo & Maroun, 2020). Combined assurance over KPIs facilitates integrated thinking by ensuring that the organisation's various functions, for example, internal audit and those charged with governance, work together to monitor and improve performance in line with the companywide objectives. Formal approval of KPIs by governing bodies; reviews of progress against targets by senior management and the implementation of suitable internal controls to ensure the reliability of underlying data contributes to more credible KPIs which address economic, environmental and social matters appropriately (ibid). As a result, the first "indicator" included in the KPI-ITI is:

I1: Assurance of KPIs (AS)

In an effort to align KPIs with sustainable practices which embody longevity and sustainable development, targets should be set over the timeframes of short-, medium- and long-term goals and not only be focused on short-term goals (IIRC, 2021). This will ensure that the goals of the organisation and management are better aligned and consider broader capital objectives (ibid).

I2: Timeframe (T)

As discussed in Section 2.1, a robust MIS is a key driver of extra-financial report quality (Alrazi et al., 2015). Coverage of the United Nations' Sustainable Development Goals (SDGs) (UN, 2015) in KPIs may be achieved by way of the implementation of a robust MIS which takes into account extra-financial data and metrics. This also allows for a holistic assessment of the organisation and augments management's understanding of the business. SDGs, however, are often focused on national and supranational objectives. Companies may find it difficult to set performance targets which align with the objectives of the SDGs. Nevertheless, given that the SDGs provide a framework for addressing and incorporating financial, social and environmental objectives, companies which are incorporating this in performance evaluation points to the fact that proactivity is being illustrated.

I3: Number of SDGs addressed (C_{SDG})

Coverage of the multi-capitals in KPIs demonstrates integrated thinking by acknowledging the various forms of capitals which an organisation relies on and impacts in the pursuit of its

objectives. Additionally, integrated thinking recognises that value creation extends beyond financial profit to encompass social, environmental and long-term value (IIRC, 2021). KPIs which cover various capital objectives help organisations measure and communicate how they generate value in multiple dimensions, demonstrating a commitment to creating sustainable and balanced outcomes. The interdependencies and trade-offs between the capitals needs to be considered as part of the performance evaluation structure as changes in capital availability and quantifiable measurement impact the performance metric (IIRC, 2021). Addressing multiple capitals signals a proactive approach to KPI setting and also aligns the cultural values within the organisation.

I4: Number of capitals addressed (C_{CAP})

The responsibility for achieving targets should be assigned to specific personnel (Mans-Kemp & Viviers, 2018). This will enable companies to hold the relevant individuals accountable. Companies will also be able to reward the respective group should targets be met which would ultimately enhance staff and executive morale.

I5: Level of application of KPI (APP)

The business model of an organisation should address stakeholder expectations (Chistopolova & Kaspina, 2022). Limited stakeholder engagement hinders the ability of organisations to satisfy stakeholders' legitimate needs (Oshika & Saka, 2017; Sakunasingha & Derakhshan, 2013; Sukhari & De Villiers, 2019). The failure to meet stakeholder expectations may lead to the ultimate failure of an entity as its legitimacy becomes compromised. A wide range of stakeholders should be consulted on KPIs to ensure that the relevant needs and expectations are addressed and to promote a multi-capital perspective.

I6: Stakeholder engagement (SE)

All companies, regardless of their size, must identify matters most material to their operations and address them through performance evaluation (VRF, 2022). As these matters differ among entities, it is important for organisations to disclose how they determined their materiality. When materiality assessments vary widely from one organisation to another, it becomes challenging for stakeholders to evaluate and compare the performance of different companies. Transparency in the materiality determination process for performance metrics encourages organisations to consider a broader range of perspectives, leading to more meaningful sustainability reporting.

I7: Materiality (MAT)

KPIs should be set in line with the assumption that they are achievable. Additionally, performance should only be evaluated on facts and circumstances which management can control. Organisations should avoid setting KPIs which may have their achievement hindered by external factors such as market sentiment (Pigatto et al., 2023). This may also reduce the risk of fraud taking place to achieve KPI metrics.

I8: Factors influencing achievement of KPI (FAC)

An integrated thinking mindset emphasises continuous improvement and addressing shortcomings. Evaluating progress against targets by way of a post-implementation review and taking corrective action where required signals an integrated thinking mindset (Maroun et al., 2023). Post-implementation reviews allow organisations to assess the effectiveness and relevance of their integrated KPIs after they have been implemented. This evaluation helps determine whether the selected KPIs are providing meaningful performance metrics and whether they align with the organisation's overall objectives. Feedback and discussion from different stakeholders allow for the refinement of integrated KPIs and the identification of aspects of the KPI which need to be amended. This also enables the organisation to provide a balanced report on shortcomings in performance and how these will be addressed in the future as part of a multi-capital business model.

I9: Post-implementation review (REV)

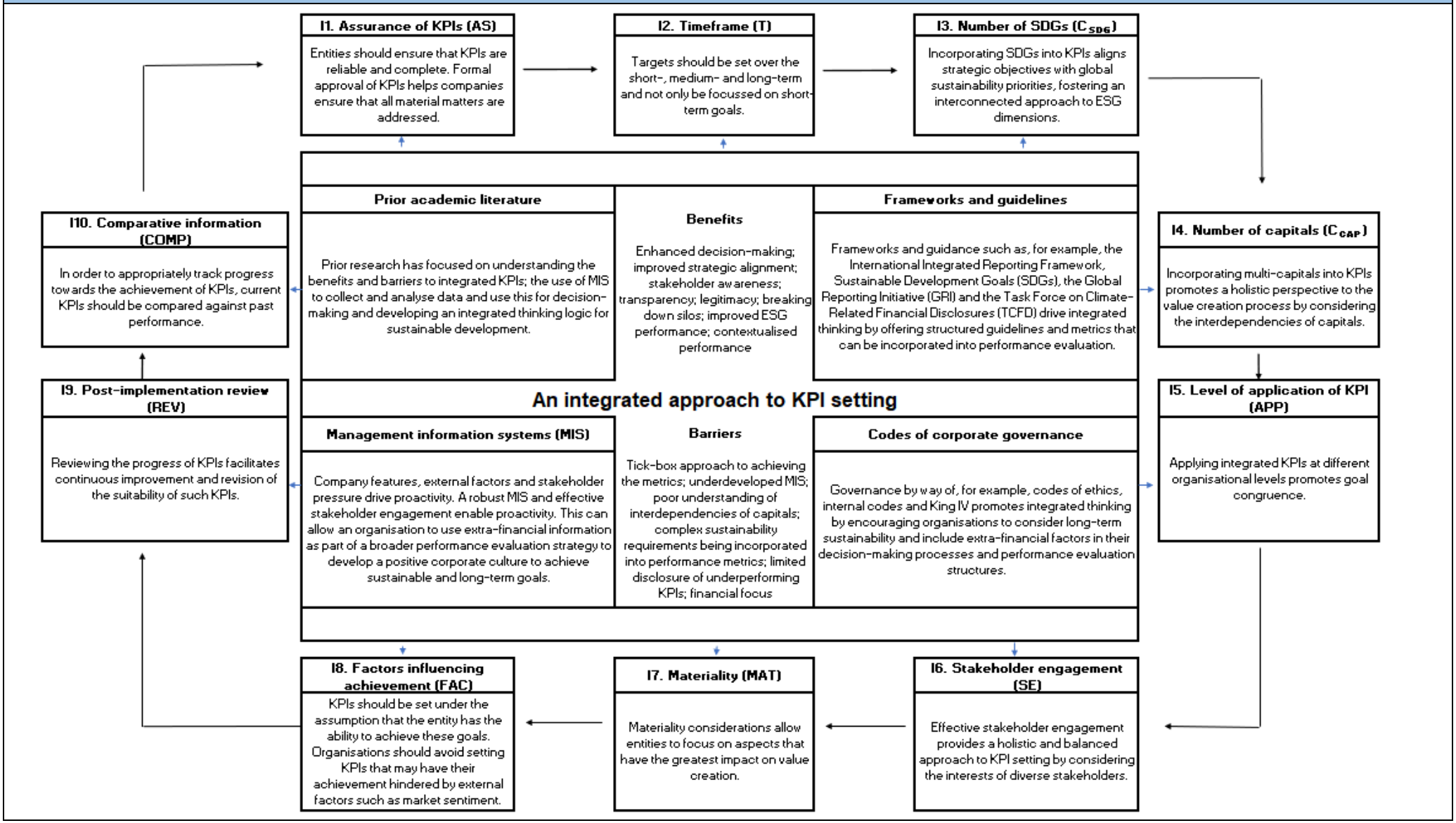
It is difficult to track progress on KPIs which are not consistent and comparable. In addition, it is difficult for external stakeholders to evaluate the performance of an entity if its KPIs are not comparable with its competitors (Oshika & Saka, 2017). How the organisation reports on KPIs is important to allow stakeholders to evaluate year-on-year performance (IIRC, 2021). This emphasises the need for structured guidance by the organisation on how KPIs should be set, evaluated, amended and disclosed. The final "indicator" included in the KPI-ITI is:

I10: Comparative information (COMP)

Appendix B provides a summary of how the indicators are mapped to the prior literature.

The key indicators of integrated thinking in KPI structures are summarised in Figure 2. By applying the KPI-ITI to a sample of organisations' primary reports, the appropriateness of the tool to gauge levels of integrated thinking in performance evaluation can be tested. Refer to Section 3.1 for the application of these indicators to the KPI-ITI.

Figure 2: Indicators of integrated thinking in KPIs



3: Method

Data are collected from the 40 largest companies listed on the Johannesburg Stock Exchange (JSE) by market capitalisation (as at 01/03/2023) and have prepared primary extra-financial reports (see Appendix E). This controls for the possibility of a lack of resources or technical expertise to implement robust controls, or a lack of experience in exercising integrated thinking and implementing KPIs (De Villiers & Hsiao, 2017). South African companies are selected because the country has a well-developed reporting environment[4] (Maroun et al., 2014). The experience with sustainability-related reporting ensures that the selected companies should have the resources, management control systems and accounting infrastructure to manage economic, environmental and social capitals as part of the performance evaluation and strategy.

The KPI-ITI can be applied using both proprietary and publicly available information but, as a practical expedient, the researchers only applied the index to a sample of companies' primary reports. This is an inherent limitation but allowed the researchers to collect data on KPIs from a larger sample of organisations rather than running case studies of only a few. Given that stakeholders may not always have access to an organisation's internal information, applying the index to publicly availble information illustrates the usefulness of the tool (Maroun et al., 2023).

Companies' 2013, 2017 and 2021[5] reports are examined. Reports prepared during 2013 were among the first to be compiled according to the guidance of the Framework's (see Section 1) principles, which includes the formal recognition of integrated thinking as part of business processes (IIRC, 2013). The researchers selected 2021 reports because this covers the first year after the COVID-19 pandemic. The mid of 2013 and 2021 were also selected to assess the progression of integrated thinking in KPIs over time. This longitudinal analysis provides insights into how organisations have matured in their approach towards an integrated thinking ethos. In 2017, there may have been a period of adjustment and refinement following the initial adoption of integrated thinking principles in 2013. Examining reports in 2021 allows the researchers to gauge the long-term development of integrated thinking practices. No significant changes were introduced to the Framework and SDGs from 2013 to 2021 (IIRC, 2013, 2021; UN, 2015). A consistent 4-year interval is used to investigate KPI disclosures[6].

[4] Given that integrated reporting by South African listed companies is de facto mandatory, self-selection bias associated with voluntary reporting is reduced.

[5] A technical report to summarise key findings for practitioners is produced based on the 2021 results. Refer to Appendix D.

[6] A preliminary analysis revealed that no significant changes to KPI structures were implemented over a 3-year period (2019, 2020 and 2021) and so a longer time period has been used in this study to assess how KPIs have developed from 2013 to 2021.

3.1: Data collection and analysis

Following a similar approach to prior corporate reporting literature (Cho et al., 2014; Gray, 2006; Maroun, 2018), content analysis is used to collect the data and analyse companies' primary reports irrespective of whether they are labelled as "integrated" reports and the reporting frameworks according to which they have been prepared. Content analysis is suitable for dealing with material which is not consistently formatted, while highlighting trends and investigating both text and descriptive statistics (Krippendorff, 2013).

The study uses companywide KPIs as the unit of account to ensure contextual accuracy. The reports are examined to identify disclosures dealing with KPIs. Each KPI is evaluated based on the presence of indicators provided in Table 1. The coding is based only on the presence or absence of disclosures as per the indicators. No inferences were drawn based on tone, layout or the use of infographics in order to maintain a focus on the content of KPIs, reducing subjectivity.

Table 1: Indicators of integrated thinking in KPIs

Indicator	Specification
I1: Assurance of KPIs (AS)	$AS = \sum_{c=1}^{t=1}(CA + AP + MON) \div 3$ Where AS is the level of assurance for company c in year t. A score of 1 is applied where each of the following is present: combined assurance over the KPI (CA), formal approval of the KPI (AP) and monitoring of the progress of achievement of the KPI (MON). A score of 0 is applied for the absence of these factors.
I2: Timeframe (T)	$T = \sum_{c=1}^{t=1} k \div 3$ Where T is the timeframe[7] in which the KPI is measured for company c in year t. A score of k = 1 is awarded for a short, 2 for medium and 3 for a long-term timeframe to achieve the KPI.
I3: Number of SDGs addressed (C_{SDG})	$C_{SDG} = \sum_{c=1}^{t=1}(SDG_1 + SDG_2 \ldots + SDG_{17}) \div 17$ Where C_{SDG} is the number of SDGs addressed by the KPI. A score of 1 is awarded for each SDG addressed.
I4: Number of capitals addressed (C_{CAP})	$C_{CAP} = \sum_{c=1}^{t=1}(CAP_1 + CAP_2 \ldots + CAP_6) \div 6$ Where C_{CAP} is the number of capitals addressed by the KPI. A score of 1 is awarded for each capital addressed.
I5: Level of application of KPI (APP)	$APP = \sum_{c=1}^{t=1}(S + E + Co) \div 3$ Where APP is the organisational level at which the KPI applies. A score of 1 is awarded for each horizon covered: staff[8] (S), executives (E) and the company as a whole (Co).

[7] Short-term KPIs are attainable within 12 months of implementation, medium-term ranges between 1 and 5 years, and long-term exceeds 5 years.
[8] This level covers staff excluding directors and prescribed officers. All horizons are mutually exclusive.

I6: Stakeholder engagement (SE)	$SE = \sum_{c=1}^{t=1} k \div 2$ Where SE is the level of stakeholder engagement performed in setting the KPI. k = 1 if there is stakeholder engagement on the remuneration policy and k = 2 if there is an explicit statement of SE on both the remuneration policy and the issue that the KPI seeks to address.
I7: Materiality (MAT)	$MAT = \sum_{c=1}^{t=1} k$ Where MAT is the indicator of whether materiality was considered in setting the KPI. A score of k = 1 is awarded where materiality was considered and 0 where it is not mentioned.
I8: Factors influencing achievement of KPI (FAC)	$FAC = \sum_{c=1}^{t=1} k$ Where FAC is the nature of factors impacting the achievement of the KPI. A score of k = 0 is awarded where external factors exist and a score of k = 1 is awarded where only internal factors exist.
I9: Post-implementation review (REV)	$REV = \sum_{c=1}^{t=1} k$ Where REV is evidence of a post-implementation review performed over the KPI. A score of k = 1 is awarded where a post-implementation review is performed, and a score of k = 0 where it is not.
I10: Comparatives provided (COMP)	$COMP = \sum_{c=1}^{t=1} k$ Where COMP is an indicator that prior year results were provided for the KPI. A score of k = 1 is awarded when comparatives are provided and k = 0 when they are not.

To ensure all KPIs were captured, a keyword search was performed for terms including, for example, “key performance indicator”, “KPI”, “performance evaluation”, “metric”, “evaluation” and “key performance metrics”. The coding per the KPI-ITI was reviewed by two research assistants to ensure the accuracy and completeness of the KPIs captured and the scoring per indicator[9].

Gauging the extent to which KPIs incorporate integrated thinking

The extent to which KPIs incorporate integrated thinking is described using the following expression:

$$KPI = AS + T + C_{SDG} + C_{CAP} + APP + SE + MAT + FAC + REV + COM$$

To limit subjectivity, each element of the expression is treated as having equal importance. The computation of individual indicators is explained in Table 1.

The indicators, each with an equal weighting[10], illustrate the application of integrated thinking in an organisation’s KPIs. The sum of the elements is a KPI-ITI where a higher score implies

[10] The maximum score on the KPI-ITI is 10.

more extensive application of integrated thinking. This is used to evaluate the extent of integrated thinking reflected in the KPI disclosures. An initial pilot test was run on a sample of ten companies to refine the indicators used in Table 1. Preliminary results were presented at two workshops at the researcher's home institution and at an international corporate governance conference.

Calibration

Each company is allocated a score according to the KPI-ITI. Data are presented in tabular and graphical formats for ease of interpretation. Kruskal-Wallis tests, supported by Spearman rho and Kendal's Tau B, are used to provide additional perspectives on changes in the KPI-ITI scores over the period under review. Non-parametric tests are used as these are less sensitive to sample-size effects and departures from normality. As the study is an exploratory one, which is not concerned with testing possible drivers of high levels of integrated thinking or establishing a causal model for generalising findings, regression or structural equation models are not used.

This study does not aim to quantify KPIs, so a mathematically precise measure is unnecessary. An index designed specifically to evaluate KPIs is better than using a broad proxy which was not intended for such purpose or no measure at all. This paper does not aim to define a framework that supports KPIs within a sustainability context, but rather to establish key components of KPI-setting which will assist companies in implementing KPIs which support an integrated thinking logic.

The KPI-ITI was calibrated by comparing the results of the index to alternate proxies of integrated thinking. Integrated thinking proxies include the integrated reporting quality scores (IRQ) developed by Ernst & Young (EY, 2022) and the Morgan Stanley Capital International (MSCI) "social, environmental and governance pillars" (Malafronte & Pereira, 2021; MSCI, 2022) (see Section 4.3). Table 2 details the variables used in the calibration tests.

Table 2: Summary of variables used in the statistical analysis

Grouping variable	Type	Assessment[11]	Reason for test
Size	Ordinal	Entities will be allocated to a size quartile based on the natural logarithm of total assets.	Entities that are larger in size are expected to have more robust controls and systems resulting in the ability to implement KPIs that cover a broader range of financial, social and environmental factors. These entities should have a higher KPI-ITI.

[11] [1] is allocated to the lowest quartile (smaller size/weaker financial performance/higher leveraging) and [4] to the highest quartile (higher performing metrics).

Financial performance	Ordinal	Entities will be allocated to a quartile based on the "return on assets" metric.	Higher profit implies a greater ability to implement and evaluate suitable KPI structures, resulting in a higher KPI-ITI (Alrazi et al., 2015).
Leverage	Ordinal	Entities will be allocated to quartiles based on the debt/equity ratio of the entity.	Lower leveraged entities have the financial resources to implement robust performance evaluation systems and processes, resulting in a higher KPI-ITI (Alrazi et al., 2015).
Industry	Ordinal	Entities will be allocated scores based on industry impact: mining/industrial [3]; financial [2]; other industries [1].	Companies in more socially sensitive industries would be expected to have a higher KPI-ITI given that the KPIs will be based on broader and more holistic capitals and SDGs being achieved (Cho et al., 2014).
Alternate measure of integrated thinking used for calibration testing			
IRQ	Ordinal	The scale from lowest to highest quality is: "Progress to be made" [1], "Average" [2], "Good" [3], "Excellent" [4] and "The Top 10" [5]. These are converted to an ordinal score where a higher value indicates better quality reporting	Integrated report quality measures per the EY "Excellence in Integrated Reporting Awards" and is a proxy for integrated thinking.
MSCI	Ordinal[12]	Companies are scored from high exposure to ESG risks and failure [CCC (laggard MSCI rating rated)] to those leading in the management of significant ESG factors and capitalising on emerging ESG-related opportunities [AAA (leader MSCI rating rated)]. These are then allocated to a quartile with [4] allocated to top performing companies and [1] to lowest performing companies.	Managing the combined effect of economic, environmental and social factors on an organisation's strategy and risk management operations per the MSCI aligns with an integrated thinking philosophy as per the IIRC (2021).

The strength of associations between the KPI-ITI, IRQ and MSCI scores are given by Spearman rho correlation coefficients. The test is robust to non-normal data which are measured on continuous or ordinal scales. Results are confirmed using Kendal's Tau B which is robust to the effect of smaller sample sizes. To ensure that observations are independent, the tests are run on each of the three years.

Companies are grouped according to their IRQ and MSCI scores as well as their size, financial performance, leverage and industry (Table 2) to gauge the sensitivity of the KPI-ITI to company-specific factors. Differences in the KPI-ITI scores per grouping variables are

[12] MSCI generates both a continuous and ordinal measure of integrated thinking. The ordinal measure is used in the same way as IRQ scores to test for differences in KPI-ITI scores.

determined. The statistical significance of the differences is evaluated using a Kruskal Wallis test and other association tests.

