

# An integrated sustainable QMS framework for the South African packaging industry



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**Purpose:** This paper explores the influence of ISO 9001:2015 certification on business performance in the packaging industry in South Africa. Additionally, the study proposes a comprehensive and sustainable quality management system (QMS) framework that harmonises with the stipulated requirements of the standard to address the challenges posed by the unpredictable and volatile business landscape.

**Design/methodology/approach:** This study adopted a quantitative research method and collected empirical data through surveys conducted in various mainstream packaging material sectors across South Africa. The participants were selected using a stratified sampling technique. The collected data underwent descriptive and inferential analysis.

**Findings/results:** The findings confirmed that the implementation of the ISO 9001:2015 certification has a significant influence on organisational performance. However, organisations should focus on integrating all business processes, prioritising lean manufacturing and ensuring effective leadership engagement at the strategic, tactical and operational levels to maximise the potential benefits of ISO 9001:2015.

**Practical implications:** The proposed integrated framework facilitates the detection and analysis of ineffective activities across organisational structures and processes within the supply chain. This comprehensive approach measures and improves all risk parameters, enabling sustainable development and providing insights into the impact and contributions of input variables to business operations.

**Originality/value:** This study addresses a practical gap in the industry by examining how ISO 9001:2015 certification can be effectively applied to enhance business improvement, even in the absence of the standard being overdue for revision. It provides valuable insights into strategies for leveraging the certification's potential to optimise business performance in such dynamic environments.

**Keywords:** ISO 9001:2015; lean; integrated; risk; sustainable; organisational structure; PDCA.

## Introduction

The ISO 9001:2015 standard is widely adopted by organisations to create a sense of trust among stakeholders within supply chains (Wetzel, 2017). ISO 9001:2015 certification signifies an organisation's commitment to maintaining high quality standards (Dinu, 2017). However, in the changing business environment, marked by volatility, uncertainty, complexity and ambiguity (VUCA) (Shper, 2022), organisations cannot rely solely on standards and expect long-term success. Thaller and Bravo (2022) suggest that it may be timely and necessary to revise ISO 9001:2015 standard to align its compatibility with the VUCA landscape. But equally note that, it remains unknown whether any revisions by its technical committee are planned soon. Thus, the prevailing turbulent conditions (Duffy & Mishra, 2022) make it imperative for businesses to extend the focus beyond the meeting of standards to the engineering of optimised business processes (Medić et al., 2016).

The aim of this study was to assess the influence of ISO 9001:2015 on organisational performance within the South African packaging industry. The research questions that the study sought to answer were: To what extent has ISO 9001:2015 influenced organisational performance and business process enhancement and what effect does leadership have in sustaining and driving the quality management system (QMS). The objectives that were set for the study were to conduct a survey among the representatives of selected South African packaging manufactures to gather data on business performance, process improvements, leadership and organisational effectiveness. The article concludes with a proposed integrated framework to coordinate, synchronise and

synergise processes that underpins and supports such a complex packaging supply chain to deliver the expected value and to be globally competitive. The subsequent section presents relevant literature on the ISO 9001:2015 standard, process and risk management and organisational leadership.

## Literature review

### The South African packaging value chain

The VUCA business environment and emerging trends, such as government-imposed levies, economic recessions, climate change and technological advancements, present significant challenges to the packaging industry in South Africa (Braithwaite et al., 2019). In this complex landscape, the interdependence of stakeholders in the South African packaging industry value chain highlights the importance of realising supply chain and quality requirements both downstream and upstream. This facilitates a seamless flow of products and information, ultimately leading to customer satisfaction. The multiple packaging supply chains, which include raw material suppliers, packaging manufacturers, packaging brand-owners, and the retail sector have the potential to hinder the delivery of quality, efficiency and innovation that are demanded by the broader market and economy at large. However, to achieve this goal, these interdependent stakeholders must operate QMS's that are optimally designed and engineered to address supply chain quality expectations and deliver quality requirements, ideally aligned with the ISO 9001:2015 standard (Wilson & Campbell, 2016). Achieving this will require optimal engineering of QMS's and business processes in the packaging industry (Medić et al., 2016). Of particular concern are the potential effects on job creation, transformation and positive financial support for the South African economy (Council for Scientific and Industrial Research, 2017).