4: Results

Table 3 includes the general statistics of the KPIs analysed over the periods 2013, 2017 and 2021.

Table 3: General statistics

	2013	2017	2021	H-stat 2013-2021	JT-stat 2013-2021
Total number of KPIs analysed[13]	586	611	606	-0.94	0.89
Number of companies with no KPIs disclosed	2	0	3	-0.56	0.46
Minimum KPI-ITI for a company as a whole[14]	3	2.8	4.1	-1.68*	1.71**
Maximum KPI-ITI for a company as a whole	7.33	7.97	7.97	-2.06**	2.04**
Mean KPI-ITI across all 40 sampled entities	5.88	5.96	6.20	-1.57	1.55
Median KPI-ITI across all 40 sampled entities	6.00	6.10	6.40	-0.05	0.07
Most mentions of KPIs in a report	34	66	82	-3.09***	3.08***
Maximum number of pages of a primary report	348	292	312	0.56	-0.61

*Correlations exist at the ***1%, **5% and *10% level of significance*

There was a marginal improvement of 5.44% in the mean KPI-ITI scores from 2013 ($\bar{X}$ = 5.88) to 2021 ($\bar{X}$ = 6.20) but the change is not statistically significant (H = -1.57, p > 10%). The slow growth in the KPI-ITI may be attributed to organisations having difficulty with operationalising integrated thinking principles, specifically in the context of KPI implementation. Organisations have not yet holistically adopted the ten indicators of integrated thinking in performance evaluation structures. Most organisations focused on financial capital and did not integrate multiple capitals nor SDGs into performance evaluation.

Some organisations do, however, have a high KPI-ITI (maximum = 7.97) indicating that they are establishing a sophisticated MIS and incorporating proactivity in performance evaluation over time (H = -2.06, p < 5%). Despite this, the contrast between the minimum (2021 = 4.1) and maximum (2021 = 7.97) KPI-ITIs illustrates that while some companies are applying integrated thinking principles in KPI determination, others have not fully adopted such principles, nor have they understood integrated KPIs. KPIs are, however, being disclosed with increasing prominence in primary reports (H = -3.09, p < 1%). This may be due to several factors such as increased stakeholder pressure, external influences as well as company features (Alrazi et al., 2015). As organisations have more time to mature and understand integrated and other sustainability frameworks, including the need to adopt these, progress can be made in integrating this mindset into performance evaluation structures.

[13] In total, five companies did not disclose KPIs at the company level.
[14] This statistic does not include scores of 0 obtained by companies that did not disclose KPIs.

4.1: Specific indicator trends

Table 4 details the statistics per indicator of the KPI-ITI over the periods 2013, 2017 and 2021.

Table 4: Indicator analysis

	2013	2017	2021	U-stat 2013-2017	U-stat 2017-2021	H-stat 2013-2021	JT-stat 2013-2021
Indicator 1: Percentage of KPIs assured							
• Combined assurance	26.70%	31.99%	29.45%	7.02***	-4.71***	-2.80***	2.51***
• Formal approval	23.28%	25.21%	32.54%	1.28	10.76***	-10.99***	11.82***
• Monitor performance	30.28%	32.21%	33.59%	1.90	4.44***	-5.77***	5.96***
Indicator 2: Timeframe analysis							
• Short-term KPIs	95.59%	93.78%	81.54%	-1.40	-4.77***	6.32***	-5.97***
• Medium-term KPIs	4.07%	4.26%	14.05%	0.16	3.97***	-4.36***	4.08***
• Long-term KPIs	0.00%	1.96%	3.92%	3.42***	2.02	-4.87***	4.86***
Indicator 3: Average number of SDGs explicitly linked to KPIs	0.00	0.08	0.61	0.00	3.09*	-3.38***	2.73***
Indicator 4: Percentage coverage of multi-capitals							
• Financial	57.65%	56.79%	37.44%	-0.23	-6.84***	7.00***	-7.01***
• Natural	10.71%	10.47%	17.73%	-0.12	3.61***	-3.73***	3.61***
• Human	16.67%	16.53%	19.54%	-0.04	1.33	-1.34***	1.33
• Social and relationship	6.80%	7.86%	14.12%	0.72	3.47***	-4.28***	4.11***
• Intellectual	2.21%	2.13%	4.93%	-0.09	2.63***	-2.80***	2.63***
• Manufactured	5.95%	6.22%	6.24%	0.21	-0.01	-0.21	0.21
Indicator 5: Level of application of KPI							
• Staff	0.00%	0.00%	0.00%	0.00	0.00	0.00	0.00
• Executives	2.10%	2.43%	5.37%	0.52	4.73***	-5.47***	5.16***
• Company as a whole	100.00%	100.00%	100.00%	0.00	0.00	0.00	0.00
Indicator 6: Stakeholder engagement							
• On remuneration policy	99.66%	100.00%	96.90%	1.44	-4.39***	4.48***	-3.66***
• On issues addressed by KPI	97.97%	92.14%	67.16%	-4.63*	-10.85***	15.21***	-13.98***
Indicator 7: Percentage of companies considering materiality	95.25%	99.02%	99.51%	3.93*	1.01	-5.22***	4.65***
Indicator 8: Factors influencing the achievement of KPIs							
• External influences	8.14%	9.82%	9.97%	1.02	0.09	-1.09	1.11
• Internal influences	91.53%	91.16%	97.55%	-0.22	4.83***	-4.22***	4.84***
Indicator 9: Percentage of companies using a post-implementation review	65.25%	68.74%	82.35%	1.28	5.54***	-6.61***	6.75***
Indicator 10: Percentage of companies including comparative information	84.24%	84.45%	89.05%	0.10	2.37	-2.40	2.46***

****Correlations exist at the 1% level of significance*

Combined assurance obtained over KPIs increased from 2013 (26.7%) to 2017 (31.99%, U = 7.02, p < 1%). However, it then decreased from 2017 to 2021 (29.45%, U = -4.71, p < 1%). As part of the combined assurance strategy, 49.35% of KPIs were externally assured in 2021 indicating that at least half of KPIs are subjected to more detailed measures to ensure that the outcomes have been verified for accuracy and completeness. There is also a steady increase in efforts to monitor (H = -5.77, p < 1%) and formally approve (H = -10.99, p < 1%) KPIs from 2013 to 2021.

In 2013, almost all KPIs were short-term focused (95.59%) with no long-term KPIs set. This coincides with the financial-centric focus which dominated that time period. A slight shift away from a short-term focus is noted in 2017, however significant steps were not yet evidenced to develop a multi-timeframe horizon (93.78%; U = -1.40, p > 10%). In 2021, short-term KPIs made up 81.54% of the total with medium-term (14.05%; H = -4.36, p < 1%; JT = 4.08, p < 1%) and long-term (3.92%; H = -4.87, p < 1%; JT = 4.86, p < 1%) KPIs gaining significance to promote long-term value creation. Because of unforeseen future events, organisations may be exercising prudence by not setting KPIs in the long-term in fear of the KPIs being unattainable near the date of realisation. Should a robust MIS be implemented, it would encourage a long-term focus as companies will be able to collect data, monitor performance and adjust KPIs accordingly.

The number of SDGs explicitly linked to KPIs has increased over time (H = -3.38, p < 1%). By 2021, almost 1 SDG (0.61) was being explicitly linked to performance evaluation. Although many SDGs are implicitly linked in environmental, social and governance (ESG)-related KPIs, many companies are not explicitly linking performance evaluation to the SDGs. This may be due to a difficulty in aligning supranational objectives at a company level.

There is a notable shift away from financially focused KPIs from 2013 to 2021 with a significant decline in the number of KPIs linked only to financial outcomes (H = 7, p < 1%; JT = -7.01, p < 1%). Financial capital was the dominant KPI focal area in 2013 (57.65%) with only an insignificant downward decline to 2017 (56.79%; U = 0.23, p > 10%) before a significant movement in 2021 (37.44%; U = -6.84, p < 1%). This shift may be because of increased stakeholder pressure on organisations to acknowledge the other capitals. Integrated thinking characterises the acknowledgement of the interdependencies of the capitals on each other (Maroun et al., 2023). As a result, a shift away from a financial-centric mindset is an indication of the presence of a more sophisticated integrated thinking logic. Axiomatically, financial capital will still form a significant part of performance metrics for profit-driven companies. However, it is encouraging to note the adoption of a more multi-capital approach to KPI setting amongst South African organisations.

The presence of natural capital in KPIs has improved in aggregate from 2013 (10.71%) to 2021 (17.73%; H = -3.73, p < 1%). Sustainability-related frameworks and guidance such as, for example, the GRI, the Taskforce on Nature-related Financial Disclosures (TNFD) and the Carbon Disclosure Project (CDP) may have assisted companies in incorporating environmental and biodiversity considerations in performance evaluation. As entities received more guidance on how to account for their environmental performance, they more readily reported on it. As global warming and environmental sustainability has caused more concern over the years, organisations have become more cognisant of their environmental impact and consequently, report on it as a company-wide and employee-specific KPI.

Human capital considerations in performance evaluation have also increased from 2013 (16.67%) to 2021 (19.54%; H = -1.34, p < 1%). The increase over the years may be a consequence of increased stakeholder engagement with employees and a growing awareness of taking employee safety, skills, well-being and job security into account. Additionally, South Africa's Broad Based Black Economic Empowerment (BBBEE)[15] policies may be factored into performance evaluation to improve BBBEE compliance status which will enhance both financial and human capital outcomes.

The integration of social and relationship capital into KPIs has increased from 2013 (6.80%) to 2021 (14.12%; H = -4.28, p < 1%). A key challenge in addressing this capital is that stakeholder expectations change over time, requiring organisations to monitor the effectiveness and relevance of the KPIs which address social and relationship capital. An efficient MIS may assist entities in augmenting these KPIs with stakeholder needs that were established from continuous and effective stakeholder engagement (Alrazi et al., 2015).

Intellectual capital considerations as part of KPIs have grown from 2017 (2.13%) to 2021 (4.93%; U = 2.63, p < 1%), however, this remains the smallest component of KPIs from a capital perspective. This may be indicative of innovation incentives not being prominent performance metrics. Companies may be focusing on addressing more pressing issues focused on short-term goals. Incorporating manufactured capital as part of the KPI strategy has remained relatively consistent over the period from 2013 to 2021 (H = -0.21, p > 10%) suggesting that the maintenance of manufactured capital, as part of a performance evaluation strategy is not a priority. Additionally, investing in manufactured capital often requires substantial upfront capital, which is challenging to secure in an emerging economy with a high

[15] The Broad-Based Black Economic Empowerment Act aims to rectify past inequalities imposed on specific races in South Africa through the empowerment of these races by promoting participation and ownership in the country's economic activities. It encompasses preferential procurement, skills development and equity ownership to redress the imbalances created during the past.

borrowing rate and may be difficult to attribute to performance evaluation given that it is based on fluctuating organisational needs.

Results show an improvement over time regarding the alignment of individual executive KPIs with companywide KPIs (2013 = 2.10%, 2021 = 5.37%; H = -5.47, p < 1%). When executive directors' KPIs are linked to companywide KPIs, it promotes decision-making which benefits the organisation as a whole, rather than focusing solely on departmental or individual goals.

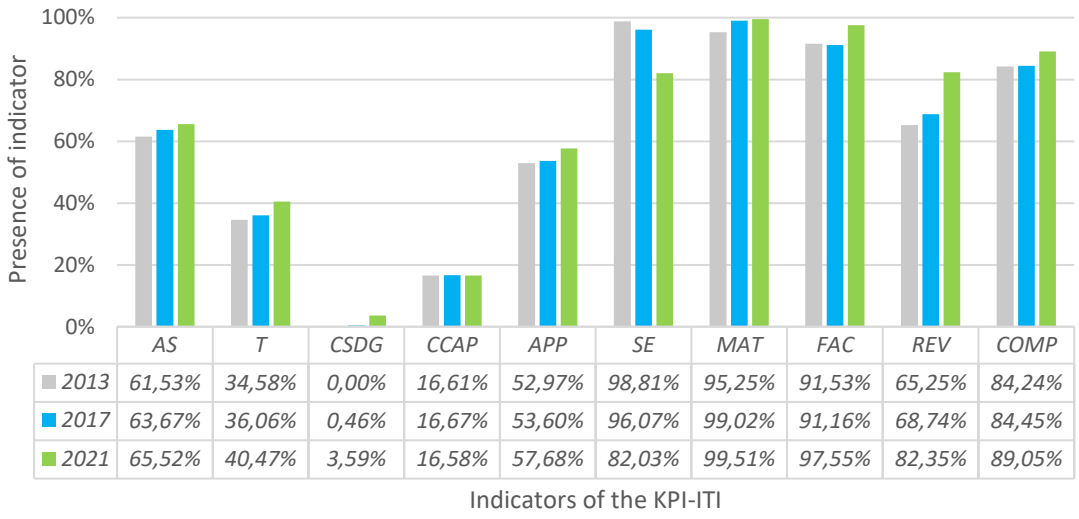
Stakeholder engagement on the specific issues addressed by the KPI has significantly decreased over time (2013 = 97.97%; 2021 = 67.16%; H = 15.21, p<1%; JT = -13.98, p < 1%). This decrease may be a result of many KPIs not being met because of post-COVID-19 political, social and economic challenges in South Africa. In response, companies may have refrained from addressing poor performance with stakeholders in order to manage impressions. However, stakeholder engagement on the remuneration policy is exercised by almost all companies every year. King IV requires organisations to obtain a non-binding advisory vote from shareholders on the remuneration policy (IOD, 2016), necessitating stakeholder engagement on the remuneration policy.

The significant improvement in post-implementation reviews (2013 = 65.25%; 2021 = 82.35%; H = -6.61, p < 1%; JT = 6.75, p < 1%) is indicative of an enhanced effort from management to assess their progress and performance and implement corrective and remedial action where necessary.

Finally, indicators 7 (materiality), 8 (factors) and 10 (comparative information) have performed consistently well across all 3 years, showing that companies have understood these principles well, probably as a result of adopting the Framework's principles since its publication.

Figure 3 summarises the results per indicator on the KPI-ITI over time. Integrated thinking practices improve over time as accounting and management infrastructure mature and management develop a better understanding of capital interconnections. The observed improvement in KPI-ITI scores over time supports the functionality of the KPI-ITI and the extent to which integrated KPIs are being included in organisation's performance evaluation structures and reports. This iterates the ability of the KPI-ITI to assess the extent of integrated thinking in performance evaluation.

Figure 3: Total scores per indicator of integrated thinking



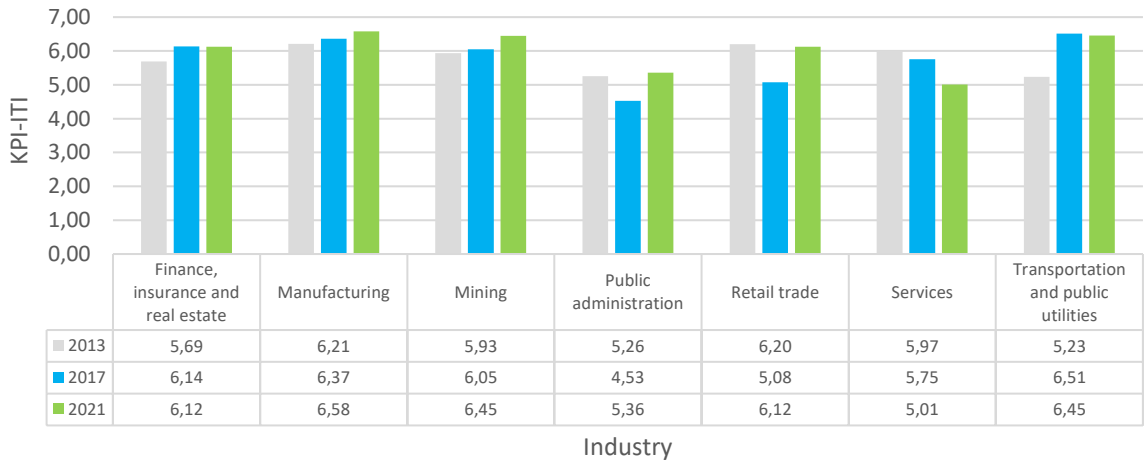
	AS	T	CSDG	CCAP	APP	SE	MAT	FAC	REV	COMP
2013	61,53%	34,58%	0,00%	16,61%	52,97%	98,81%	95,25%	91,53%	65,25%	84,24%
2017	63,67%	36,06%	0,46%	16,67%	53,60%	96,07%	99,02%	91,16%	68,74%	84,45%
2021	65,52%	40,47%	3,59%	16,58%	57,68%	82,03%	99,51%	97,55%	82,35%	89,05%

4.2: Complementary analysis

To provide further insights, the nature and extent of KPI-ITI reporting is analysed by examining how the KPI-ITI scores differ among different sized companies, as well as in different industries.

The KPI-ITI differs across the industries in total (H = 215.528, p < 1%) with statistically significant changes in industry scores between 2013 and 2021 noted for finance, insurance and real estate (H = -5.16, p < 1%), mining (H = -8.06, p < 1%), services (H = 4.62, p < 1%) and transportation and public utilities (H = -7.61, p < 1%). Refer to Figure 4.

Figure 4: KPI-ITI over time per industry



	Finance, insurance and real estate	Manufacturing	Mining	Public administration	Retail trade	Services	Transportation and public utilities
2013	5,69	6,21	5,93	5,26	6,20	5,97	5,23
2017	6,14	6,37	6,05	4,53	5,08	5,75	6,51
2021	6,12	6,58	6,45	5,36	6,12	5,01	6,45

	Mean	Median	Standard deviation	H-stat 2013-2021	JT-stat 2013-2021
Finance, insurance & real estate	5.98	6.12	0.21	-5.16***	4.39***
Manufacturing	6.38	6.37	0.15	0.29	-0.54
Mining	6.14	6.05	0.22	-8.06***	8.11***
Public administration	5.05	5.26	0.37	-0.11	-0.23
Retail trade	5.80	6.12	0.51	0.25	-1.15
Services	5.58	5.75	0.41	4.62***	-4.93***
Transportation & public utilities	6.07	6.45	0.59	-7.61***	6.74***

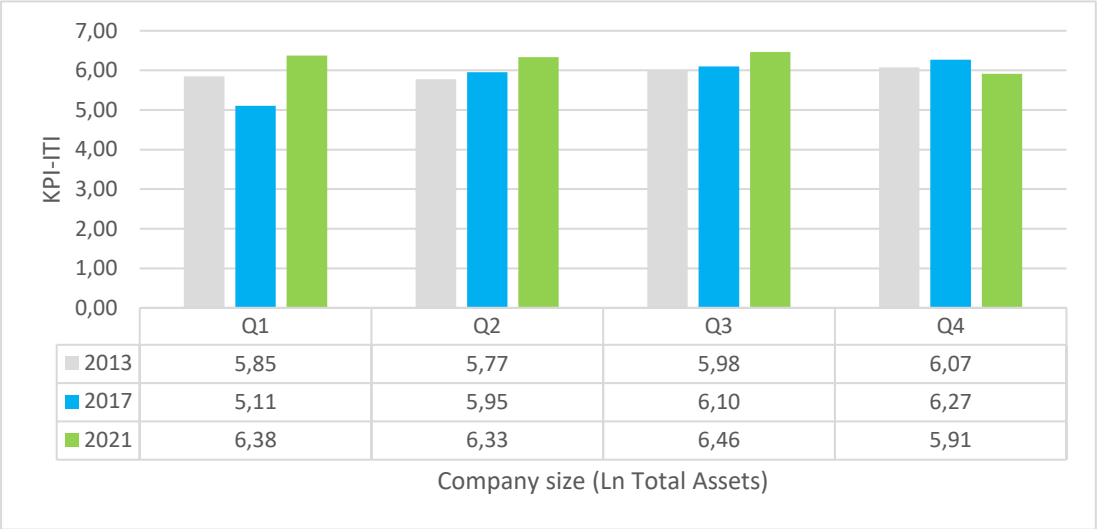
****Statistical significance at 1% level*

The public administration ($\bar{X}$ = 5.05) and services ($\bar{X}$ = 5.58) sectors exhibited the lowest KPI-ITI. Complex structures and departmental fragmentation within public administration often result in isolated reporting, with departments prioritising their financial KPIs over broader implications. Other than the services and retail trade industries, all other industries have improved over time.

Companies in the manufacturing ($\bar{X}$= 6.38) and mining ($\bar{X}$ = 6.14) sectors show the highest KPI-ITI. Manufacturing and mining companies face intricate, multi-stakeholder supply chains and impacts on natural resources, necessitating integrated strategies to optimise the value chain holistically, including ESG considerations. Reporting on resource conservation becomes a significant concern for these companies, potentially prompting increased inclusion of natural capital in performance assessments. Integrated thinking enables sustainable product design, life cycle considerations and differentiation through environmental and social responsibility while promoting quality. This is reflected in how the organisation structures its KPIs.

Figure 5 shows how the KPI-ITI has changed over time based on companies of different sizes. The companies were stratified into quartiles based on their log of total assets, with the first quartile (Q1) representing the smallest companies and the last quartile (Q4) representing the largest companies in the sample.

Figure 5: KPI-ITI over time per company size



	Mean			Median			Standard deviation			H-stat 2013-2021	JT-stat 2013-2021
	2013	2017	2021	2013	2017	2021	2013	2017	2021		
Q1	5.85	5.11	6.38	6.10	5.47	6.30	0.91	0.67	0.50	-5.60***	5.85***
Q2	5.77	5.95	6.33	5.91	6.14	6.66	0.82	0.72	0.91	-6.39***	5.80***
Q3	5.98	6.10	6.46	6.42	6.35	6.43	0.85	1.13	0.85	-4.23***	4.20***
Q4	6.07	6.27	5.91	6.33	6.44	6.13	0.48	0.67	0.94	1.15	-1.44

****Significant at the 1% level*

In 2013 (Q4 = 6.07) and 2017 (Q4 = 6.27), the largest companies in the sample had the highest KPI-ITI. This may have been due to the larger entities having sufficient financial resources to implement policies and procedures to oversee the KPI determination process. These entities were able to react to changes in sustainability requirements quicker and implement policies to incorporate these considerations into performance evaluation structures. This is supported by a robust MIS to track material issues and progress towards the achievement of their objectives as well as enhanced stakeholder engagement.

However, by 2021, the KPI-ITI of the largest organisations in the sample had declined (Q4 = 5.91; H = 1.15, p > 10%; JT = -1.44, p >10%). Organisations in Q1 – Q3 had overtaken the Q4 organisations on the KPI-ITI and shown significant progress in adopting more integrated KPIs (Q1: H = -5.60, p < 1%; Q2: H = -6.39, p < 1%; Q3: H = -4.23, p < 1%). As organisations begin to understand and incorporate integrated thinking in operations and strategies, this can be included in performance evaluation structures. Given the growing sustainability agenda, particularly from 2017, many organisations may have taken to mimetic isomorphism to adopt the disclosed structures and policies of larger organisations. These could then be more easily adapted to smaller stakeholder groups and simpler business models to achieve a higher KPI-ITI.

4.3: Calibration tests

To support the functionality of the KPI-ITI and the ability of the KPI-ITI to capture integrated thinking, the scores generated using the KPI-ITI are compared to established integrated thinking proxies per the prior academic literature. This includes the IRQ scores developed by Ernst & Young (EY, 2022) and the MSCI "social, environmental and governance pillars" (Venter et al., 2017) .

The EY Awards assess the quality of integrated reports produced by South African-listed companies based on the implementation of the guiding principles and content elements from the Framework (VRF, 2021), along with the fundamental idea of value creation across the six capitals (EY, 2022). Higher quality integrated reporting can indicate the effectiveness of an organisation's commitment to a multi-capital outlook over a multi-timeframe horizon (refer Section 2.1). In other words, the MIS, processes and holistic analysis used to develop high quality reports may be indicative of an integrated thinking logic (Barth et al., 2017; Venter et al., 2017).

The MSCI ESG ratings measure a company's resilience to, and management of, long-term industry material ESG risks which aligns with an integrated thinking philosophy (Malafronte and Pereira, 2021). This includes the internal management and monitoring of the integration of economic, environmental and social dimensions (MSCI, 2022). This provides an external database to assess whether ESG factors are incorporated into an organisation's strategies, operations and actions and is reasonable proxy for integrated thinking used in prior studies (Maroun et al., 2023).

Kendal's Tau B and Spearman rho correlations[16] were run to confirm the robustness of the KPI-ITI in gauging the extent of integrated thinking explicated by KPI disclosures by comparing the results of the KPI-ITI to the MSCI and IRQ scores of the companies in the sample. Refer to Table 5.

Table 5: Correlation between KPI-ITI, MSCI and IRQ scores over time

		KPI-ITI	MSCI	IRQ
2013	**KPI-ITI**	1.000	-0.044	0.074
	MSCI	-0.042	1.000	0.648***
	IRQ	0.071**	0.526***	1.000
2017	**KPI-ITI**	1.000	0.241***	0.361***
	MSCI	0.184***	1.000	0.691***

[16] Spearman's rho coefficients are reported below the diagonal. Kendal's Tau B results are reported above the diagonal.

Table 5: Correlation between KPI-ITI, MSCI and IRQ scores over time				
		KPI-ITI	**MSCI**	**IRQ**
	IRQ	0.278***	0.598***	1.000
2021	**KPI-ITI**	1.000	0.147***	0.336***
	MSCI	0.113***	1.000	0.582***
	IRQ	0.271***	0.506***	1.000

****Correlation is significant at the ***1% & **5% level*

Table 5[17] shows that the KPI-ITI scores are correlated with both the IRQ (T_b = 0.361; r_s = 0.278, p < 1%) and MSCI (T_b = 0.241; r_s = 0.184, p < 1%) scores from 2017 onwards, indicating that the KPI-ITI is calibrated with established integrated thinking principles. This supports the assertion that the index can be used by management and other stakeholders as a tool to implement and evaluate integrated KPIs.

A Pearson correlation was conducted to assess the magnitude of associations between KPI-ITI scores and grouping variables (see Table 2) such as profitability (ROA) and leverage (Debt/Equity) to examine the impact which entity-specific factors have on the respective KPI-ITI scores. Refer to Table 6.

Table 6: Correlation between KPI-ITI and grouping variables					
	KPI-ITI	**ROA**	**Debt/Equity**	**MSCI**	**IRQ**
KPI-ITI	1.000	0.117***	-0.123***	0.134***	0.273***
ROA	0.117***	1.000	-0.131***	0.071***	0.135***
Debt/Equity	-0.123***	-0.131***	1.000	0.046*	0.045*
MSCI	0.134***	0.071***	0.046*	1.000	0.603***
IRQ	0.273***	0.135***	0.045*	0.603***	1.000

*Correlations exist at the ***1%, **5% & *10% level of significance*

More profitable companies have a higher KPI-ITI (r_p = 0.117, p<1%). Companies with higher profitability tend to demonstrate higher levels of integrated thinking in their KPI disclosures. These organisations can allocate more resources to data collection, analysis and reporting, enabling the development of integrated KPIs. Having a diverse stakeholder base compels them to adopt a comprehensive reporting approach, aligning with stakeholder expectations. Supporting this, a negative correlation (r_p = -0.123, p < 1%) suggests that companies with higher leverage levels tend to have lower KPI-ITI scores. This aligns with prior literature supporting the fact that larger organisations which are more profitable have the capabilities to implement a stronger integrated thinking ethos which can also be translated to performance evaluation as one of the indicators of an integrated thinking logic (Maroun et al., 2023).

[17] The results are shown on a total basis over 2013, 2017 and 2021.

Further supplementary results are provided in Appendix C. This includes an analysis of SDGs, results on the assurance of KPIs, sensitivity analyses and best/worst case disclosure practices identified from the companies in the sample. These results provide an additional, in-depth examination of notable findings from the data studied.

5: Conclusion

This paper develops a tool for evaluating the extent to which KPIs incorporate integrated thinking indicators. Ten indicators are identified which form the basis of the KPI-ITI. The KPI-ITI is then applied to a sample of JSE-listed entities to illustrate its functionality and the extent to which "integrated KPIs" are being included in primary reports of organisations for the periods 2013, 2017 and 2021. The results of the KPI-ITI are calibrated against established proxies of integrated thinking to support the robustness of the tool.

The KPI-ITI developed can be used to evaluate the level of integrated thinking evidenced in performance evaluation structures. Overall, there has been an improvement in the level of integrated thinking demonstrated and reported by way of KPI disclosures over the period from 2013 to 2021. This is driven primarily by organisations exercising post-implementation reviews, incorporating SDGs in KPI structures and taking a multi-capital approach to KPI setting. The recognition of interdependencies among different capitals has led to the development of an integrated thinking logic. This logic can be further advanced by investing in a robust MIS and enhancing stakeholder engagement. The findings highlight the diminishing dominance of financial KPIs, signalling a shift towards a multi-capital approach. Although natural and human capital are gaining prominence, there is still room for growth in incorporating broader capital objectives as part of performance metrics.

The KPI-ITI has been calibrated with established integrated thinking proxies (IRQ and MSCI) supporting its robustness. This correlation underscores a consistent relationship between indicators which the KPI-ITI embodies and measures of corporate social responsibility and governance, indicating a holistic approach to organisational performance evaluation. This alignment substantiates the value of integrated thinking principles in fostering comprehensive performance evaluation frameworks which encompass not only financial metrics but also broader sustainability and responsible business practices.

The researchers acknowledge that while the KPI-ITI has been validated using established integrated thinking proxies, there is room for improvement and further research. Expanding the application of the KPI-ITI to different contexts, including the private sector and governmental organisations in various jurisdictions, can offer additional insights into the levels and evolution of integrated thinking in KPI disclosures. This becomes particularly relevant

when the tool is used in countries which have not explicitly embraced extra-financial reporting for publicly listed companies. The tool can also be applied to a larger sample size, different sized entities and a cross-jurisdictional analysis where different material issues and stakeholder expectations impact KPI disclosures. Furthermore, conducting positivist-inspired studies to investigate determinants of integrated thinking in KPI disclosures, its relevance in terms of value and its broader implications can contribute to understanding how companies transition from a one-dimensional focus on financial performance to a more diverse approach to achieving long-term sustainability.

A further limitation is that management may disclose integrated KPIs as an impression management tool but the KPIs may lack substance in terms of the impact on the different capitals or ESG outcomes. The risk of manipulation of these KPIs to achieve a financial gain for the directors or employees can also not be precluded. Future research can continue to explore the assurance of non-financial information, particularly in the context of performance evaluation disclosures.

The study may also be expanded by interviewing management at organisations to understand the practical application of integrated thinking in KPI disclosures and obtain viewpoints from practitioners, executives and assurance providers. With the emergence of sustainability standards such as IFRS S1 and S2, future research can examine the extent of integrated thinking in sustainability-related disclosures using the index and how different frameworks are adopted as part of the broader performance evaluation objectives and considerations.

Despite the limitations, this study provides an important contribution to stakeholders in evaluating the extent of integrated thinking evidenced by performance evaluation disclosures, which has not been explored in depth and is an underdeveloped concept both in academia and practice.

The benefits of integrated thinking lend themselves to a need for companies to utilise this within their operations, reporting and communication. Future research will help to clarify this concept and allow organisations and stakeholders to evaluate KPIs in more detail. This will improve the levels of integrated thinking in the South African business landscape with the hope of improving stakeholder communication, management of the capitals and SDGs, as well as overall value creation. The benefits will then materialise for multiple stakeholders through an ethos of integrated thinking.

6: Appendices

6.1: Appendix A: Bibliometric analysis

To understand the prior literature on KPIs, a detailed assessment of relevant academic sources was performed. This systematic review of the existing body of knowledge allows the researchers to investigate key themes, patterns and gaps in KPI-related research. This provides a solid foundation for the current study and facilitates a deeper understanding of how KPIs have been developed, applied and improved over time. It also enables researchers to draw on the body of knowledge from prior literature, while identifying areas in which fresh perspectives and insights are needed.

Search protocol

In total, 979 academic sources from 2013 to 2023 included in the Scopus Database were analysed using a content and bibliometric analysis dealing specifically with KPIs. The features of KPIs are summarised and classified in conjunction with research methods, epistemological paradigms, and locus of enquiries employed. Focus was placed on internationally recognised journals (Dumay et al., 2016; Rinaldi et al., 2018) instead of restricting research to highly ranked journals. The Scopus Database was used based on the merit of its discerning filtration criteria (Dumay et al., 2016; Rinaldi et al., 2018) and its incorporation of reputable journals featuring robust peer-review procedures.

A systematic inquiry was conducted to identify articles in the Scopus Database which included the terms “key performance indicator”; “performance indicator”; “KPI” or “performance evaluation” in their titles, keywords or abstracts. The thematic categorisation was refined to encompass KPIs across various domains, specifically: business, finance, accounting, assurance, sustainability, capitals, management, risk and policy. All documents, including “final” and “in press” publications, were evaluated. The search was initiated on 1 January 2013, which corresponds to the year the IIRC published the Framework until 31 March 2023. This provides a 10 year period over which to assess the progress and state of research on KPIs.

The preliminary search yielded a total of 979 documents. Each document underwent an assessment to gauge its relevance to the research topic (Dumay et al., 2016). The researcher reviewed the title, abstract and content of each document (ibid). Documents which did not align with the current study were subsequently excluded, with any disparities resolved by the supervisor prior to further coding the articles. To ensure the completeness of the literature search, it was reperformed after six months, covering the same period to mitigate the risk of omitting pertinent publications. Subsequently, the filtration criteria were broadened to encompass “integrated reporting” and “integrated thinking”. This expansion was predicated on

the notion that papers addressing “integrated reporting” or “integrated thinking” can offer insights into the disclosure practices in relation to KPIs and how an integrated thinking logic can be evidenced through such disclosures (Maroun et al., 2023). These papers were thoroughly screened to confirm that they explored integrated reporting disclosure practices and the operationalisation of an integrated thinking logic in the context of performance evaluation structures.

It is a limitation that relevant articles not included in the Scopus Database are overlooked. As the intention of the bibliometric analysis is to gauge the direction being taken by KPI research and not to provide a detailed count of prior literature, this is not considered a material issue (Rinaldi et al., 2018). Furthermore, given the large quantum of research assessed based on the Scopus Database output, it is unlikely that any material changes in the analysis can be identified. After controlling for irrelevant KPI research in the context of integrated thinking, **667 academic sources** were identified as relevant to the current study. This provides a large sample from which to assess the state of KPI research and to identify key trends which can be used to evaluate the development of integrated KPIs.

Content analysis

Each academic source was classified according to methodology, epistemological paradigms, and locus of enquiries employed (see Table 7).

Table 7: Coding of the academic sources

Characteristic	Details
Publication information	The content, publication year, abstract and keywords
Research objectives	The purpose and objectives of the research
Key themes	The focus of the research categorised KPIs, integrated thinking, integrated reporting and a combination of all areas
Affiliated country/ies	The country that the academic source was published in
Research methodology	Research methods are categorised as case study, commentary/normative/policy, content/historical analysis, survey/questionnaire/other empirical research
Locus of enquiry	The research is classified as macro-, meso- or micro-level research. The macro-level explores social structures and their relevance for integrated KPIs. The meso-level deals with how organisations are interpreting and applying integrated thinking in their KPI disclosures. The micro-level deals with the application of KPIs by specific organisations (adapted from Rinaldi et al., 2018)
Epistemological paradigm	The epistemology categorised as positivist, interpretive or critical. Positivist focuses on quantitative methods and aims to achieve distinct objectives. The interpretive approach employs qualitative techniques and a subjective understanding of social constructs. The critical perspective is normative in nature and supports specific viewpoints, advocating for social critique and transformative change (adapted from Maroun & Jonker, 2014)

Sources which did not fit into a specific research typology were assigned to the category that was most suitable (Dumay et al., 2016; Maroun & Jonker, 2014; Rinaldi et al., 2018). The methodology as per Ecim and Maroun (2023) has been adopted and adapted from a focus on integrated thinking only to include performance evaluation. The use of coding sources necessitated the exercise of professional judgement to prevent researcher bias and unintentional limitations on the boundaries of the analysis (De Villiers et al., 2019; Rinaldi et al., 2018). Upon accessing and examining additional sources, the paper classifications were reevaluated and updated as needed. The results were documented in a theme table and reviewed again after six months to ensure veracity and consistency. Subsequently, a bibliometric analysis was conducted.

Bibliometric analysis

Bibliometric analysis examines the connection, volume and influence of research using procedures such as citation, authorship and country affiliation analysis (Lopes & Penela, 2021; Zupic & Čater, 2015). The 667 sources were analysed using bibliometric tools such as citation, co-citation, bibliographic-coupling and keyword co-occurrence analyses (Van Eck & Waltman, 2017) . The citation analysis evaluates frequently cited authors, publications and topics while the co-citation analysis examines the number of citations and likeness of articles which cite two or more authors together (Caputo et al., 2021; Zupic & Čater, 2015). Bibliographic coupling analysis quantifies the similarity among two papers by examining the number of references they share. It also implies topics which are common by considering the articles cited by both documents (ibid). Zupic and Čater (2015) conducted a keywords co-occurrence analysis to determine the quantity of articles that share the same keywords. This suggests a connection between articles with similar themes (ibid). This analysis facilitates the identification and development of research themes and future directions for the concept of integrated KPIs. The study uses VOSviewer software to produce written and visual representations of the findings, consistent with previous bibliometric studies (Bellucci et al., 2020; Lopes & Penela, 2021).

Volume of research dealing with KPIs and where it is published

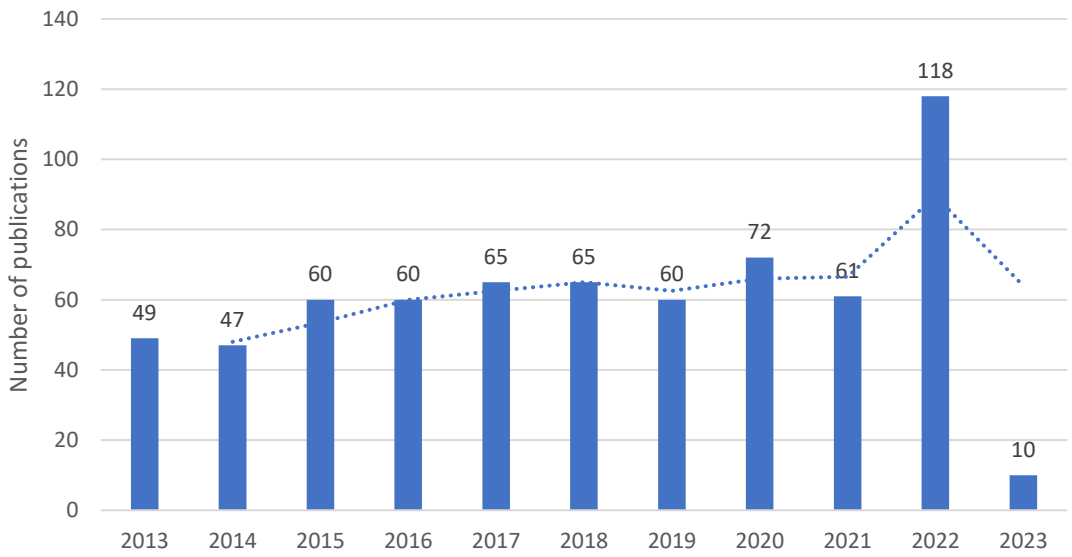
Since 2013 (49 publications), there has been a steady increase in the volume of research which deals with KPIs with a large increase in 2022 (118 publications). Refer to Figure 6.

Organisations are increasingly recognising the need for comprehensive and multifaceted performance evaluation structures as a central aspect of their integrated thinking logic. Integrated thinking, which advocates a holistic approach to management, became increasingly prominent from 2013 to 2021 (Ecim et al., 2021; Maroun et al., 2023). The emphasis was on acknowledging the complex relationship between financial, environmental, social and governance aspects of business performance (Alrazi et al., 2015). As organisations

recognised the interconnectedness of these aspects, there was a growing realisation of the necessity of a broader approach to measuring performance (Oshika & Saka, 2017). The academic community, in particular, also devoted more attention to this field of research.

The establishment of the International Sustainability Standards Board (ISSB) has led to an increased recognition of the significance of incorporating global sustainability disclosure standards into performance evaluation. The ISSB's mission, announced at the UN Climate Change Conference (COP26) in November 2021, is to offer investors and capital market participants valuable insights into companies' sustainability risks and opportunities (ISSB, 2021b). This directive highlights the importance of companies adhering to these standards, as they play a key part in assisting stakeholders in making informed decisions (ibid). The increased focus on sustainability reporting, led by the ISSB, and the associated impact on performance evaluation contributed to a significant increase in research activity in 2022.

Figure 6: Volume of academic research focussing on KPIs



The trend towards integrated thinking has impacted both practical business strategies and research on KPIs (Busco et al., 2021; Herath et al., 2021; Maroun et al., 2023). It accomplished this by critically examining the constraints of conventional, financially-focused metrics (Amran et al., 2017). Both researchers and practitioners have acknowledged the need for a more balanced and comprehensive perspective to capture fully the range of organisational performance. Researchers responded to this by exploring the creation of KPIs which incorporated qualitative, contextual and non-financial indicators with guidance from relevant frameworks (Akhtar & Wani, 2016). The transition towards integrated reporting and thinking

frameworks was supported by the publication of research and guidelines, including the International Integrated Reporting Framework (Herbert & Graham, 2021; IIRC, 2021).

The changing nature of modern business environments, driven by fast-paced technological advancements (Kend & Nguyen, 2020) and evolving stakeholder expectations (Alrazi et al., 2015), has increased the need for continuous research on KPIs. Organisations are now faced with the task of setting KPIs which are both aligned with their strategic objectives and flexible enough to accommodate changing circumstances. The need for agility and relevance in performance measurement has driven researchers to investigate new methods and frameworks for determining KPIs (Agbali et al., 2017).