### The ISO 9001: 2015 quality management standard

The ISO 9001:2015 standard is the fifth and latest revised version of the standard in alignment with the revolutionary changes in the current complex dynamic business environment in which organisations operate (Anttila & Jussila, 2017). The intent behind the ISO 9001:2015 standard is the conscious adoption of good manufacturing and service practices, across all processes of the business to achieve conformity and customer satisfaction and to improve its overall performance for sustainability (Cianfrani et al., 2022; Smith, 2016; ISO 9001:2015). By adopting this standard, companies can streamline their processes, reduce costs and enhance their reputation in the marketplace, leading to increased profitability and growth (Bakator & Cockalo, 2018; Martin, 2017).

The standard focusses on a process approach that seeks to reduce variation of singular unit processes and consequently, since business processes are all interconnected, where the output from a process becomes the input into another process, this approach will ultimately express itself in

multiple processes as expounded by De Aguiar et al. (2015). The result from such a process approach is the generation of products and services that demonstrate safety and reliability that align with each specific customer. The ISO standards are generic and not only limited to products or services, but also apply to all processes and that meeting the requirements does not necessarily assure against defective products but provides a set of good management practices for establishing a quality system (Dinu, 2017; ISO 9001:2015). The standard is based on the seven quality management principles, promotes the process approach, recommends the adoption of the Plan Do Check Act (PDCA) cycle and encourages risk-based thinking (Cressionnie, 2022; Sa et al., 2022; ISO 9001:2015).

### Process approach

The process approach requires the entire business to be analysed in terms of business operation flow showing the core process as well as all the support processes (Solomon et al., 2017). Heher and Chen (2017) posit that a process map is commonly employed to visually depict a process by utilising graphical illustrations that display the sequential order of steps. This allows non-value adding steps to be easily identified, enabling the process to be re-engineered and those non-value adding steps to be eliminated. Applying this methodology throughout a business can result in a leaner and more agile organisation, ultimately enhancing overall performance (Cressionnie, 2022; Geissdoerfer et al., 2016). Morgan and Stewart (2017) suggest that the process approach must be integrated with Deming's PDCA cycle as well as the risk-based thinking approach. These three concepts together form an integral part of the ISO 9001:2015 standard.

### Risk management

Effective risk management is crucial in dynamic and competitive business environments, as uncertainty can hinder the achievement of objectives (Cianfrani et al., 2022). However, organisations vary in their recognition and management of risks because of their unique operational and strategic goals (Hariyadi, 2018). To prevent risks from impeding organisational objectives, a comprehensive approach addressing quantitative and qualitative aspects of risks, based on established standards and specific requirements, should be integrated within the management system (Ganesan, 2023).

Mishra and Duffy (2023) propose integrating pervasive risk-based thinking with the process approach to enhance the effectiveness of continual improvement and the QMS. Moon (2022) suggests adopting synchronised risk management approaches across different hierarchical levels as represented in Figure 1 to ensure business sustainability. At every level of the hierarchy, specific goals and objectives are set, with a focus on products and processes that have distinct objectives. However, because of the interconnected risks in the hierarchical structure, it becomes imperative to integrate a comprehensive value chain perspective to identify potential limitations that may arise at various



Source: Moon, J. (2022). A risk management 4.0 approach helps organizations thrive and be more proactive. *Quality Progress*, 55(7), 16–23

**FIGURE 1:** Quality and risk hierarchy.

levels. This will ensure that organisations address the complexities and interconnected risks that arise across the various levels of the hierarchy and throughout the entire value chain (Ramsay, 2022).

Therefore, adopting a synchronised risk management strategy across hierarchical levels, as represented in Figure 1, is vital for ensuring business sustainability amid interconnected risks. This approach may not only enhance the alignment of goals and objectives but also empower organisations to proactively address potential obstacles and ensure a resilient path to long-term success across the entire value chain. It is advisable to implement a risk management process to ensure open communication, as well as the necessary flow of information and data within the organisation. This can only be achieved through proactive risk management, which involves predicting and mitigating potential risks such as the formation of silos within the organisation before they materialise, as opposed to reactive risk management, which involves responding to risks after they have occurred (Ganesan, 2023; Moon, 2022).