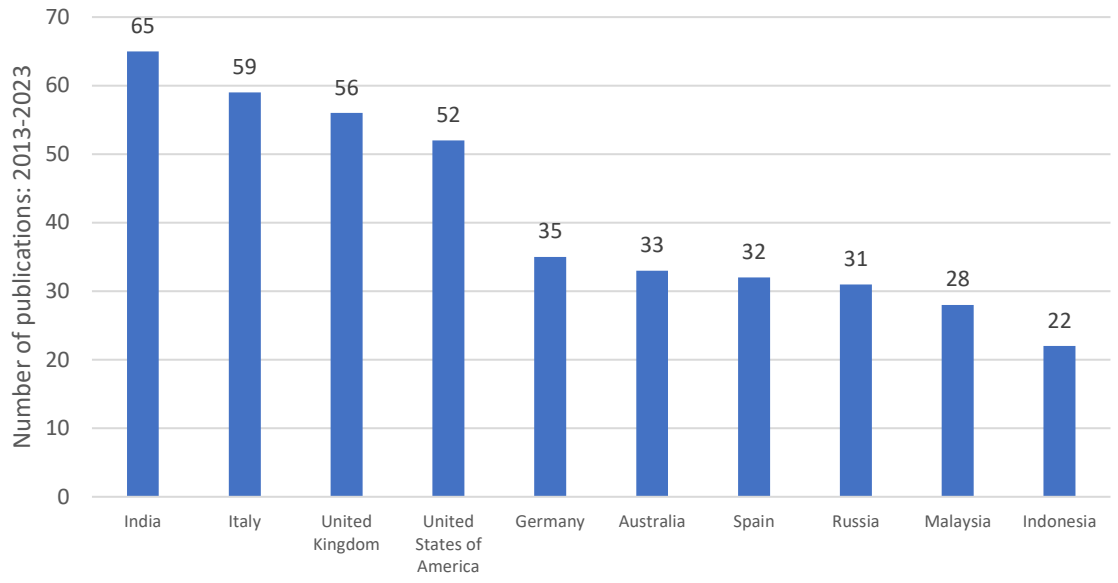
In 2013, the main emphasis was on the development, measurement and utilisation of KPIs. Academic literature predominantly focussed on the practical implementation of KPIs in various industries (Boiral & Henri, 2015). Over the subsequent decade, there has been a shift in the literature on KPIs towards a more nuanced and dynamic viewpoint. Academics and professionals have acknowledged the drawbacks of conventional KPIs because of their exclusive emphasis on quantitative metrics (Moraes et al., 2020). The research discourse now includes qualitative and contextual indicators, reflecting a growing recognition of the importance of a balanced approach to performance evaluation (Herbert & Graham, 2021). Researchers have examined the difficulties of selecting appropriate KPIs in industries which are evolving rapidly (Neri et al., 2021). They have also explored the impact of emerging technologies such as artificial intelligence and big data analytics on the design and monitoring of KPIs (Ren et al., 2019).

Literature now highlights the significance of aligning KPIs with an organisation's strategic objectives. This promotes a comprehensive and strategic approach to performance management. The focus has shifted from 2013 to 2023, emphasising the importance of considering performance evaluation metrics as part of a comprehensive performance management system which takes into account organisational culture, employee engagement and stakeholder expectations (Alrazi et al., 2015). The research on KPIs in management practices has evolved to reflect a better understanding of their complex and multifaceted nature.

KPI research by jurisdiction

Figure 7 shows the countries that produced the most research on KPIs in the last decade.

Figure 7: KPI research by jurisdiction



The academic sources affiliated with emerging economies were stratified to assess the development of integrated KPI research. The emerging economies which have contributed to research on the current study include India, Indonesia, Malaysia, South Africa and Russia. No other emerging economies produced significant research on integrated KPIs from 2013 to 2023.

India contributes 10% to the total KPI publications followed by Italy (9%). Half of the top-producing countries operate in emerging economies (India, Spain, Russia, Malaysia and Indonesia). In total 52% of research is from developed countries and 48% from emerging economies. Emerging economies frequently undergo a period of accelerated economic expansion and development. As businesses grow, there is an increasing need for efficient performance measurement and reporting to ensure sustainable growth that aligns with corporate and national development objectives (Izzo et al., 2020). To attract foreign investment and foster the trust of domestic investors, organisations operating in emerging economies must demonstrate transparency and good corporate governance whose progress can be tracked by implementing robust KPIs (Husnah et al., 2023). As a result, research on KPIs and integrated reporting contributes to enhancing investor confidence (ibid).

Regulatory frameworks in emerging nations are in the process of development, and compliance standards are generally less strict in comparison to those of developed economies. As a result, the research has primarily focused on aligning KPIs with evolving regulatory requirements and facilitating the transition of businesses towards more robust

reporting practices (Dissanayake, 2021). A substantial proportion of enterprises in emerging economies comprise small and medium-sized enterprises (SMEs). Research focused on addressing the unique requirements and difficulties faced by SMEs, such as developing simplified methods for measuring KPIs appropriate for their scale (Negri et al., 2021).

Only 2% (12 publications) of the KPI research performed in the past decade originate from South Africa. South Africa's dominance in integrated thinking and integrated reporting (Ecim & Maroun, 2023) is not matched with a corresponding level of research on performance evaluation. This links with the findings of Maroun et al. (2023) which indicate that South African countries exhibit strong integrated thinking, but they perform inadequately in terms of holistic performance evaluation across a multi-capital sphere. This highlights the necessity for further research into performance evaluation within the South African context.

The United Kingdom (UK) (8%) and United States of America (USA) (8%), both developed economies, rank third and fourth. KPI research in the UK, USA and other developed economies between 2013 and 2023 dealt with an evolving business landscape marked by digital transformation (Alkaraan et al., 2023), sustainability issues (Maltz et al., 2018), regulatory shifts (Elzahar et al., 2015) and the demand for advanced performance measurement techniques (Kristensen et al., 2022). The research areas focus on assisting organisations to adapt to new trends and challenges while also ensuring the effective utilisation of KPIs (Curado et al., 2022). The “Balanced Scorecard” has undergone further development, with research exploring its applicability to current challenges and strategies in organisations (Harvey & Sotardi, 2018). Researchers investigated the integration of non-financial KPIs and their correlation with organisational goals (Rodríguez-Gutiérrez et al., 2019). The emergence of big data and data analytics has played a significant role in KPI research for developed economies. Research has focused on the various ways in which organisations can utilise data to enhance the development of sophisticated and real-time KPI feedback systems (Austin et al., 2021). The studies highlighted the significance of digital transformation in measuring KPIs and making informed decisions. The COVID-19 pandemic prompted research into the development of KPIs for remote work situations. The studies investigated the methods for accurately assessing employee performance and productivity within distributed work settings (Atkins et al., 2020; Rahman et al., 2022).

Journals in which KPI research is published

Table 8 shows the number of research papers published in journals with a minimum of 8 publications.

Table 8: Academic sources with more than eight publications focussing on KPIs												
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
Journal of Cleaner Production		1	1	4	5	5	2	4	2	8	2	**34**
International Journal of Productivity and Performance Management		1	3	2	1	2	3	1	2	8		**23**
Benchmarking: An International Journal	1	1	2	3		4		2		2		**15**
International Journal of Production Research	1		3	1	2	2						**9**
Total Quality Management and Business Excellence		2		2				2	2			**8**
Total	**2**	**5**	**9**	**12**	**8**	**13**	**5**	**9**	**6**	**18**	**2**	**89**

Journal of Cleaner Production (JCP) (34 publications) accounts for 5% of total publications on KPIs. Half of the publications in this journal (53%) were published as recently as 2019. Following *JCP* are *International Journal of Productivity and Performance Management* (*IJPPM)* (23 publications) and *Benchmarking: An International Journal (BIJ)* (17 publications). Similar to *JCP*, more KPI research was published after 2019. Figure 8, illustrating the volume of journal citations, demonstrates a similar depiction.

Figure 8: Total citations per journal

JCP (651 citations) has most citations, followed by *BIJ* (321 publications) and *International Journal of Production Research (IJPR)* (310 publications) which have a significant impact. *JCP* has produced the greatest research output, in terms of total KPI publications, and impact,

in terms of total citations. *JCP* facilitates interdisciplinary collaboration and publication of research in fields such as environmental science, management, economics and engineering. This multifaceted approach is in line with the diverse nature of KPIs. Despite none of the top producing journals originating from emerging economies, *IJPPM* (57%) and *BIJ* (47%) have a substantial number of publications originating in emerging economies.

KPI research has mainly focused on a managerial context with 255 publications listed in management journals. These include *Management Accounting Research (MAR), IJPPM, Total Quality Management and Business Excellence*. KPI research in accounting (34 publications) and auditing (5 publications) journals are limited. *Sustainability Accounting, Management and Policy Journal (SAMPJ), Accounting, Auditing and Accountability Journal (AAAJ), Australian Accounting Review (AAR) and South African Journal of Accounting Research (SAJAR)* are among the top publishers in the accounting sphere. *AAJ* is also the dominant journal in the auditing sphere. As a result, KPIs in an accounting and auditing context need to be further examined in future areas of research.

Research objectives: coverage of KPI research over time

A bibliometric analysis of keywords is employed to emphasise the primary themes explored in the sources under consideration (Zupic & Čater, 2015). Results are generated and conveyed through VOSViewer software. Figure 9 displays the temporal evolution of emerging research nodes. The prominence of each node in prior research is indicated by its size. The distances between nodes represent the interconnections among them, with a shorter distance indicating interconnected topics, themes, or keywords (Bellucci et al., 2020; Caputo et al., 2021). The research themes of benchmarking and key performance indicators are closely related, as evidenced by the significant overlap in the literature on these topics. Figure 9 depicts the thematic analysis conducted on the literature search.

Figure 9: Bibliometric network based on keywords with a year-of-publication overlay

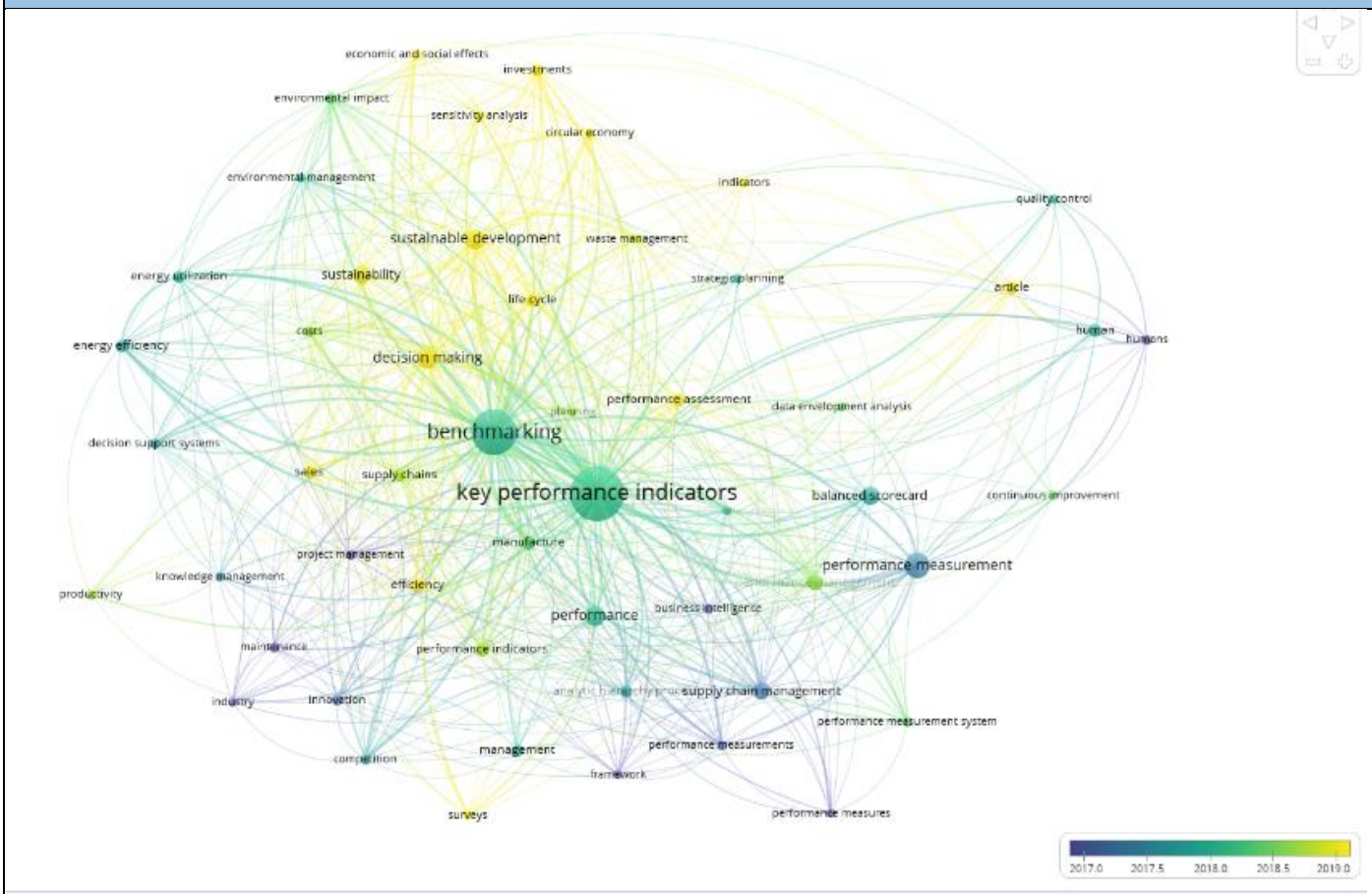


Table 9: Thematic analysis of literature over time	
Cluster	**Examples of core themes**
Dark blue – benefits and challenges of managing performance	Understanding what KPIs are, supply chain management, innovation, competition and industry analysis.
Green – management of balanced scorecards, benchmarks and systems	Management information systems, strategic planning, the use of balanced scorecards, energy efficiency and utilisation as well as quality control.
Yellow – integrated thinking, decision making and sustainable development	Sustainable development, circular economies, decision-making and integrated thinking.

The first cluster of KPI-focused research was produced mainly from 2013 to 2017. This seminal collection of work focuses on understanding what KPIs are, supply chain performance management, innovation in performance evaluation and an analysis of industry-specific KPIs (Agbali et al., 2017; Akhtar & Wani, 2016; Amran et al., 2017; Churet & Eccles, 2014; Varenova et al., 2013). This includes the emergence of KPIs related to economic, social and environmental sustainability (Akhtar & Wani, 2016). Additionally, initial insights found mixed results on the relationship between sustainability performance measurement and financial performance (Amran et al., 2017).

From 2018 to 2019, the focus of KPI research shifted towards management information systems (MIS), strategic planning, the use of balanced scorecards, energy efficiency and utilisation as well as quality control (Boccardi et al., 2019; Chang et al., 2019; Chen et al., 2018). The usefulness and benefits of robust a MIS (Boccardi et al., 2019) and a balanced scorecard approach (Chang et al., 2019; Chen et al., 2018) in managing and communicating sustainability performance was highlighted.

From 2020 onwards, the focus shifted towards how KPIs integrate sustainable development, circular economies and holistic decision-making (Pigatto et al., 2023). Put differently, an integrated thinking logic was being evidences in academic research. Emphasis was placed on the importance of integrated thinking in understanding the interconnectedness between financial and environmental, social and governance (ESG) factors and promoting value creation. This includes communicating value creation in the context of the six capitals to promote a holistic approach to performance evaluation (Pigatto et al., 2023).

Three key themes of KPIs have been identified from prior research which are used to assist in the development of the KPI-ITI:

(1) management information systems;
(2) benefits of, and barriers to, integrated KPIs and
(3) an integrated thinking logic and proactive approach to KPI structures.

These three themes are used to assist in the development of the KPI-ITI. Refer to Section 2.

The locus, epistemological paradigms and methods of the research

As shown by Table 10, the focus is on the meso- (42%) and micro-levels (37%). Policy analysis, global economic trends and multifaceted interconnections between performance evaluation structures and ESG factors (macro-level) has not been examined in detail (21%). This is particularly pertinent in the case of developing economies with the meso- (43%) and micro-levels (38%) dominating the research while only 18% of research in developing economies is performed at the macro-level. Limited research exists on the establishment of guidance for determining and setting integrated KPIs, highlighting the need to address the associated challenges.

Table 10: The locus of enquiry of KPI research

	Micro-level	Meso-level	Macro-level	Total	Emerging economies
2013	17	22	10	49	16
2014	16	17	14	47	18
2015	11	34	15	60	35
2016	14	27	19	60	29

Table 10: The locus of enquiry of KPI research					
	Micro-level	**Meso-level**	**Macro-level**	**Total**	**Emerging economies**
2017	25	28	12	65	33
2018	26	28	11	65	28
2019	21	26	13	60	42
2020	30	30	12	72	36
2021	29	26	6	61	33
2022	54	35	29	118	46
2023	3	4	0	10	3
Total	249	277	141	667	
Emerging economies	122	138	59		319

Micro-level research focuses on individual KPIs or specific performance metrics. The objective was to establish and develop precise performance metrics for specific areas, processes or functions within an organisation (Wannes & Ghannouchi, 2019). This involved identifying suitable data sources, selecting appropriate data collection methods, and establishing benchmarking criteria (Stricker et al., 2017). The research at this level highlights the tactical implementation of individual KPIs within a specific organisational setting. It examines how these metrics can be utilised for monitoring, controlling and enhancing performance at a granular level (Rahman et al., 2022).

At the meso-level, researchers examine how KPIs align with an organisation's overall strategic objectives. Studies at this level also analyse the impact of change management on implementing and integrating KPIs with operations (Kimhi & Oliel, 2019), which requires organisational change. Macro-level research explores the role of KPIs in regulatory frameworks and global reporting standards (Boiral & Henri, 2015). This includes how KPIs are used to measure compliance and adherence to international guidelines. The implementation and operationalisation of KPIs specific to certain sectors or industries are examined using the basis of contingency theory in selecting appropriate KPIs (Moraes et al., 2020; Scheyvens et al., 2016). Industry-wide trends and broader implications of KPIs are also examined, for example, assessing how economic indicators (Amran et al., 2017), corporate governance (Solomon, 2013) and market dynamics (Busco et al., 2017) influence performance evaluation structures.

KPI research in emerging economies has been performed primarily at the micro- (38%) and meso-levels (43%) with a smaller focus on the macro-level (18%). Emerging economies often face constraints in terms of financial resources and specialised knowledge. Conducting research at the micro-level, which involves analysing specific KPIs enables a more practical

and manageable approach for measuring performance. It allows organisations to implement tailored solutions which address their specific limitations. Research has focused on how the development and implementation of KPIs can assist companies in assessing the efficiency and effectiveness of internal process, leading to improved productivity and competitiveness (Niyommaneerat et al., 2023). Studies conducted in emerging economies necessitates the establishment of KPIs specifically designed to evaluate performance in local and niche markets given that universal KPI norms may not always be directly relevant in these contexts (Akhtar & Wani, 2016).

The research is further categorised based on epistemological paradigm and methodology. Refer to Table 11.

KPI research predominantly adheres to a positivist paradigm (49%), followed by an interpretive approach (29%), with critical epistemologies less frequently investigated (22%). The majority of positivist research employed content/historical analyses (43%) and survey/questionnaires/other empirical research (29%). Despite the growing demand for integrated KPIs, a significant portion of KPIs remains quantitative in nature (Keddie & Magnan, 2023), making positivist methods a natural fit for studying and assessing them. Researches aim to establish empirical relationships between KPIs and performance outcomes (Velte, 2019). This is vital for organisations seeking to identify which KPIs have a direct impact on their objectives, enabling them to prioritise their performance measurement efforts. Surveys, questionnaires and other empirical research methods are well-suited for benchmarking and comparing practices across organisations (SAICA, 2015). Researchers use these methods to gather insights into best practices and industry standards, which are valuable for performance improvement and strategic development.

Table 11: Research methodologies and epistemological paradigms													
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**	**Emerging economies**
Critical	**6**	**3**	**17**	**13**	**23**	**21**	**9**	**16**	**12**	**25**	**2**	**147**	**69**
Case study	3	1	2	3	11	12	3	6	2	4	0	47	20
Commentary/normative/policy	0	0	2	1	0	3	0	1	0	1	0	8	5
Content/historical analysis	0	0	7	2	4	1	3	4	1	5	0	27	12
Survey/questionnaire/other empirical research	3	2	6	7	8	5	3	5	9	15	2	65	32
Interpretive	**8**	**11**	**16**	**16**	**27**	**24**	**15**	**23**	**19**	**34**	**3**	**196**	**91**
Case study	0	1	4	4	11	10	3	7	6	4	0	50	21
Commentary/normative/policy	0	1	1	2	1	4	1	2	1	2	1	16	8
Content/historical analysis	2	2	5	4	5	4	6	2	3	11	1	45	20
Survey/questionnaire/other empirical research	6	7	6	6	10	6	5	12	9	17	1	85	42
Positivist	**35**	**33**	**27**	**31**	**15**	**20**	**36**	**33**	**30**	**59**	**5**	**324**	**159**
Case study	6	7	1	4	3	4	5	2	8	6	1	47	24
Commentary/normative/policy	8	7	5	9	2	6	0	0	1	4	0	42	19
Content/historical analysis	11	12	15	12	2	7	21	21	8	27	4	140	64
Survey/questionnaire/other empirical research	10	7	6	6	8	3	10	10	13	22	0	95	52
Total	**49**	**47**	**60**	**60**	**65**	**65**	**60**	**72**	**61**	**118**	**10**	**667**	
Emerging economies	**16**	**18**	**35**	**29**	**33**	**28**	**42**	**36**	**33**	**45**	**3**		**319**

Most interpretive research was conducted using surveys, questionnaires and other empirical research methods (43%). Interpretive research focuses on examining the contextual (Akhtar & Wani, 2016), semantic (Domínguez et al., 2019) and societal (Hristov et al., 2022) dimensions of KPIs. Researchers in this field explore how KPIs are interpreted within organisational cultures, their impact on decision-making and broader social implications associated with their use. The studies delve into organisational attitudes towards KPIs, including their understanding, acceptance and potential resistance (Thoradeniya et al., 2021). Additionally, studies were conducted on how different stakeholder groups, departments and organisations interpret KPIs differently and the implications of these variations (Alrazi et al., 2015; Krasodomska & Zarzycka, 2021).

Critical exploration in KPI research has been relatively limited (22%), with the majority of critical studies relying on surveys, questionnaires and other empirical methods (44%). Critical studies examine the ethical implications of KPI usage. This includes assessing whether KPIs may inadvertently lead to negative consequences, such as unethical behaviour or neglect of social and environmental responsibilities (Bui & De Villiers, 2017; Di Vaio et al., 2020). Studies examine potential biases introduced by KPIs towards specific groups or objectives, and the resulting implications (Pizzutilo & Venezia, 2021).

Conclusion

The bibliometric analysis illustrates the development of KPI research over the past decade. Initially, focus was placed on the (KPIs), with a primary focus on quantitative and financial aspects (Rodrigue et al., 2013). As the economic landscape evolved, and further emphasis was placed on integrated thinking (Maroun et al., 2023), there was a shift towards a more holistic approach. This transition was characterised by the acknowledgment of the constraints of traditional performance evaluation metrics (Moraes et al., 2020) which prioritised quantitative measurements. Both businesses and researchers acknowledge the importance of including environmental, social, and governance factors in performance measurement, in addition to financial aspects (Neri et al., 2021). The transition was facilitated by frameworks such as the International Integrated Reporting Framework (IIRC, 2021), which highlights the interdependence of these elements.

Emerging economies such as India, Indonesia, Malaysia, South Africa, and Russia have significantly contributed to the advancement of KPI research. These countries have adopted KPIs as instruments for achieving sustainable economic growth and promoting transparent corporate governance (Akhtar & Wani, 2016; Alrazi et al., 2015; Herbert & Graham, 2021). This emphasis is crucial for attracting investment and facilitating economic development in these areas. The study emphasises that KPI research extends beyond developed economies.

Developed nations have prioritised the modification of performance metrics in order to effectively tackle emerging challenges, including digital transformation (Caputo et al., 2021) and sustainability concerns (Sukhari & De Villiers, 2019). Furthermore, the significance of technology and data analytics in KPI research has been highlighted, particularly in addressing the difficulties presented by the COVID-19 pandemic (Atkins et al., 2020; Rahman et al., 2022).

The dominance of the positivist paradigm in KPI research highlights the quantitative approach that researchers are taking to investigate KPI practices, highlighting the need for future areas of research on the qualitative examination of KPI structures and implementation practices. Interpretive research, which explores the contextual and societal aspects of KPIs, is becoming increasingly prominent. The literature investigates the perceptions of KPIs among various stakeholders within organisations (Alrazi et al., 2015). The existence of different research paradigms reflects the diverse nature of KPIs. The allocation of research endeavours across micro, meso, and macro levels is captivating. Micro-level research examines the precise execution of KPIs within organisations. Meso-level research examines the correlation between KPIs and overarching strategic goals, which encompasses the aspect of change management. Nevertheless, there is a lack of sufficient macro-level research which adequately addresses global economic trends and their interrelationships with environmental, social, and governance factors.

In conclusion, this research provides a comprehensive overview of how businesses and researchers are adapting to the evolving dynamics of performance measurement through the use of KPIs. The shift towards holistic approaches (Neri et al., 2021), recognition of the limitations of traditional KPIs and acknowledgement of the significance of integrated thinking is reflected (Maroun et al., 2023). The active participation of emerging economies and the global scope of KPI research highlight its importance in modern business practices. Researchers are examining KPIs from different perspectives, considering their contextual (Akhtar & Wani, 2016) and societal (Hristov et al., 2022) implications. The study offers valuable insights and encourages further exploration of macro-level KPI research and the ongoing development of KPI paradigms in response to a dynamic business environment.

6.2: Appendix B: Prior research on indicators of integrated thinking

Table 12 details the research which the indicators of integrated thinking were derived from.

Table 12: Prior research on indicators of integrated thinking										
Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Professional literature										
(IOD, 2016)	✔		✔	✔						
(VRF, 2022)	✔			✔			✔			
(IIRC, 2021)	✔	✔		✔			✔			✔
(UN, 2015)			✔							
Academic literature										
(Fukuda-Parr, 2004)			✔							
(Maroun et al., 2023)	✔	✔							✔	
(Alrazi et al., 2015)			✔				✔			
(Prinsloo & Maroun, 2020)	✔									
(Mans-Kemp & Viviers, 2018)					✔					
(Chistopolova & Kaspina, 2022)						✔				
(Sukhari & De Villiers, 2019)						✔				
(Oshika & Saka, 2017)						✔				✔
(Pigatto et al., 2023)								✔		
(Ruivo et al., 2014)									✔	
Supplementary literature[18]										
(Zakaria, 2015)					✔					
(Setiawan & Purba, 2020)		✔								
(Wijesinghe et al., 2023)				✔				✔		
(Swiatek, 2019)										✔
(Mio et al., 2020)							✔			

[18] Additional literature is provided to further substantiate the adoption of indicators. Although the literature primarily focuses on various other topics, they are included for completeness purposes.

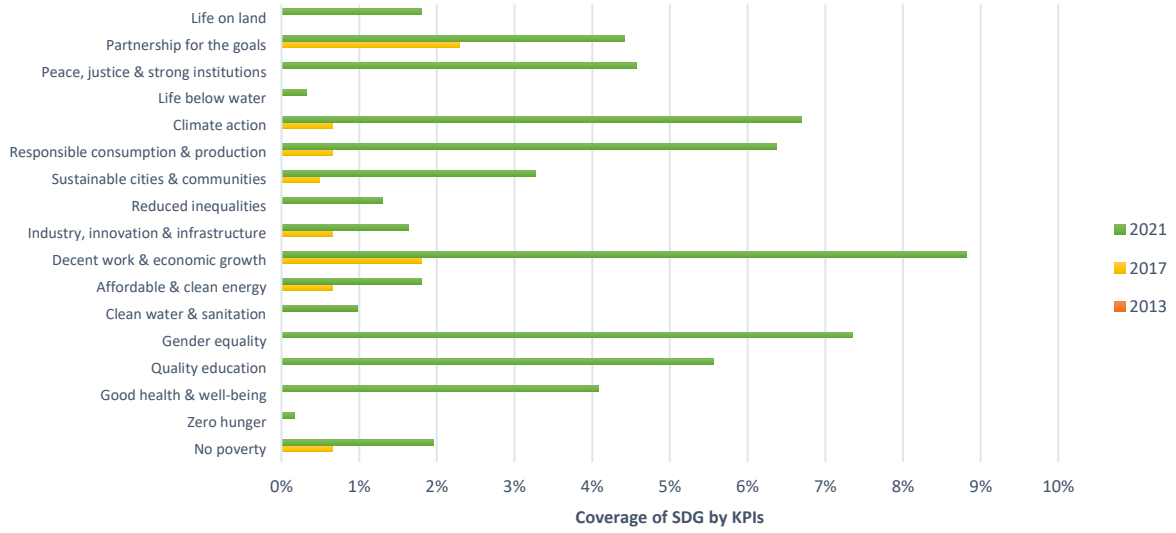
6.3: Appendix C: Supplementary results

The following results have been included as a supplementary analysis of findings on the extent of integrated thinking in KPI disclosures.

Coverage of SDGs in KPI disclosures

Figure 10 and Table 13 illustrate the percentage of SDGs which are explicitly linked to KPI disclosures. The results for 2013 depict the percentage of MDGs which are explicitly linked to KPI disclosures, as this set of goals is the predecessor of SDGs (UN, 2015).

Figure 10: Volume of SDGs explicitly linked to KPIs



In 2013, no KPI disclosures provided a specific link to the MDGs. An absence of reporting frameworks or standards which promoted the integration of KPIs with the MDGs may have been a limiting factor. In the absence of explicit reporting guidelines, such as the Framework, organisations lacked the drive to establish these connections. The relationship between corporate reporting and sustainable development has undergone changes over time (Maroun et al., 2023). In recent years, there has been an increased focus on aligning corporate strategies and reporting with global sustainability goals (Scheyvens et al., 2016), particularly since the introduction of the SDGs in 2015. The SDGs were introduced as a successor to the MDGs. They aim to provide a more comprehensive and inclusive framework, facilitating the integration of these goals into organisations' reporting practices (Adams et al., 2020).

Table 13: Coverage of SDGs explicitly linked to KPI disclosures							
	2013	**2017**	**2021**	**U-test (2013-2017)**	**U-test (2017-2021)**	**H-test (2013-2021)**	**JT-test (2013-2021)**
No poverty (SDG 1)	-	0.65%	1.96%	-1.21	-2.44**	-3.63***	3.42***
Zero hunger (SDG 2)	-	-	0.16%	-	-1.22	-1.21	0.98
Good health & well-being (SDG 3)	-	-	4.08%	-	-6.12***	-6.07***	4.96***
Quality education (SDG 4)	-	-	5.56%	-	-7.16***	-7.10***	5.81***
Gender equality (SDG 5)	-	-	7.35%	-	-8.26***	-8.20***	6.71***
Clean water & sanitation (SDG 6)	-	-	0.98%	-	-2.98***	-2.96***	2.41***
Affordable & clean energy (SDG 7)	-	-	1.80%	-	-2.21**	-3.44***	3.27***
Decent work & economic growth (SDG 8)	-	1.80%	8.82%	-1.68*	-6.60***	-8.22***	7.38***
Industry, innovation & infrastructure (SDG 9)	-	0.65%	1.63%	-1.30	-1.96**	-3.23***	3.12***
Reduced inequalities (SDG 10)	-	-	1.31%	-	-3.45***	-3.42***	2.79***
Sustainable cities & communities (SDG 11)	-	0.49%	3.27%	-0.76	-4.34***	-5.06***	4.43***
Responsible consumption & production (SDG 12)	-	0.65%	6.37%	-0.75	-6.57***	-7.26***	6.23***
Climate action (SDG 13)	-	0.65%	6.70%	-0.73	-6.79***	-7.46***	6.39***
Life below water (SDG 14)	-	-	0.33%	-	-1.72*	-1.71*	1.39*
Life on land (SDG 15)	-	-	4.58%	-	-6.49***	-6.43***	5.26***
Peace, justice & strong institutions (SDG 16)	-	2.29%	4.41%	-2.67***	-5.49***	-5.14***	5.16***
Partnership for the goals (SDG 17)	-	-	1.80%	-	-4.05***	-4.01***	3.27***

*Significant at the ***1%, **5% & *10% level*

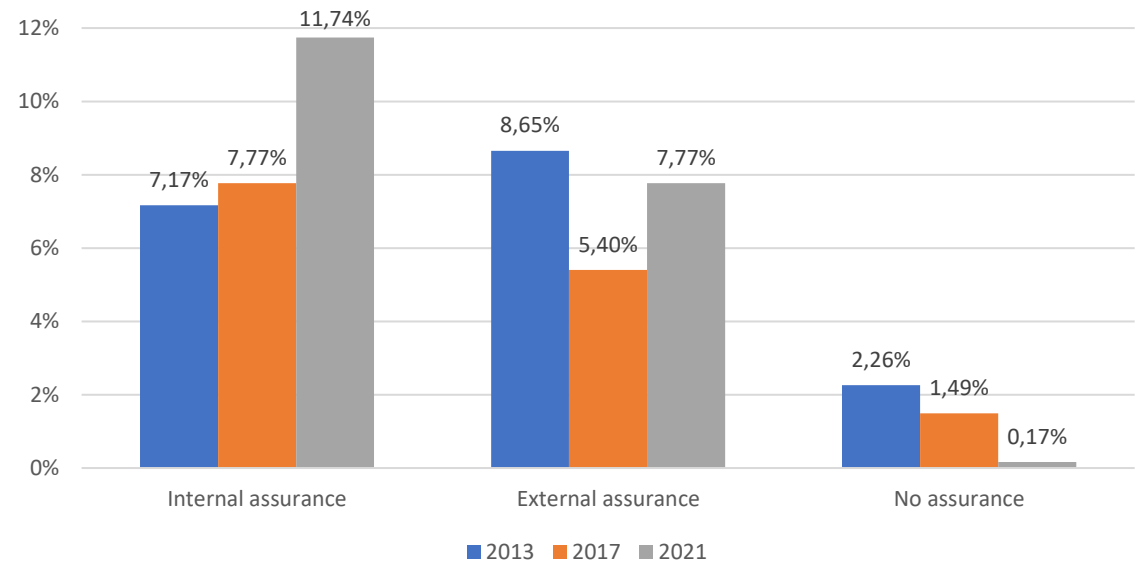
An improvement is noted from 2013 to 2017, with *partnership for the goals (SDG 17)* (2.29%) and *decent work and economic growth (SDG 8)* (1.80%) as the most prominent SDGs. *SDG 17* highlights the significance of collaboration and partnerships in achieving sustainable development (UN, 2015). Businesses have increasingly prioritised partnerships with governments, non-profit organisations (NGOs), and other stakeholders because of the perceived value they bring (Adams et al., 2020). The need of achieving *SDG 8* is a fundamental societal expectation. Companies recognised their contribution to job creation and economic growth, which led to the prominence of this SDG (Scheyvens et al., 2016).

A further improvement is noted from 2017 to 2021, with *SDG 8* (8.82%; U = -6.60, p < 1%), *gender equality (SDG 5)* (7.35%; U = -8.26, p < 1%) and *climate action (SDG 13)* (6.70%; U = -6.79, p < 1%) gaining prominence. Companies faced increasing pressure from society and stakeholders to address pressing concerns, including gender equality and climate change (Izzo et al., 2020). Stakeholders have a growing expectation for companies to showcase their dedication to these objectives (ibid). Consequently, companies have addressed these expectations by prioritising the reporting of these particular SDGs.

Assurance over KPIs

Figure 11 shows the levels of assurance obtained over KPIs in 2013, 2017 and 2021.

Figure 11: Levels of assurance obtained over KPIs



	2013	2017	2021	U-stat (2013-2017)	U-stat (2017-2021)	H-stat (2013-2021)	JT-stat (2013-2021)
Internal assurance	7.17%	7.77%	11.74%	-0.41	-4.63***	-5.00***	4.90***
External assurance	8.65%	5.40%	7.77%	4.43***	-2.96***	1.50	-1.43*
No assurance	2.26%	1.49%	0.17%	2.26**	3.54***	5.77***	-5.96***

*Significant at the ***1%, **5% & *10% level*

The substantial increase in internal assurance (JT = 4.90, p < 1%; H = -5.00, p < 1%) suggests that organisations are increasingly prioritising self-assessment and internal controls pertaining to their KPIs. Internal assurance can enhance operational efficiency (Prinsloo & Maroun, 2020). Through the internal validation of performance evaluation metrics, organisations can effectively identify areas requiring improvement, minimise errors, and streamline their performance management procedures (Baboukardos et al., 2021).

The decline in external assurance (JT = -1.43, p < 10%; H = 1.50, p > 10%) indicates a shift in the dependence on external assurance for the validation of KPIs. Organisations may seek cost efficiencies because of the high costs associated with external assurance (Simnett et al., 2009). Companies may choose to adopt a targeted approach when seeking external assurance for specific KPIs that are deemed critical while relying on internal assurance for other KPIs. The increase in internal assurance suggests that organisations have gained greater confidence in their internal control mechanisms. Enhancing internal processes and controls can decrease the perceived necessity for external validation (ibid).

The decrease in cases where no assurance is obtained over KPIs (JT = -5.96, p < 1%; H = 5.77, p < 1%) demonstrates the growing recognition of the importance of assurance mechanisms. Assurance promotes transparency and accountability (Adams & Evans, 2004). Organisations acknowledge that ensuring their performance evaluation metrics can enhance their reputation and credibility (ibid).

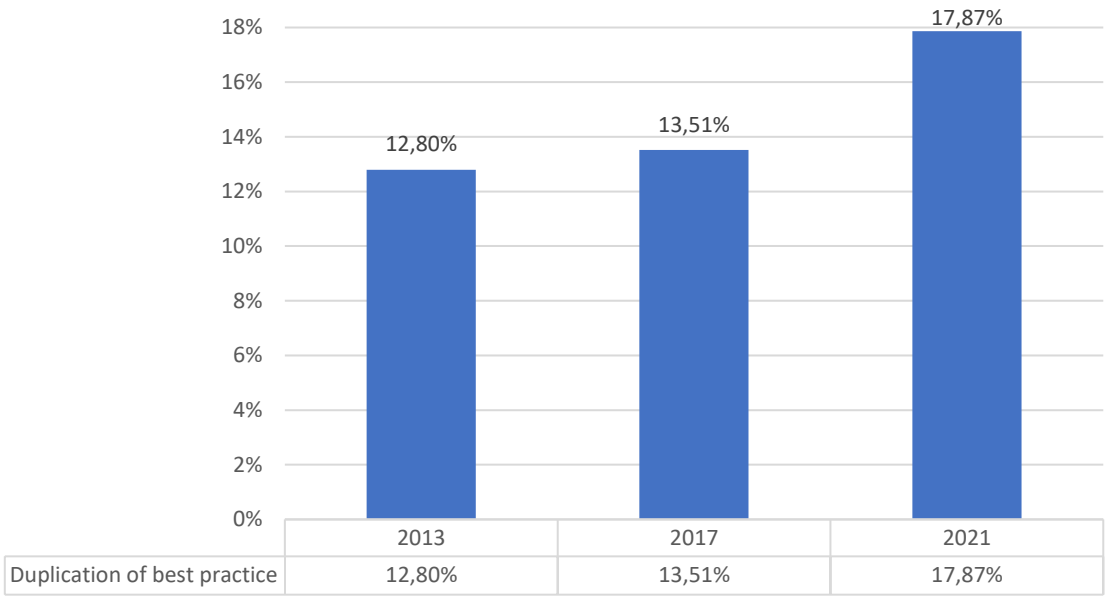
Evidence of duplication of best practice in KPI disclosures

The shift in evidence of duplication of best practice explicated by KPI disclosures is illustrated in Figure 12.

There has been an increase in the number of KPIs which represent a duplication of best practices from 2013 to 2021 (untabulated JT = 4.73, p < 1%; H = -4.75, p < 1%). In a highly competitive business landscape, organisations seek to compare themselves to their peers and competitors through benchmarking (Boiral & Henri, 2015). Organisations adopt KPIs which reflect industry best practices in order to showcase their adherence to established standards and gain a competitive advantage (ibid).

Regulatory bodies and standard-setters have implemented guidelines and regulations, such as the CDP and GRI, to promote best practices in diverse domains (Dissanayake, 2021). Organisations have adopted KPIs which are in line with best practices in order to ensure compliance and mitigate the risk of penalties.

Figure 12: Evidence of duplication of best practice in KPI disclosures



Sensitivity analysis of indicators of integrated thinking on KPI-ITI

A sensitivity analysis was conducted to ensure that specific indicators did not bear a disproportionate impact on the KPI-ITI scores. Refer to Table 14.

Table 14: Sensitivity analysis on indicators of integrated thinking

	Average KPI-ITI	Difference
Original KPI-ITI (3 year average)	6.01	0
Excluding I1 (AS)	5.38	0.63
Excluding I2 (T)	5.64	0.37
Excluding I3 (C_{SDG})	6	0.01
Excluding I4 (C_{CAP})	5.46	0.55
Excluding I5 (LEV)	5.85	0.16
Excluding I6 (SE)	5.09	0.92
Excluding I7 (MAT)	5.03	0.98
Excluding I8 (FAC)	5.08	0.93
Excluding I9 (REV)	5.43	0.58
Excluding I10 (COMP)	5.15	0.86

The analysis depicts that most indicators have minimal effect on the KPI-ITI, suggesting that no single indicator is dominant. This finding supports the justification for giving equal importance to all ten indicators in the KPI-ITI. Indicators 6, 7, 8, and 10 tend towards 1, primarily attributed to the extensive disclosure practices adopted by the majority of companies.

Excluding these indicators has an impact on the KPI-ITI, but it does not establish their superiority.