### Plan Do Check Act cycle

The PDCA cycle is a proven and well-established model for problem solving and continual process improvement that was developed and endorsed by the early quality gurus Shewhart and Deming (Johnson, 2016). It consists of four phases performed in a circular sequence with risk-based thinking at each phase (Cressionnie, 2022). It starts with the Planning phase where the problem or opportunity for improvement is identified, the goals and objectives of the systems and processes are established, and the plan is developed to achieve these goals. The Do phase entails implementing and controlling what was planned, and collecting data for evaluation. In the Check phase, the data are analysed to determine the effectiveness of the plan and to identify any deviations from the expected results. In the Act phase, the results of the analysis are used to improve the plan and to

implement the changes in the process (Cressionnie, 2022; Johnson, 2016; Morgan & Stewart, 2017; Sa et al., 2022). Integrating employees throughout the PDCA process unlocks their collective expertise and innovative capacities, enabling valuable contributions and leveraging their comprehensive understanding of operational processes (Markovitz, 2017). This comprehensive approach enhances the learning, problem-solving and long-term sustainability of improvements within organisations.

### Lean manufacturing

The objective of lean manufacturing is to eliminate waste and maximise value throughout all business processes (Deshmukh et al., 2022). It pursues continuous improvement and integration of labour with a clear focus on value adding activities based on five principles that revolve around identifying value from the customers perception, incorporating value stream mapping in all processes, creating a one piece flow throughout the processes, establishing a pull system and pursuing perfection (Kumar et al., 2022). Recent concepts such as sustainability (Debnath et al., 2022) and digitalisation (Deshmukh et al., 2022; Palange & Dhartrek, 2021) have emerged to expand the boundaries of these principles to facilitate the timely and efficient adaptation of businesses to evolving market demands, while simultaneously minimising waste and maximising value. The efficacy of lean manufacturing in process optimisation, quality improvement and customer satisfaction has been substantiated across diverse industries and contexts (Debnath et al., 2022; Kumar et al., 2022).

The Just-In-Time (JIT) approach is an integral element of lean manufacturing that underscores the production of requisite quantities precisely when required, aligning with customer demand (Kumar et al., 2022). In the realm of JIT manufacturing, the primary forms of waste such as overproduction, work in progress and safety stock need to be mitigated through reduction in lot sizes, buffer sizes and order lead time

(Vanichchinchai, 2019). Suppliers play a vital part in this process as the degree of integration level between a supplier's delivery plan and an organisation's product line must be effectively coordinated and structured to ensure that the supplier delivers parts in the same sequence as internally manufactured parts that are transferred between processes (Dossou et al., 2022). Therefore, lean manufacturing exerts a direct influence on supplier chain relationships and supplier performance (Vanichchinchai, 2019).

### Organisational decision-making levels

According to Hariyadi (2018), organisations are increasingly compelled to leverage accurate information and a comprehensive understanding of both their internal and external environments to guide their strategic, operational and tactical decision-making processes. It is the responsibility of leadership to make high-quality decisions that are not only accepted but also executed promptly at these different management levels (Misni & Lee, 2017). At the strategic level, decisions hold utmost importance for the overall functioning of the organisation (Kuruppuge & Gregar, 2020). It defines the long-term direction of an organisation by formulating and implementing strategies that align with the organisation's mission and vision. It is important to note that strategic decision planning occurs over a long-term timeline, typically spanning 2 years to 5 years (Misni & Lee, 2017).