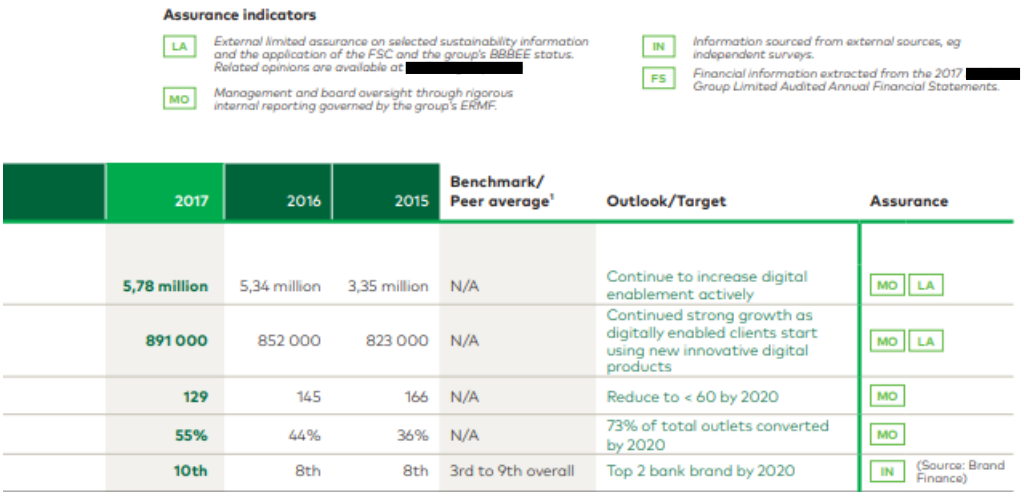
Best and worst KPI disclosure practices

By analysing the integrated reports of the 40 companies over the 3 year period (120 observations), best and worst practice examples have been illustrated with reference to each indicator of integrated thinking[19].

I1: Assurance

Figure 13 shows the inclusion of types of assurance obtained over each KPI disclosed.

Figure 13: Best practice of assurance in KPI disclosure



Assurance indicators

LA — *External limited assurance on selected sustainability information and the application of the FSC and the group's BBBEE status. Related opinions are available at* [redacted]

MO — *Management and board oversight through rigorous internal reporting governed by the group's ERMF.*

IN — *Information sourced from external sources, eg independent surveys.*

FS — *Financial information extracted from the 2017* [redacted] *Group Limited Audited Annual Financial Statements.*

	2017	2016	2015	Benchmark/ Peer average[1]	Outlook/Target	Assurance
	5,78 million	5,34 million	3,35 million	N/A	Continue to increase digital enablement actively	MO LA
	891 000	852 000	823 000	N/A	Continued strong growth as digitally enabled clients start using new innovative digital products	MO LA
	129	145	166	N/A	Reduce to < 60 by 2020	MO
	55%	44%	36%	N/A	73% of total outlets converted by 2020	MO
	10th	8th	8th	3rd to 9th overall	Top 2 bank brand by 2020	IN (Source: Brand Finance)

source: [redacted]

Assurance types vary in terms of independence and rigour. External assurance is often considered to be more objective and comprehensive than internal assurance (Simnett et al., 2009). The company's disclosure of the assurance type assists stakeholders to establish accurate expectations regarding the reliability of the reported KPIs. Transparently disclosing the type of assurance employed demonstrates a dedication to transparency and accountability (Adams & Evans, 2004). This promotes trust among stakeholders by allowing them to evaluate the alignment between the chosen assurance type and best practices, as well as the nature of the KPIs being assessed.

[19] All extracts have been redacted for discretionary purposes. All examples of best and worst practices are extracted from the integrated reports of companies included in the sample tested (Appendix E).

I2: Timeframe

Figure 14 is an extract of KPI disclosures, including the timeframe in which the KPI is intended to be achieved. The extract was obtained from a 2021 integrated report, showing a mixture of medium- (2022-2026) and long-term (post 2026) KPIs reported. Short-term KPIs were disclosed but are not included for stylistic purposes.

Figure 14: Best practice of timeframe disclosure

Goals	Targets	UN SDGs	Year	KPIs
Reduce primary energy consumption, greenhouse gas emissions, potable water demand, non-recycled waste generation, and pollution	Increase energy efficiency by 20%	12, 13	2024	% MWh LFL % energy intensity LFL
	Assets to produce renewable energy for own consumption	7, 13	2030	on-site renewable production capacity
	Reach a waste recycling rate of 60% from operations	11	2025	waste recycled/total % of recycled waste per m^2 % of recycled waste per visitor
	Achieve zero waste to landfill from operations	11	2025	waste to landfill
	Decrease potable water consumption by 15%	6	2024	% water consumption LFL % water intensity LFL
	Reduce emissions from operations by 70%	13	2030	operations carbon footprint
	Reduce embodied emissions from new constructions by 30%	13	2030	construction carbon footprint

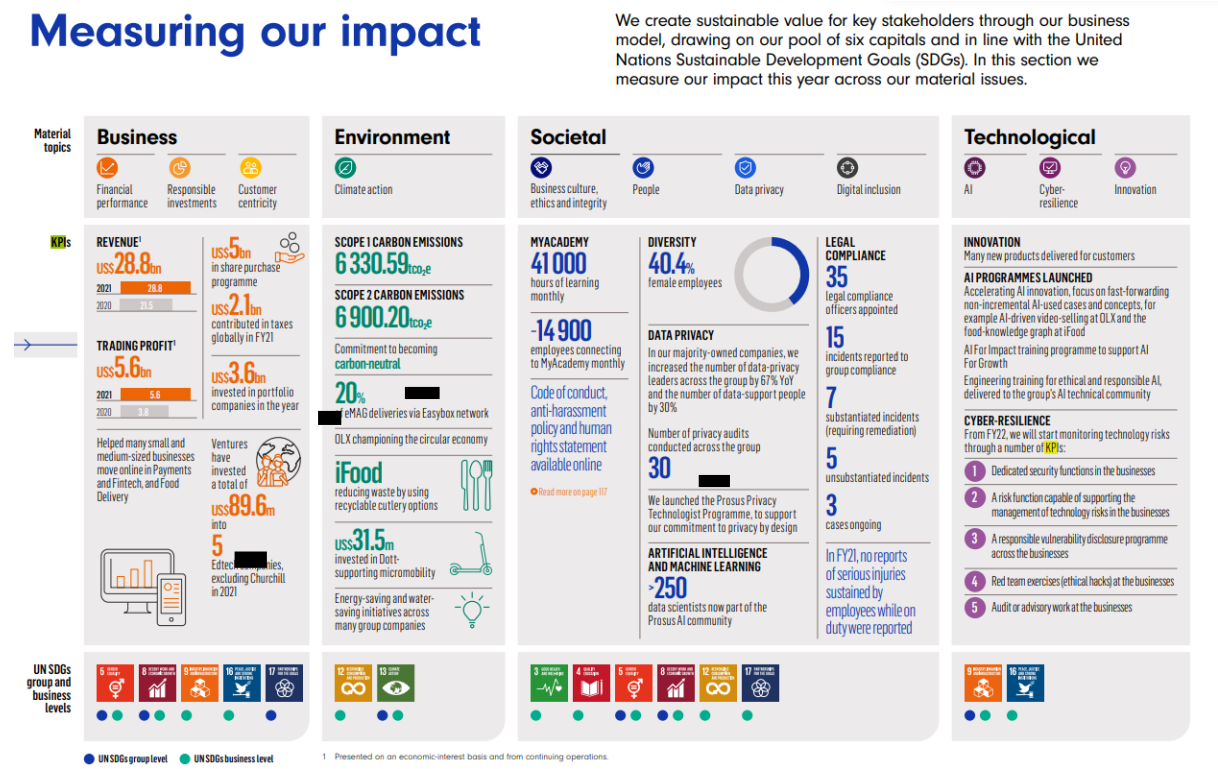
source: [redacted]

Defining the timeframes of KPIs enables stakeholders to comprehend the alignment between KPIs and a company's strategic goals (IIRC, 2021). It is crucial to establish a clear connection between performance metrics and organisational goals, as well as to demonstrate the presence of a cohesive strategy. Timeframe disclosures offer context for evaluating KPIs. Short-term KPIs are relevant for operational efficiency and immediate decision-making, whereas medium- and long-term KPIs primarily prioritise sustainability and the organisation's future (Wannes & Ghannouchi, 2019). Transparent disclosures assist stakeholders in interpreting the relevance of performance evaluation metrics within the context of the company's time frame.

I3: Number of SDGs addressed

Figure 15 illustrates how SDGs can be explicitly linked to KPI disclosures. Despite SDGs being set at a supranational level, companies have demonstrated their ability to measure their contribution toward achieving these goals (Adams et al., 2020). This highlights the application of an integrated thinking logic, as performance evaluation structures are formulated with a multifaceted agenda which goes beyond internal and immediate external factors impacting the organisation.

Figure 15: Best practice of KPI linkage to SDGs



source: [redacted]

Companies which include SDGs in their KPI disclosures demonstrate their recognition and response to significant global challenges that can impact their finances, operations, and reputation. This approach aids in the reduction of risks by actively overseeing and addressing sustainability risks (Izzo et al., 2020).

I4: Number of capitals addressed

Including different types of capitals in KPI disclosures demonstrates a holistic approach to sustainability reporting (Herath et al., 2021). This approach acknowledges that a company's actions have various impacts on different types of capital, highlighting the interconnectedness between financial and non-financial aspects of the organisation (ibid). Figure 16 illustrates a set of KPI disclosures which comply with the integrated thinking agenda by recognising performance in various capital domains.

Figure 16: Best practice of multi-capitals addressed

NATURAL CAPITAL	Trend	2017	2016
Reportable cases of environmental incidents	●	1 x level 2	5 x level 2
Carbon intensity ($ktCO_2e$/TTM)	●	5,4	6,0
Water intensity (kℓ/total tonnes mined)	●	0,18	0,22
Rehabilitation funding adequacy of commercial mines, ex guarantees (%)	★	24	

HUMAN CAPITAL	Trend	2017	2016
Fatalities	●	1	0
LTIFR	●	0,12	0,09
OHIFR	●	0,33	0,35
Skills provision (human resource development) (%)	●	5,1	4,5
Fraud and corruption (%)	●	0	0

SOCIAL CAPITAL	Trend	2017	2016
BBBEE contribution level	●	6	4
SLP project delivery (time variance) (%)	●	(15)	(13)
SLP project delivery (cost variance) (%) is below cost = -5% (2017) + -17% (2016)	●	(15)	(13)
Mining charter compliance (%)	●	Employment equity at senior management level and employing people with disabilities lag aspirations at some operations	

MANUFACTURED CAPITAL	Trend	2017	2016
Capital project delivery measure (on-time variance) (%)	●	(0,17) (behind)	(1,2) (behind)
Capital project delivery measure (on-cost variance) (%)	●	1,0 (saving)	0,3 (saving)

● Changes to a negative ● Changes to a positive ● Information has not changed ★ New KPI this period

source: [redacted]

On the other hand, some companies have not taken a holistic approach to their KPI structures, maintaining a financial-centric agenda (Figure 17). This narrow scope fails to consider other crucial aspects such as ESG factors which are vital for ensuring long-term sustainability. Overreliance on financial metrics may lead to managerial myopia, wherein decision-makers excessively prioritise short-term financial objectives, possibly compromising long-term success and the organisations' reputation (Herath et al., 2021).

Figure 17: Worst practice of multi-capitals addressed

		2021	2020*	% change 2021/2020	2019	2018	2017
Profitability							
Interest income on loans[1]	R'm	13 401	13 552	(1)	12 723	13 216	13 225
Interest income on investments	R'm	3 143	3 489	(10)	2 778	2 258	1 709
Total interest income	R'm	16 544	17 041	(3)	15 501	15 474	14 934
Net loan fee and insurance income	R'm	1 863	1 871		1 507	1 380	495
Total lending, investment and insurance income less loan fee expense	R'm	18 407	18 912	(3)	17 008	16 854	15 429
Interest expense	R'm	(4 985)	(5 680)	(12)	(4 510)	(4 184)	(3 552)
Net lending, investment and insurance income	R'm	13 422	13 232	1	12 498	12 670	11 877
Net transaction fee income	R'm	8 708	7 416	17	6 464	5 127	3 923
Other income	R'm	114	32	>100	3	(1)	–
Foreign currency income	R'm	111	38	>100	–	–	–
Funeral plan income	R'm	650	413	57	54	–	–
Income from operations	R'm	23 005	21 131	9	19 019	17 796	15 800
Credit impairment charge[1]	R'm	(7 825)	(4 474)	75	(4 450)	(5 280)	(5 121)
Net income	R'm	15 180	16 657	(9)	14 569	12 516	10 679
Operating expenses	R'm	(9 463)	(8 612)	10	(7 494)	(6 364)	(5 439)
(Loss)/income from associates and joint ventures	R'm	(7)	11		2	3	–
Impairment of investment in associate	R'm	(122)	–		–	–	–
Income before tax	R'm	5 588	8 056	(31)	7 077	6 155	5 240
Tax	R'm	(1 130)	(1 805)	(37)	(1 781)	(1 685)	(1 434)
Preference dividend	R'm	(4)	(7)	(43)	(9)	(12)	(16)
Discount on repurchase of preference shares	R'm	(2)	(1)	100	(2)	–	–
Earnings attributable to ordinary shareholders							
Basic	R'm	4 452	6 243	(29)	5 285	4 458	3 790
Headline	R'm	4 586	6 277	(27)	5 292	4 461	3 793
Net transaction fee and funeral plan income to net income	%	62	47		45	41	37
Net transaction fee and funeral plan income to operating expenses	%	99	91		87	81	72
Cost-to-income ratio	%	41	41		39	36	34
Return on ordinary shareholders' equity	%	17	28		28	27	27

source: [redacted]

I5: Level of application of KPI

Figure 18 is an extract of an executive's KPIs disclosed in an integrated report.

Figure 18: Worst practice of level of application of KPI

Summary of outcomes for the CEO

Performance measure	Weighting for FY2021	Threshold	Target	Maximum	Percentage outcome
HSEC	25%				30%
Financial	50%				60%
Individual	25%				25%
Total	**100%**				**115%**

source: [redacted]

The chief executive officer's (CEO) performance evaluation metrics consist of individual (25%), financial (50%) and Health, Safety, Environment and Communities (HSEC) committee goals. More than half (75%) of the CEO's performance is evaluated on an atomistic basis whereby KPIs are not linked to the company's overall strategic objectives. Although a quarter of the CEO's KPIs consist of HSEC considerations, the specific performance metrics are not disclosed. Such elusiveness disallows stakeholders from discerning the appropriateness of the CEO's KPIs, breaking down the company's ability to engage effectively with stakeholders and meet their needs.

I6: Stakeholder engagement

Companies should disclose their efforts endured to maintain and enhance effective stakeholder engagement. Figure 19 provides an example of a boilerplate disclosure on stakeholder engagement.

Figure 19: Worst practice of stakeholder engagement

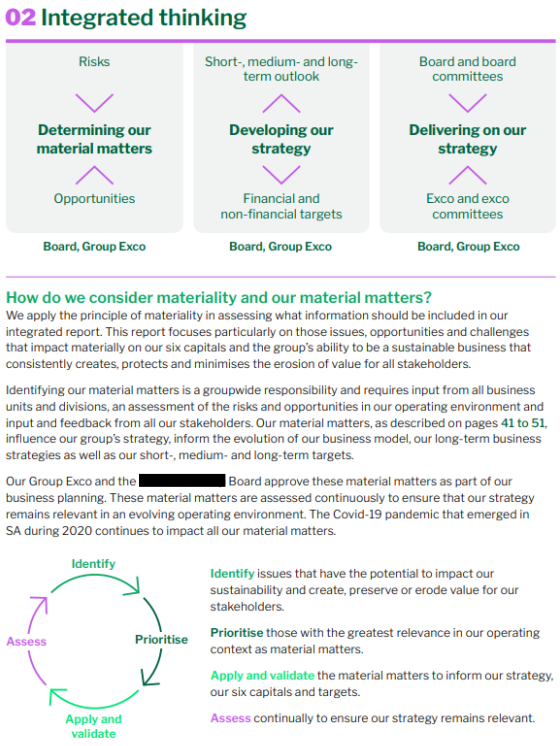
source: [redacted]

The extract in Figure 19 does not provide a comprehensive explanation on how stakeholder engagement is conducted and the channels used to engage with stakeholders. As a result, the company runs the risk of setting KPIs that are irrelevant to stakeholder expectations, leading to dissatisfied stakeholders and compromised legitimacy.

I7: Materiality

Companies can determine which KPIs are most pertinent to their industry, strategy, and sustainable future by conducting materiality assessments. Figure 20 shows how a company should disclose their materiality determination process, specifically linking their considerations to performance targets over the short-, medium- and long-term. Businesses can more efficiently manage their performance and allocate resources by concentrating on tangible KPIs. Investors and stakeholders can more easily compare a company's performance to peers and industry benchmarks when material KPIs are revealed. This makes it possible to conduct more insightful benchmarking and competitiveness evaluations of businesses.

Figure 20: Best practice of materiality disclosure



02 Integrated thinking

Risks	Short-, medium- and long-term outlook	Board and board committees
Determining our material matters	**Developing our strategy**	**Delivering on our strategy**
Opportunities	Financial and non-financial targets	Exco and exco committees
Board, Group Exco	Board, Group Exco	Board, Group Exco

How do we consider materiality and our material matters?

We apply the principle of materiality in assessing what information should be included in our integrated report. This report focuses particularly on those issues, opportunities and challenges that impact materially on our six capitals and the group's ability to be a sustainable business that consistently creates, protects and minimises the erosion of value for all stakeholders.

Identifying our material matters is a groupwide responsibility and requires input from all business units and divisions, an assessment of the risks and opportunities in our operating environment and input and feedback from all our stakeholders. Our material matters, as described on pages **41 to 51**, influence our group's strategy, inform the evolution of our business model, our long-term business strategies as well as our short-, medium- and long-term targets.

Our Group Exco and the [redacted] Board approve these material matters as part of our business planning. These material matters are assessed continuously to ensure that our strategy remains relevant in an evolving operating environment. The Covid-19 pandemic that emerged in SA during 2020 continues to impact all our material matters.

Identify issues that have the potential to impact our sustainability and create, preserve or erode value for our stakeholders.

Prioritise those with the greatest relevance in our operating context as material matters.

Apply and validate the material matters to inform our strategy, our six capitals and targets.

Assess continually to ensure our strategy remains relevant.

source: [redacted]

I8: Factors influencing achievement of KPI

Figure 21 illustrates KPI disclosures that are primarily influenced by external factors beyond the entity's control.

Figure 21: Worst practice of factors influencing achievement of KPI

Financial performance indicators	2017
Distributable earnings per share (eurocents)	48.26
Growth in distributable earnings per share*	17.1%
Adjusted NAV per share (euro)	7.10
Growth in Adjusted NAV per share*	11%
Loan-to-value**	26%
Unencumbered assets (% of total assets)	76%
Cost of debt	2.2%
Average remaining debt maturity	4.4 years
Interest rate hedge coverage	100%

source: [redacted]

The first four KPIs provided in Figure 21 are used to assess the company's operational efficacy and performance. There may be little control over achieving KPIs if they are highly impacted by external factors, such as share price affected by market sentiment. With the volatility of the market and its susceptibility to outside influences, it can be difficult for an organisation to manage its performance.

I9: Post-implementation review

Figure 22 details a post-implementation review performed over the 2021 KPIs disclosed by a company. The COVID-19 pandemic was considered as having a material effect on performance evaluation outcomes. As a result, the baseline year for assessing targets was 2019 to provide a more stable benchmark.

Figure 22: Best practice of post-implementation review

The Company established 2019 as baseline year for assessing the progress on the above targets. This was chosen as a representative year, before the Covid-19 pandemic impact tweaked some of the figures.

In 2021, the Group:

- scoped in and defined more precisely some targets, i.e., to cover either operations or development processes. As there are different material issues and a different approach in operating versus in developing a property, different targets need to be set up and different types of measures need to be implemented.
- revised the timeline and the ambition level for the targets maturing in 2022. Due to the Covid-19 pandemic and temporary reduction in operations (including restrictions on the operations of certain types of businesses), as well as decrease of the footfall in some periods, the Company cannot reliably separate the effects of these, from the resource consumption reduction based on the efficiency measures implemented. In this context, the Group decided to move the targets set for 2022 to 2024 or 2025, while at the same time revising the ambition level, in line with the sustainability strategy and industry.
- revised the ambition level for the long-term targets maturing in 2030, in line with best-in-class peers, while still reflecting the Group's context, markets, capabilities and portfolio. The long-term targets have been defined in 2020 to reflect the commitment to address climate change risks and opportunities. Starting 2021 [redacted] is also implementing a regular process of reassessment versus markets and internal progress, to ensure the targets remain relevant, achievable and sufficiently ambitious.

source: [redacted]

Additionally, the timelines set to achieve certain KPIs were altered because of operational disruptions caused by COVID-19 restrictions. Post-implementation reviews assist companies with ensuring that their KPIs are attainable and aligned with the overall strategic objectives which would have changed since the COVID-19 pandemic.

I10: Comparative information

In order to evaluate performance appropriately, comparative information should be provided for all KPIs disclosed. Figure 23 illustrates a comprehensive disclosure of comparative information provided over each KPI.

Figure 23: Best practice of comparative information

	Target	FY2021 result	Year-on-year	
People	Zero work-related fatalities	Workplace fatalities **0**	FY2017[1] FY2018 FY2019[2] FY2020 **FY2021**	1 2 1 0 **0**
	Year-on-year improvement of total recordable injury frequency[3] (TRIF) per million hours worked	Total recordable injury frequency decreased by **11%** compared to FY2020	FY2017[4] FY2018[4] FY2019[5] FY2020 **FY2021**	4.2 4.4 4.7 4.2 **3.7**
	50 per cent reduction in the number of workers potentially exposed[6] to our most material exposures of diesel particulate matter, respirable silica and coal mine dust compared to our FY2017[7] baseline by FY2022	Occupational exposures **70%** reduction compared to FY2017 baseline	Adjusted FY2017 baseline FY2018 FY2019[8] FY2020 **FY2021[9]**	4,266 3,032 2,192 1,744 **1,280**

source: [redacted]

Comparative information can be helpful to assess whether the business is progressing or is experiencing challenges. From the information provided in Figure 23, stakeholders are able to determine that the organisation is progressing in terms of employee safety, illustrating the effectiveness of efforts exerted.

Disclosure summary of best and worst practice

By analysing the integrated reports, best and worst practice examples have been illustrated (see Section 3). Examples of best and worst practice have been summarised in Table 15.

Table 15: Disclosure summary of best and worst practice

Indicator	Best practice	Worst practice
I1: Assurance	• Matching levels of assurance with rank of importance of KPIs • Clear articulation on roles of different assurance providers in combined assurance model • Disclosing process for selecting and approving KPIs, emphasising alignment with strategic objectives • Illustration of how insights gained from KPI outcomes impact operations and strategic direction	• Low levels of assurance for highly important KPIs • Vague/inconsistencies in combined assurance components • Boilerplate disclosure on combined assurance obtained • Failure to engage stakeholders during KPI selection/approval process • Ignoring deviations from targets without further explanation/corrective action
I2: Timeframe	• Definition of what is considered short-, medium- and long-term • Clear articulation of how medium-term KPIs bridge the gap between short-term actions and long-term objectives • Rationale explained for selecting long-term KPIs emphasising their strategic performance • Appropriate balance among all three timeframes	• Over-emphasis on short-term goals/lack of medium- and long-term focus • Lack of clarity on what each timeframe represents • Long-term KPIs are unattainable/unrealistic
I3: Number of SDGs addressed	• KPI-SDG linkages provided on an individual KPI basis • Alignment of KPI-SDG linkages with strategic objectives • Coverage of multiple SDGs	• Focus on limited SDGs • Failure to quantify efforts of KPIs on SDGs, leaving impact open to interpretation • KPI-SDG linkages detached from broader strategic objectives
I4: Number of capitals addressed	• All capitals addressed by KPIs • Distinct link between each capital and each KPI • Description of how company manages and manages each capital, illustrating relevance of KPIs	• Majority financially focused KPIs • Isolated capital considerations/no acknowledgement of interdependencies of capitals • Dominance of long-term KPIs of natural capitals & neglect of other capitals for long-term considerations
I5: Level of application of KPI	• Alignment of companywide KPIs with executive KPIs • Explanation on interconnections between KPIs set at various organisational levels	• Executive KPIs misaligned with companywide KPIs • No link provided for companywide and staff-level KPIs (lack of goal congruence)
I6: Materiality	• Transparent description on process used to determine materiality • Stakeholder engagement conducted in materiality determination process	• Blanket statement on materiality for all items in integrated report • No information provided on how materiality is determined

Table 15: Disclosure summary of best and worst practice		
Indicator	**Best practice**	**Worst practice**
	• Consideration of strategic priorities in materiality determination	• Overlooking feedback from stakeholders on matters that are most material to them
I7: Stakeholder engagement	• Statement on methods used & frequency of engagement • Inclusion of various stakeholder groups • Demonstration of how stakeholder feedback has influenced KPI selection • Communication of outcomes from stakeholder engagement	• Shareholder-centric focus/no stakeholder engagement • Failure to demonstrate tangible actions based on stakeholder feedback • Neglecting to address disagreements/concerns raised by stakeholders
I8: Factors influencing achievement of KPI	• Description of actions implemented to mitigate impact of external factors on KPIs • Acknowledgement of how internal/external factors impact the entity's ability to achieve KPIs	• KPIs linked to market sentiment/share price/market share • Ignoring historical context/trends related to internal/external factors impact KPIs
I9: Post-implementation review	• Detailed discussion on events impacting the relevance/achievement of KPIs • Explanation of recommendations & subsequent adjustments made to KPIs • Inclusion of stakeholders in review	• Omission of discussion on actions taken based on review findings • Shallow/vague review of KPIs • Failure to articulate criteria for evaluating appropriateness & progress of KPIs
I10: Comparative information	• Comparative information provided for multiple years • Progress indicator that clearly illustrates whether progress has been made/declined • Performance compared against industry benchmarks	• No analysis of what the data signifies and whether progress has been made/not • Comparative information provided without historical context • Only internal comparative information provided; no reference made to industry benchmarks

6.4: Appendix D: Technical report on 2021 results

The following technical report was presented on the 2021 data for practitioners. This summarises the thesis in simpler terms that can be understood and operationalised by the non-academic community.

Purpose of this report

Organisations have historically favoured financially focused performance evaluation metrics over other forms of key performance indicators (KPIs). The former is the easiest to define, quantify and evaluate (Herbert & Graham, 2021) unlike environmental and social metrics which are, accordingly, overlooked (Bellucci et al., 2020; Grassmann et al., 2019; Herbert & Graham, 2021; Maroun et al., 2023). Additionally, non-financial metrics are often not duly considered in the risk and materiality assessment processes of organisations, possibly because of underdeveloped management information systems (MIS) (Alrazi et al., 2015). This is despite the emphasis being placed on a more holistic approach to managing financial and extra-financial metrics in keeping with an integrated thinking philosophy (Herbert & Graham, 2021).

Integrated thinking is defined as:

> "The active consideration by an organization of the relationship between its various operating functional units and the capitals that the organization uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short, medium and long term" (IIRC, 2021, p. 53).

The inclusion of economic, environmental and social dimensions in KPIs plays a key role in promoting integrated thinking. There is, however, a limited understanding of how to adopt an integrated approach to KPI determination and the suitability of integrated KPIs for specific industries (Liu et al., 2019; Pigatto et al., 2023). As a result, this report proposes a KPI Integrated Thinking Index (KPI-ITI) which can be used to analyse the type and content of KPIs used by organisations and the extent to which they are aligned with an integrated thinking ethos.

The index is developed using principles from the International Integrated Reporting Framework (the Framework) (IIRC, 2021) and the King IV Code of Corporate Governance (King IV) (IOD, 2016) complemented by prior academic research (Alrazi et al., 2015; Herbert & Graham, 2021; Izzo et al., 2020; Mans-Kemp & Viviers, 2018). The application of the index is illustrated by applying it to a sample of Johannesburg Stock Exchange (JSE)-listed firms.

Background

KPIs are an underdeveloped area of research, particularly in the context of extra-financial reporting and integrated thinking (Liu et al., 2019; Maroun et al., 2023; Oshika & Saka, 2017). Prior research[20] has focused on three key areas:

1. benefits of, and barriers to, integrated KPI implementation;
2. developing MIS to define, monitor and evaluate KPIs and
3. an integrated thinking logic and proactive approach to KPI structures.

Each is examined briefly below.

Benefits of, and barriers to, integrated KPI implementation

Table 16 summarises the advantages and disadvantages of integrated KPIs.

Table 16: Benefits of, and barriers to, integrated KPI implementation

Benefits of integrated KPIs	Barriers to implementing integrated KPIs
Integrated KPIs demonstrate an organisation's commitment to gaining a deeper understanding of its impact on stakeholders and society as a whole, promoting its legitimacy (Herbert & Graham, 2021).	While the legitimacy of an organisation may be compromised, if the entity does not integrate extra-financial matters in performance evaluation, the risk of these KPIs becoming a compliance or "tick-box" exercise cannot be precluded (Haji & Anifowose, 2016; Massa et al., 2015; Samkin, 2012).
Integrated KPIs provide management with a broader perspective on strengths and weaknesses which enhances the entity's internal decision-making processes (Alrazi et al., 2015).	Specifically within the context of emerging economies, organisations may not have sufficient resources to develop a sophisticated MIS to assist the development of a robust performance evaluation structure (Alrazi et al., 2015).
Integrated KPIs provide a comprehensive view of an organisation's capitals and value creation abilities, enabling informed decision-making, strategic alignment and transparent communication with stakeholders (Busco et al., 2021; Rinaldi, 2020).	A key barrier to the development of integrated KPIs is the lack of understanding which management have on the interdependencies between capitals and value creation within the context of a specific business model (Dumay & Dai, 2017).
Integrated KPIs can be a useful tool to address key needs of stakeholders which can accommodate effective communication channels and enhance collaboration between divisions, assisting in breaking down divisional silos (Haji & Anifowose, 2016).	Complexities involved in the implementation of recommended disclosure practices from normative frameworks hinder the ability of organisations to operationalise such practices (Alrazi et al., 2015).
Environmental, social and governance (ESG) factors have become important to integrate into performance evaluation and this needs to be tailored to the specific industry and jurisdictional context (Hassan et al., 2019). Consequentially, improvements in ESG performance promotes long-term sustainability, improved	Difficulty in obtaining valid, accurate and complete ESG-related data also makes the evaluation of extra-financial KPIs complex, while a myriad of sustainability-related frameworks complicates the discourse around best-practice approaches for performance evaluation (Afolabi et al., 2023; Bui & De Villiers, 2018; Oshika & Saka, 2017).

[20] A search was performed for peer-reviewed articles on the Scopus Database with a total of 979 articles on KPIs and integrated thinking. These articles were run through VOSViewer software to determine the key themes explored by each paper which was then amalgamated into the three core themes discussed in this report.

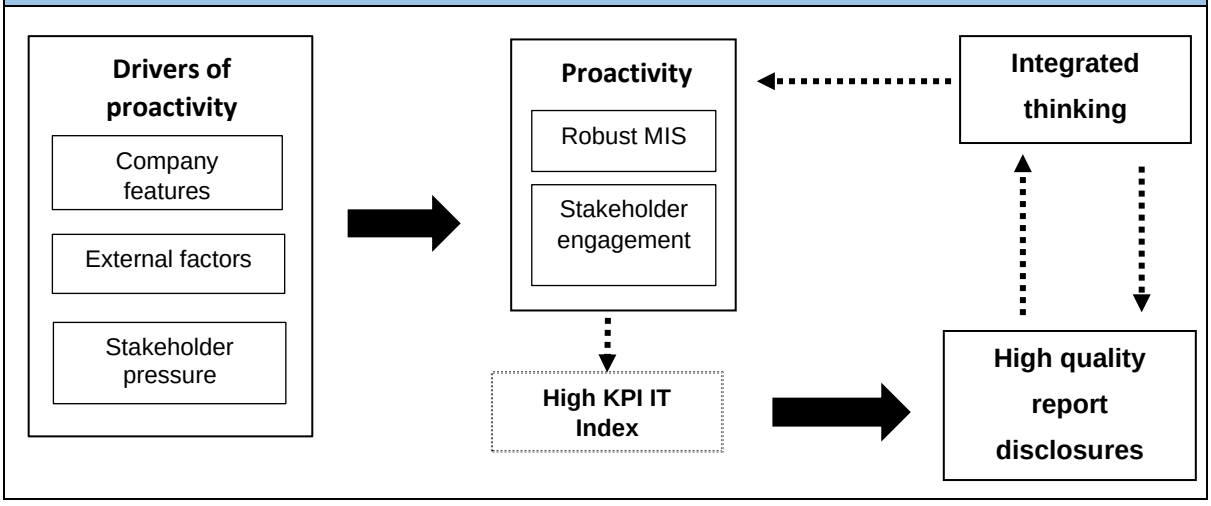
Table 16: Benefits of, and barriers to, integrated KPI implementation	
Benefits of integrated KPIs	**Barriers to implementing integrated KPIs**
decision-making and increased awareness and accountability for performance (Alrazi et al., 2015).	
Reporting on both positive and negative performance results in transparent business models where corrective action can be taken to result in positive organisational change.	In fear of compromising their legitimacy, entities may limit their disclosure of under-performing KPIs on the premise that such information did not qualify as material (Di Vaio et al., 2020).
KPIs are a useful tool to contextualise performance and to align broader capital objectives with those held by managers and accommodate effective communication and collaboration between divisions (Liu et al., 2019).	Resistance to change performance evaluation structures and underlying MIS because of resource constraints can hinder the implementation of integrated KPIs (Herbert & Graham, 2021).

The relevance of MISs in the development and implementation of integrated KPIs is discussed in more detail below.

Developing management information systems

Figure 24 illustrates how the use of a MIS dedicated to the business model, strategic information and disclosures assists management in ensuring that strategic goals are considered when drafting performance incentives. This is particularly helpful for large companies with complex operations and management structures.

Figure 24: The relationship between proactivity, KPI IT Indices and integrated thinking[21]



[21] This diagram was adapted from the ELAP Framework developed by Alrazi et al. (2015).

“Proactivity” is “the voluntary implementation of practices and initiatives aimed at improving environmental performance”. The determinants of proactivity include company factors, external factors and stakeholder pressure (Gonzalez-Benito & Gonzalez-Benito, 2006).

- Company factors comprise of company size, position in the value chain and strategic attitude (Glennie & Lodhia, 2013). Larger companies have the financial resources to implement robust MIS and commit to sustainability.
- External factors include industrial sector and geographical location (Alrazi et al., 2015). Companies with greater environmental risks are likely to be more proactive on environmental issues (Summerhays & De Villiers, 2012).
- Companies under greater stakeholder pressure are more likely to be proactive and improve their environmental performance (Bebbington & Larrinaga-Gonzalez, 2008; Hopwood, 2009; Rankin et al., 2011).

Proactivity is split into three main categories: environmental management systems, operational practices and reporting practices (Gonzalez-Benito & Gonzalez-Benito, 2006). The first two categories may be amalgamated into a single component: MIS.

- A robust MIS may help entities develop appropriate policies and goals to address stakeholders’ needs (Bui & De Villiers, 2017). Additional benefits include the execution and monitoring of such policies, compliance with legislative requirements, achieving goal congruence and maintaining communication with respective stakeholders (Alrazi et al., 2015).
- The implementation of robust information systems and continuous stakeholder engagement enable management to integrate decision-making with reporting (Maroun et al., 2023). To ensure the integrity of the data collected and processed, internal controls need to be strong. Reliable data enhance stakeholder accountability as well as reporting quality (Alrazi et al., 2015).

Higher levels of proactivity should result in an improved integrated thinking logic. This would render a favourable position on the KPI-ITI. As high quality reports are used as a proxy for integrated thinking (Maroun et al., 2023), proactivity may be seen as a main contributor to integrated thinking (Alrazi et al., 2015). If an organisation has a robust MIS in place, it may assist in identifying, assessing and mitigating material risks (Alrazi et al., 2015). It is important to acknowledge the aspects being measured and controlled. It is equally essential that the measurements generate value for both the company and its stakeholders (Kocmanová & Dočekalová, 2012).

The proactive approach to KPI structures will be discussed below.

An integrated thinking logic and proactive approach to KPI structures

Integrated thinking is characterised by assessing progress towards a pre-determined goal which encompasses multi-capital objectives and taking remedial action based on the outcome of the performance evaluation (Maroun et al., 2023). The practice of integrated thinking can foster a culture of transparency, accountability, and innovation which promotes better decision-making and value creation for all stakeholders (Dumay & Dai, 2017). This approach takes into account the interdependencies of an organisation's financial and extra-financial performance and how it affects long-term value creation. Table 17 summarises the indicators used to assess the level of integrated thinking in KPI disclosures. Indicators have an equal weighting and are not presented in order of importance.

Table 17: Indicators of integrated thinking in KPIs

Indicator	Index score	Explanation
Assurance of KPIs (AS)	AS captures the level of assurance obtained over the KPI. Assurance can be obtained from formal approval of the KPIs, monitoring of progress towards the achievement of the KPI by governing bodies, other internal assurance providers and external assurors. AS ranges from 0 (no assurance over KPIs) to 1 (at least some assurance over all KPIs).	Entities should ensure that KPIs are reliable and complete (IIRC, 2021).Certification of information systems may assist companies in assuring their performance and the integrity of metrics reported, which may assist with this matter (Rankin et al., 2011; Sumiani et al., 2007). Formal approval of KPIs and reviews of progress help companies ensure that all material matters are addressed.
Timeframe (T)	T illustrates the timeframe given to achieve the KPI. Short-term KPIs are attainable within 12 months, medium-term ranges from 1 to 5 years and long-term exceeds 5 years. T ranges from 0.3 (short), 0.6 (medium) and 1 (long-term).	In an effort to align KPIs with sustainable practice which embodies longevity and sustainable development, targets should be set over the short-, medium- and long-term and not only be focussed on short-term goals (IIRC, 2021; IOD, 2016). Timeframes assigned to KPIs should align with the entity's strategy.
Number of SDGs addressed (C_{SDG})	C_{SDG} encapsulates the number of SDGs that each KPI addresses. C_{SDG} ranges from 0 (no SDGs considered) to 17 (all SDGs considered).	A robust MIS is said to be a key driver of integrated report quality (Alrazi et al., 2015). As illustrated in Figure 2, the coverage of the SDGs (UN, 2015) and multi-capitals (IIRC, 2021) in KPIs may be achieved by way of the implementation of a robust MIS which takes into account extra-financial data and metrics. This also allows for a holistic assessment of the organisation and augments management's understanding of the business. By addressing multiple capitals and sustainable development goals, this signals a proactive approach to KPI setting and also aligns the cultural values within the organisation.
Number of capitals addressed (C_{CAP})	C_{CAP} captures the number of capitals that each KPI addresses. C_{CAP} ranges from 0 (no capitals considered) to 6 (all capitals considered).	
Level of application of KPI (APP)	APP encapsulates the organisational level at which the KPI applies. The KPI may apply to staff[22], executives and the company as a whole. APP ranges between 0.3 (low level of organisational integration) to 1 (high level of organisational integration).	The responsibility of achieving targets should be attributed to specific personnel (Mans-Kemp & Viviers, 2018). This will enable companies to hold the respective group accountable should progress decline. Conversely, companies will also be able to reward the respective group should targets be met which would ultimately enhance staff and executive morale. Goal congruence may be achieved by aligning KPIs applicable to staff and executives with the overall objectives of the organisation.

[22] Staff excludes directors and prescribed officers. All organisational levels are mutually exclusive.

Table 17: Indicators of integrated thinking in KPIs		
Indicator	**Index score**	**Explanation**
Stakeholder engagement (SE)	SE encapsulates the level of stakeholder engagement performed in setting the KPI. SE ranges from 0 (no stakeholder engagement) to 1 (engagement on the issue that the KPI seeks to address).	The business model of an organisation should address both internal and external stakeholder expectations (Chistopolova & Kaspina, 2022; IOD, 2016). Limited stakeholder engagement hinders the ability of organisations to satisfy stakeholders' needs (Oshika & Saka, 2017; Sakunasingha & Derakhshan, 2013; Sukhari & De Villiers, 2019). The failure to meet stakeholder expectations may lead to the ultimate failure of an entity as its legitimacy becomes compromised.
Materiality (MAT)	MAT captures the consideration of materiality in the KPI determination process. MAT ranges from 0 (materiality not considered) to 1 (materiality considered).	All companies, regardless of their size, must identify matters most material to their operations and address them through performance evaluation. As these matters differ among entities, it is important for organisations to disclose how they determined their materiality. KPIs should also be set on the premise of addressing matters that most significantly impact the achievement of the company's objectives.
Factors impacting KPI achievement (FAC)	FAC illustrates the nature of factors influencing the achievement of the KPI. Internal or external factors may impact such achievement. FAC ranges between 0 (external factors) to 1 (internal factors).	KPIs should be set under the assumption that the entity has the ability to achieve these goals. As such, organisations should avoid setting KPIs that may have their achievement hindered by external factors such as market sentiment. This will also reduce the risk of fraud taking place to achieve KPI metrics.
Post-implementation review (REV)	REV captures the evaluation of performance at year-end. REV ranges from 0 (no review) to 1 (evidence of reflection)	It is imperative to keep KPIs consistent over time, whilst still making appropriate adjustments to accommodate the ever-changing needs of stakeholders (IIRC, 2021). It is difficult to track progress on KPIs that are not consistent. In addition, it is difficult for external stakeholders to evaluate the performance of an entity if its KPIs are not comparable with its competitors (Oshika & Saka, 2017). Integrated thinking is characterised by evaluating progress against targets and taking corrective action where required (Maroun et al., 2023).
Comparatives provided (COMP)	COMP encapsulates the inclusion of comparative figures on the KPI. COMP ranges from 0 (no comparatives provided) to 1 (comparatives provided).	