Tactical decisions are bestowed upon managers who are responsible for coordinating and supervising resources and projects throughout the organisational functions (Khalifa, 2021). Tactical decision-making operates within a medium-term timeframe of 1 year to 2 years, and usually translates strategic goals into specific plans and actions to achieve the desired outcomes. Such decisions relate to production planning, inventory management, procurement and integrated product returns management within the organisation (Misni & Lee, 2017). Operational decision planning encompasses short-term considerations, typically on a day-to-day basis (Misni & Lee, 2017), and is relied upon by shop floor operations and supervision (Khalifa, 2021; Kuruppuge & Gregar, 2020). Strategic decisions inform tactical planning, which, in turn, guides operational execution. This alignment among the management levels ensures that organisational resources and efforts are directed towards achieving desired outcomes.

### Research design and methods

For this study, a case study research design was suitable for providing a detailed perspective of the influence of ISO 9001 systems on certified businesses within the South African packaging industry. The South African packaging industry was chosen as a case study because of it being a unique case that is representative of a broader set of cases within the manufacturing and service sectors. A case study approach is an attempt to understand a specific research problem within a set of specific circumstances as it is the logical sequence that connects the empirical data to a

study's initial research questions and, ultimately, to its conclusions (Yin, 2018). Therefore, the study employed a case study approach, deeming it both desirable and necessary to analyse the characteristics of the sample organisations in a real-world context through the collection of quantitative data (Larrinaga, 2017).

### Survey instrument design

The development of the survey instrument was informed by the ISO 9001 standard requirements and guided by Patyal and Koilakuntla's (2017) study. The proposed inquiry procedure is also adequate according to the literature combining qualitative procedure and quantitative approach. Rathilall and Singh (2018) demonstrated in their research that adopting this type of approach is effective in exploring shared areas when conducting research in the similar field of study. Section A consisted of four items that measured the participant's biometric data, Section B consisted of two items that looked at the ISO 9001 certification age and choice of certification body, and Section C incorporated 23 statements covering salient aspects of QMS's that required the participants to indicate the extent to which they agreed or disagreed on a five-point Likert scale ranging from a value of (1) 'strongly disagree' to a value of (5) 'strongly agree'.

### Sampling strategy

The study sample comprised packaging manufacturers with a turnover of greater than R20 million per annum. According to Packaging SA (2020), there were approximately 160 packaging manufacturers in South Africa across the mainstream packaging material sectors that fall into this category. The rationale for targeting these organisations was based on the premise that they would be ISO certified and therefore provide the best opportunity to obtain the required information from the industry perspective. According to Sekaran and Bougie (2016), a sample size of 113 is deemed an adequate representation to conduct research from a population of 160. The sample size is based on a 95% confidence level with a 5% margin of error as recommended by Connaway and Radford (2021). To ensure a comprehensive representation across the main stream packaging material sectors, the sampling plan was stratified. This is an efficient technique when differentiated information is needed (Sekaran & Bougie, 2016). The stratification was delineated across the main stream packaging material sectors encompassing glass, metal, paper, plastic and other categorisations. Representatives from each sector consisted of employees at the management level.

### Execution of the survey

The survey was carried out over a period of 3 months, allowing adequate time to plan, organise, distribute and receive the questionnaires. The list of the South African packaging companies and contact details, across the mainstream packaging material sectors, including information relating to value and volume turnover by company was obtained

from the Packaging Council of South Africa (Packaging SA, 2020). A total of 140 pre-selected respondents were sent the primary study survey via email. After the initial month, a courteous reminder email was despatched to the participants. Within the 3-month timeframe, the authors obtained 115 fully completed responses from the field, surpassing the targeted sample size of 113 and achieving a response receipt rate of 101.8%.

## Method of data analysis

The data obtained from the survey were analysed using the IBM SPSS Statistics (Version 26) predictive analytics software. Each statement was analysed individually in terms of content and frequency of responses. The reliability of the measuring instrument was ensured using Cronbach's coefficient alpha where a reliability coefficient of 0.70 or higher was considered as 'acceptable' (Taber, 2018). Industry experts from the South African packaging industry, academics and a statistician in the field of quality management were used to validate content and face validity of the measuring instrument. The two levels of disagreement and two levels of agreement from Section C of the survey were collapsed to show single categories of overall disagreement and overall agreement because of the acceptable levels of reliability and consistency in the factor analysis (Rathilall & Singh, 2018). This is aligned with Asun et al. (2016) that factor analysis is a statistical technique for data reduction, commonly used in survey research to represent a number of questions with a small number of hypothetical factors. The requirement is that Kaiser-Meyer-Olkin Measure of Sampling Adequacy should be greater than 0.50 and Bartlett's Test of Sphericity less than 0.05 as reported by Charalambous et al. (2016). The Pearson's Chi-squared test was performed to determine whether there were statistically significant relationships between the variables in this study. A significant  $p$ -value is indicated with ' $p < 0.05$ ' as highlighted by Charalambous et al. (2016).

## Results and analysis

### Section A – Biometric data

The job profiles of the respondents represented the Quality, Manufacturing, General Management, Procurement, Planning and Scheduling departments respectively, providing credibility to the responses. Given that these departments form the central focus of the QMS, it confirmed that the respondents' profile aligned with the industry, and therefore their responses to the ISO 9001 survey can be accepted as representative of the South African packaging industry. The age profile of the respondents was another significant factor, as around 74% of them were over the age of 40, thus increasing the dependability of the answers.

### Section B – ISO data

All of the respondents (100%) reported that their organisations had ISO 9001 certification, thereby strengthening the integrity of the responses concerning the South African packaging industry. Furthermore, over 90% of the respondents indicated

that their organisations had been certified for more than 3 years ( $p < 0.001$ ), suggesting that the responses came from experienced individuals in well-established ISO 9001-certified organisations.

### Section C – Survey data

The results for the model in this study were acceptable as the Kaiser-Meyer-Olkin Measure of Sampling Adequacy yielded a score of 0.733 and the Bartlett's Test of Sphericity yielded a score of 0.000. The communality, on the other hand, which is a part of the factor analysis, indicated the total proportion of its variation that is accounted for by the extracted factors. Therefore, the questionnaire model in this study is acceptable as it explains approximately 70% of the variation for the 23 variables in Section C.

### Influence of ISO 9001 on the organisation performance

The results pertaining to the influence of ISO 9001 on the organisation performance are presented in Table 1.

For statement C1, 40% of the respondents agreed that ISO 9001 has positively influenced sales volumes. This can be attributed to the global prestige associated with the certification as a reason for its significant value as suggested by Martin (2017). The high level of accord among the respondents in statement C2 suggests that adopting ISO 9001 leads to an increase in customers, which is consistent with the findings of Bakator and Cockalo's (2018) study indicating that ISO 9001 certification provides a strategic benefit in improving access to customers. The responses for statement C3 showed a high level of agreement among the respondents that the implementation of ISO 9001 leads to improved productivity levels. This outcome was expected and corroborates the findings of Hanushek and Ettema (2017) that these standards help businesses in enhancing conformity to customer requirements as well as productivity.

Considering the majority of respondents exhibiting agreement rather than disagreement with statement C4 suggests that ISO 9001 would have had a positive influence on wastage reduction, which can be attributed to the emphasis on good manufacturing and service practices that ISO 9001 promotes across all processes of the business (Smith, 2016). The pronounced level of concurrence for statement C5 substantiates the findings of Sa et al. (2022), highlighting that the primary emphasis of ISO 9001 registrations lies in compliance with specified practices to ensure a consistent level of product quality.

Statements C6 and C7 demonstrated a substantial consensus that the implementation of ISO 9001 resulted in a noticeable decline in both the frequency and severity of customer complaints, respectively. For statement C8, the positive responses confirm that sustained success is achieved when the customer gains a level of confidence in the management system of the supplier, and the key to this success is to

repeatedly meet or exceed customer expectations (Abuazza et al., 2019).

While the statements examined in this section exhibited a tendency towards positive agreement, a significant percentage of respondents were neutral or disagreed with these statements, suggesting that the influence of ISO 9001 certification on organisational performance may not be uniform across all organisations. Such neutrality and disagreement suggest that respondents did not perceive a clear association between ISO 9001 implementation and its influence on key factors such as sales volume, business productivity and customer relations quality in particular. A potential rationale for this pattern may be linked to significant  $p$ -values ( $< 0.05$  for C2, C5 and C6) identified between packaging material sectors, indicating the presence of non-homogenous distributions, and the timeframe of ISO accreditation within organisations ( $p$ -value  $< 0.05$  for C1, C3, C5, C6 and C7), suggesting a relatively recent adoption of ISO processes.