Methodology applied to the study

The research is based on the top 40 JSE-listed entities by market capitalisation as at 1 March 2023. This controls the possibility that a lack of resources or technical expertise to implement robust controls may impact the KPI determination process (De Villiers et al., 2017; IIRC, 2021).

Integrated reports are used to evaluate KPIs. Separate sustainability reports, ESG checklists, interim results and investor presentations are not included in the analysis.

The goal is to examine the extent of integrated thinking evidenced by KPIs with reference to indicators shown in Table 16. Qualitative content analysis is used to collect and analyse the

data. Each entity's integrated report was read several times, focusing on the part of the report detailing KPIs[23].

Descriptive statistics, supported by data visualisations, are used to analyse the KPI disclosures. The KPI-ITI scores are evaluated for 2021, distinguishing between KPIs disclosed by companies of different sizes and industries. The scores reported in the EY Awards (EY, 2022) will be used to calibrate KPI-ITI scores given that integrated report quality is a proxy for integrated thinking (Malola & Maroun, 2019)[24]. The EY awards are designed to benchmark standards of excellence in the quality of integrated reports by using the content elements and the guiding principles of the Framework to score the integrated reports of listed companies (EY, 2022).

Results

Table 18 provides an overview of KPIs reported by the sampled companies.

Table 18: General statistics	
Metric	**2021 Observation**
Total number of KPIs analysed	564
Number of companies with no KPIs disclosed	4
Minimum KPI IT Index for a company as a whole[25]	7
Maximum KPI IT Index for a company as a whole	18.67
Mean KPI IT Index across the 40 listed entities	9.28
Most mentions of KPI in integrated report	82
Indicator 1: Percentage of companies with KPIs assured Internal assurance External assurance No assurance	 15.07% 15.78% 40.25%
Indicator 2: Timeframe analysis % short term KPIs % medium term KPIs % long term KPIs	 87.41% 9.75% 2.84%
Indicator 3: Average number of SDGs explicitly linked to KPIs	0.60
Indicator 4: Percentage coverage of multi-capitals Financial	 35.64%

[23] A disclosure checklist was used to reduce subjectivity and ensure that there is limited judgement applied in assessing the indicators. The scores captured will be reviewed by a second scorer to ensure the reliability of the data captured. Any discrepancies will be addressed by the lead researcher and resolved prior to analysing results.

[24] The EY Awards assess integrated reports on a scale from lowest to highest quality "Progress to be made" [1], "Average" [2], "Good" [3], "Excellent" [4], "The Top 10 and Honours" [5] for the highest quality of reporting. A score of 0 is allocated if the company was not part of the EY assessment.

[25] This statistic excludes the companies which scored 0 if they did not disclose KPIs or publish an integrated report.

Table 18: General statistics	
Metric	**2021 Observation**
Natural	20.21%
Human	21.28%
Social and relationship	32.45%
Intellectual	6.74%
Manufactured	9.04%
Indicator 5: Percentage of KPIs with stakeholder engagement	
On remuneration policy	97.16%
On issues addressed by KPI	60.28%
Indicator 6: Percentage of companies considering and disclosing materiality in the KPI determination process	94.15%
Indicator 7: Factors influencing the achievement of KPIs	
External influences	10.28%
Internal influences	98.76%
Indicator 8: Percentage of companies using a post-implementation review	79.79%
Indicator 9: Percentage of companies replicating KPI best practice	50.18%
Indicator 10: Percentage of companies including comparative information	81.91%

The minimum (7) and maximum (18.67) scores achieved indicate that the top listed companies analysed still have room for improvement with respect to implementing integrated KPIs. Although it is encouraging to see that companies are adopting an integrated thinking approach, there is still progress to be made when focusing on performance measurement and remuneration with the balance of both financial and extra-financial considerations requiring attention. Addressing the specific indicators of the KPI-ITI can assist in facilitating this improvement.

Only a small portion of entities obtained external assurance (15.07%) on their KPIs, while a big number of companies obtained no assurance (40.25%) on their KPIs. Limited or no assurance on the achievement of KPIs may hinder stakeholder trust on whether the KPIs being reported are a true reflection of what the entity claims to do.

Most KPIs are short-term orientated (87.41%). This could explain why the KPI-ITI scores are low, as it is difficult to achieve sustainability, which embodies longevity, if most KPIs can be achieved in the short-term. The SDGs are not being covered extensively by KPIs.

Concerning the coverage of the capitals:

- Financial capital (35.64%) is still the most prominent capital addressed by KPIs, a practice which may promote short-term maximisation of economic value at the

expense of long-term sustainable development and value generation for shareholders and other stakeholders (Herbert & Graham, 2021).

- Intellectual capital (6.74%) is covered least by KPIs. This may be a result of the challenge of setting suitable KPIs to address knowledge-generation, skill development and research.
- Similarly, social and relationship capital (32.45%) is addressed to only a limited extent by KPIs. The possibility that short-term financial gain detracts from long-term status development cannot be precluded (Herbert & Graham, 2021).
- Human capital (21.28%) is a becoming more important as employee welfare and BBBEE[26]-related metrics gain prominence. The finding suggests that some organisations have started to recognise the value of employees, resulting in increased investment in their knowledge, skills and well-being.
- Natural capital follows with 20.21% of KPIs incorporating an element of environmental or biodiversity-related performance targets. Some industries have a lower environmental impact, resulting in the need to address natural capital in KPIs being lower.

Eighty-two percent of organisations provide comparative information on KPIs. Post-implementation reviews are only performed for 79.79% of KPIs. Organisations which do not reflect on their progress are unable to address poor performance which could ultimately impact legitimacy and stakeholder confidence.

KPI index among different sized entities

Figure 25 illustrates how the KPI-ITI varies with company size. For this purpose, companies were assigned to quartiles based on market capitalisations.

[26]The Broad-Based Black Economic Empowerment Act aims to rectify past inequalities imposed on specific races in South Africa through the empowerment of these races.

Figure 25: KPI-ITI scores among different sized entities

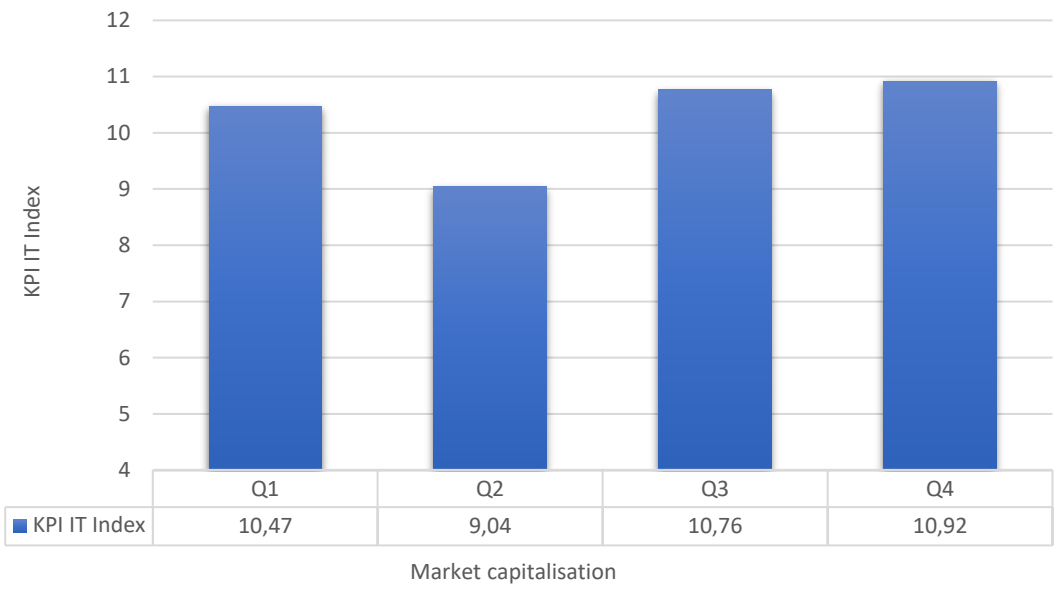
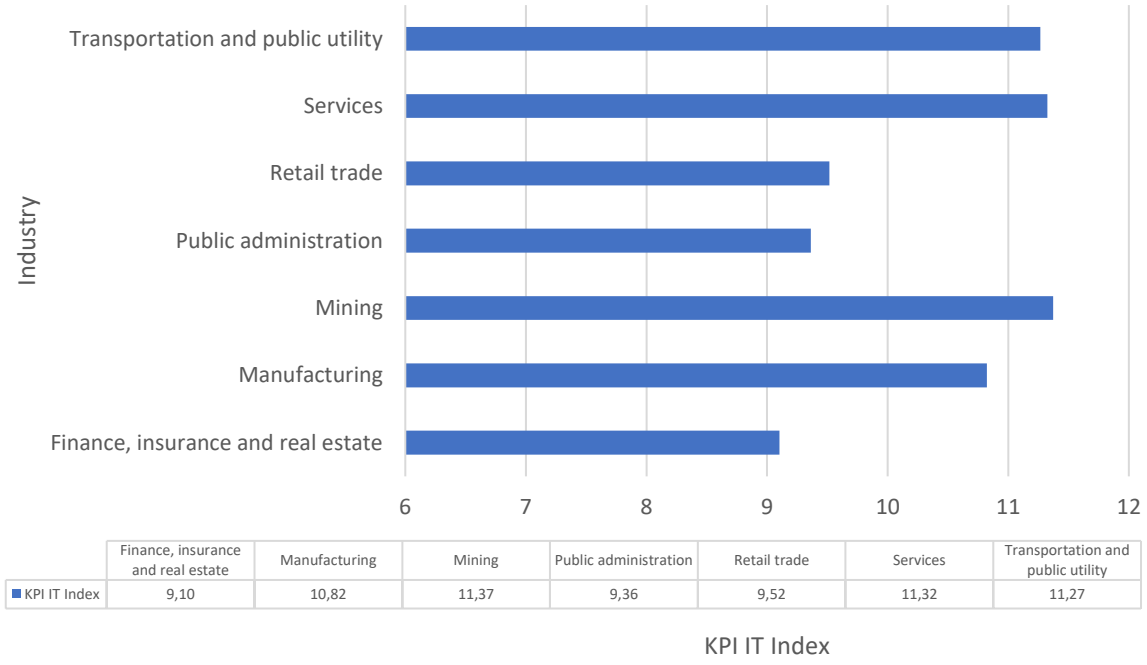


Figure 26 examines how the KPI-ITI differs among industries after controlling for differences in the number of companies per industry. Figure 26 shows that companies in the services (average 11.32) and mining (average 11.37) industries obtained the highest KPI-ITI. Companies in the finance, insurance and real estate (average 9.10) and public administration (average 9.36) industries obtained the lowest KPI-ITI.

Figure 26: KPI-ITI scores among industries on the JSE



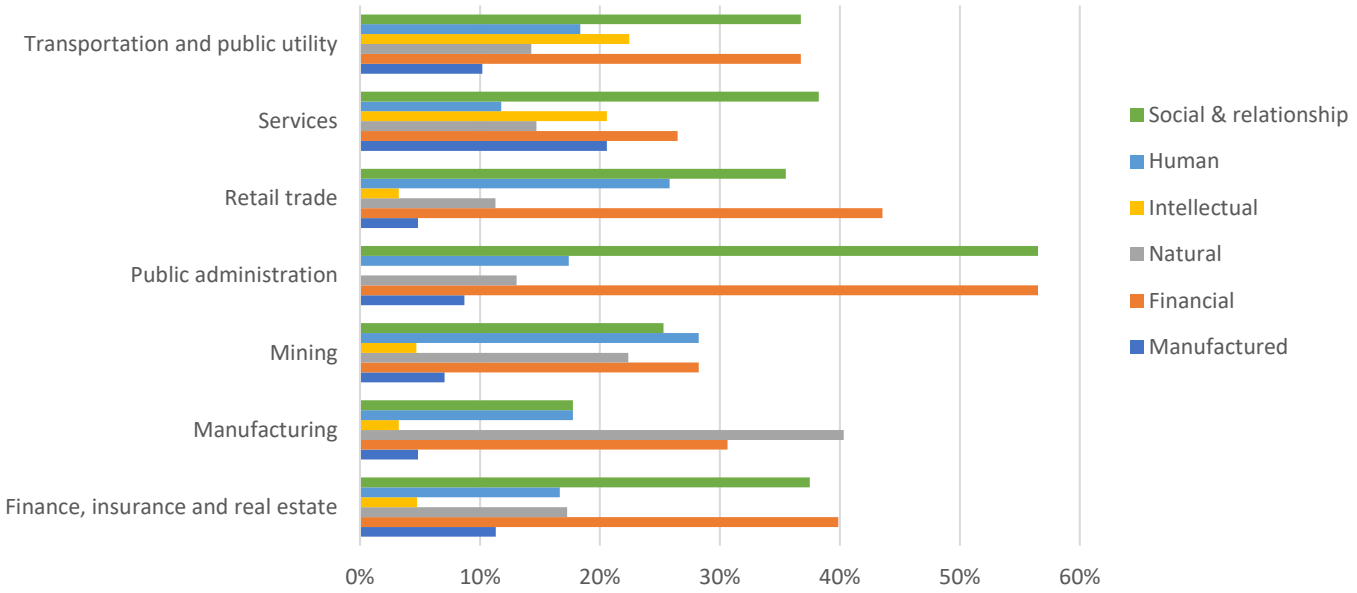
	Finance, insurance and real estate	Manufacturing	Mining	Public administration	Retail trade	Services	Transportation and public utility
KPI IT Index	9,10	10,82	11,37	9,36	9,52	11,32	11,27

Figure 27 illustrates the coverage of capitals in the KPIs disclosed by different industries on the JSE. Although financial capital is dominant on a total basis, entities within the manufacturing, transportation and public utility, services, public administration, mining and manufacturing industries are showing a better balance of KPIs across the capitals.

Social and relationship capital is heavily incorporated into KPIs among most industries. Investment in social and relationship capital may assist entities in enhancing their legitimacy, employee retention and competitive advantage (Pigatto et al., 2023). A key challenge in addressing this capital is that stakeholder expectations change over time, requiring organisations to monitor the effectiveness of the KPIs which address social and relationship capital. In contrast, natural capital is not the most prevalent capital in KPIs across all industries with only entities in the mining and manufacturing industries prioritising environmental and biodiversity-related performance metrics. Human capital is moderately incorporated into each of the industries' KPIs. This indicates that more companies are prioritising safety in the workplace in an effort to improve both its employee retention and its legitimacy.

It is important to note that the level of integrated thinking may still vary among individual organisations in specific sectors and while some companies may be more advanced, others may still be in the early stages of development.

Figure 27: Coverage of capitals among industries on the JSE



	Finance, insurance and real estate	Manufacturing	Mining	Public administration	Retail trade	Services	Transportation and public utility
Social & relationship	38%	18%	25%	57%	35%	38%	37%
Human	17%	18%	28%	17%	26%	12%	18%
Intellectual	5%	3%	5%	0%	3%	21%	22%
Natural	17%	40%	22%	13%	11%	15%	14%
Financial	40%	31%	28%	57%	44%	26%	37%
Manufactured	11%	5%	7%	9%	5%	21%	10%

Calibrating the KPI index score

Ernst & Young (EY) scores the top 100 JSE-listed companies annually on the quality of their integrated reports (EY, 2022). The EY reporting quality scores/rankings (IRQ) are used to "calibrate" the KPI-ITI. This is based on the view that better quality reporting reflects an underlying integrated thinking mindset which should also inform how companies develop and operationalise their KPIs (Malola & Maroun, 2019). Refer to Figure 28.

Index scores are shown on the y-axis. The EY quality scores are on the x-axis. The size of each plot represents the respective company's market capitalisation.

Figure 28: KPI-ITI alignment with IRQ

In general, companies with a higher KPI-IT also perform better in terms of the EY ratings of their integrated reports. In particular, the top 10 companies in terms of reporting quality (IRQ = 5) also have the highest KPI-ITI (average 11.59). This suggests that higher levels of integrated thinking are associated with the use of more integrated KPIs, however, additional factors may be involved in this observation which require further investigation (Ecim & Maroun, 2022; Maroun et al., 2023; Myeza et al., 2023).

Conclusion

This report provides an overview of the extent of integrated thinking incorporated in the KPI structures by the top 40 JSE-listed entities in 2021. The results reflect that the level of integrated thinking, as demonstrated in the KPI structures and approach, differs among companies of different sizes and industries. Larger companies and those with a high environmental impact show a higher level of integrated thinking. Companies in high-impact industries are able to implement KPIs which address a wider range of capitals and SDGs.

Companies are still prioritising financial KPIs. However, it is encouraging that there is a growing focus on the other capitals such as social and relationship, human and natural. The use of extra-financial KPIs promotes an integrated thinking logic, which is precisely what is required to operate in a sustainable manner. A lack of external assurance, a short-term focus, limited stakeholder engagement and gaps in the post-implementation reviews contribute to lower KPI-ITIs.

Future areas of research include refining the KPI-ITI and applying it to a wider range of organisations. A cross-jurisdictional analysis would also reveal how developed and developing

economies are applying the indicators of the KPI-ITI in different contexts and where areas of best practice may be replicated.

6.5: Appendix E: List of entities in sample

Table 19: List of entities in the sample

Number	Alpha	Long Name[27]	Industry	Market capitalisation ZAR 'Billions – 01/03/2023
1	BHG	BHP Group Ltd*	Mining	2 742
2	ANH	Anheuser-Busch InBev Ltd*	Manufacturing	1 992
3	BTI	British American Tobacco Plc*	Manufacturing	1 588
4	CFR	Compagnie Financière Richemont SA*	Retail trade	1 444
5	NPN	Naspers Ltd*	Services	1 425
6	GLN	Glencore Plc*	Mining	1 298
7	AGL	Anglo American Plc*	Mining	775
8	FSR	FirstRand Ltd*	Finance, insurance & real estate	349
9	SBK	Standard Bank Group Ltd*	Finance, insurance & real estate	294
10	AMS	Anglo American Platinum Ltd*	Mining	273
11	VOD	Vodafone Group Plc	Services	258
12	MTN	MTN Group Ltd	Transportation & public utilities	241
13	GFI	Gold Fields Ltd*	Mining	215
14	CPI	Capitec Bank Holdings Ltd*	Finance, insurance and real estate	196
15	ANG	AngloGold Ashanti Ltd*	Mining	175
16	SOL	Sasol Ltd*	Manufacturing	157
17	ABG	Absa Group Ltd	Finance, insurance & real estate	155
18	IMP	Impala Platinum Holdings Ltd*	Mining	147
19	MNP	Mondi Plc*	Manufacturing	143
20	KIO	Kumba Iron Ore Ltd*	Mining	142
21	BID	Bid Corporation Ltd*	Services	135
22	SHP	Shoprite Holdings Ltd*	Retail trade	132
23	SLM	Sanlam Ltd*	Finance, insurance & real estate	126
24	NED	Nedbank Group Ltd*	Finance, insurance & real estate	110
25	DSY	Discovery Ltd*	Finance, insurance & real estate	95
26	BVT	Bidvest Group Ltd*	Public administration	89
27	APN	Aspen Pharmacare Holdings Ltd*	Manufacturing	82
28	MEI	Mediclinic*	Services	82
29	RNI	Reinet Investments SCA*	Finance, insurance & real estate	73
30	REM	Remgro Ltd*	Public administration	70
31	INP	Investec Plc*	Finance, insurance & real estate	68
32	WHL	Woolworths Holdings Ltd*	Retail trade	66
33	EXX	Exxaro Resources Ltd*	Mining	64
34	CLS	Clicks Group Ltd*	Retail trade	64
35	NRP	NEPI Rockcastle NV*	Finance, insurance & real estate	63
36	NPH	Northam Platinum Holdings Ltd*	Mining	60
37	OUT	OUTsurance Group Ltd	Finance, insurance & real estate	53
38	SHC	Shaftesbury Plc	Finance, insurance & real estate	46
39	HAR	Harmony Gold Mining Company Ltd	Mining	46
40	GRT	Growthpoint Properties Ltd	Finance, insurance & real estate	45

[27] *Companies included in the pilot study.

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Candidate's Declaration

Name of Candidate:	Claudia Maria Pita Ferreira
Person Number:	1803497
Degree:	Master of Commerce (Accountancy)
Supervisor / Co-Supervisor:	Dusan Ecim & Warren Maroun
School:	Accountancy
Title of Thesis/Dissertation/ Research Report:	An analysis of the extent of integrated thinking reflected in key performance indicators disclosed by the Top 40 South African listed entities over time

Candidate's Declaration:

i. I hereby submit my PhD Thesis/Masters dissertation for examination (circle applicable).

ii. I confirm that my signed declaration in terms of Rule G9.7 is included in each copy of the thesis/ dissertation.

iii. I have checked all copies of my thesis/ dissertation and declare that no pages are missing or poorly reproduced.

iv. I hereby submit a CD/USB containing a PDF version of my submission for examination and ____0_____ bound copies.

Candidate's Signature: _____ **Date:** ____21/11/2023_____