### Continual business process enhancement

The results pertaining to continual business process enhancement are presented in Table 2.

The high level of positive responses for statement C9 reflects that business processes are clearly defined through the process mapping tool to create a visual representation of the process, which aligns with the viewpoints of Heher and Chen (2017). On the other hand, the results for statement C10 showed that only 49.1% of the respondents agreed that business processes have been analysed and

engineered to remove non-value steps, suggesting room for improvement as reflected in the work of Geissdoerfer et al. (2016). For statement C11, the moderate level of agreement (59.1%) supports the idea that business processes must be continually improved to enhance output quality and reduce variation. The combined proportion of respondents who were neutral and disagreed (40.9%) with this statement, may be attributed to factors such as the level of investment available, as well as the rate of return on the intended investment within an organisation, as elucidated by Mishra and Duffy (2023). Although significant differences in responses were observed among the packaging material sectors for statements C10 and C11 ( $p < 0.05$ ), the overall neutral and disagreement responses to these statements could be linked to the duration of ISO accreditation within these organisations. This suggests that these organisations have not fully adapted to the process approach and thinking required by the ISO 9001 standard.

The positive responses to statement C12 (47.3%) may be attributed to respondents' comprehension of the broader context of lean manufacturing, which can be considered a fundamental requirement of ISO 9001 (Debnath et al., 2022; Kumar et al., 2022). However, the significant  $p$ -value ( $< 0.05$ ) for the type of packaging material sector suggests that some sectors may have a greater comprehension and emphasis on lean manufacturing compared to others. This observation is further reinforced by the high proportion of neutral responses (38.4%), which implies that some respondents are uncertain about prioritising lean manufacturing as a key focal point following the implementation of ISO 9001. As

**TABLE 1:** Results pertaining to the influence of ISO 9001 on organisational performance.

Statements C1 to C8 – Influence of ISO 9001 on the organisation	Disagree	Neutral	Agree	Community	$p$ -value (Certified length of time)	$p$ -value (Packaging material sector)
C1 – There has been an increase in sales volume (not revenue/value) after the ISO 9001 Certification	21.7	38.3	40	0.774	0.000	0.223
C2 – There has been an increase in the number of customers after the ISO 9001 Certification	19.1	38.3	42.6	0.7	0.002	0.019
C3 – There has been a noticeable improvement in productivity after the ISO 9001 Certification	11.3	40	48.7	0.764	0.020	0.195
C4 – The reduction in the process wastage/spoilage after the ISO 9001 certification is significant	25.7	32.7	41.6	0.662	0.145	0.209
C5 – Product Quality improved significantly	10.6	33.7	55.8	0.644	0.014	0.001
C6 – The frequency of customer complaints showed a decreasing trend after the ISO 9001 Certification	14.8	20.9	64.3	0.797	0.167	0.004
C7 – The severity of customer complaints showed a decreasing trend after the ISO 9001 Certification	8.7	25.2	66.1	0.755	0.124	0.042
C8 – The ISO 9001 Certification has fostered a greater customer focussed approach	3.5	19.1	77.4	0.636	0.131	0.067

**TABLE 2:** Results pertaining to continual business process enhancement.

Statement C9 to C14 – Continual business process enhancements	Disagree	Neutral	Agree	Community	$p$ -value (Certified length of time)	$p$ -value (Packaging material sector)
C9 – The business processes are clearly defined using process mapping	3.5	21.9	74.6	0.501	0.257	0.002
C10 – Business processes have been analysed and engineered to remove non-value adding steps	10.5	40.4	49.1	0.76	0.012	0.858
C11 – The ISO 9001 Certification resulted in significant changes to business processes	12.7	28.2	59.1	0.681	0.002	0.009
C12 – There is a stronger focus on Lean Manufacturing	14.3	38.4	47.3	0.802	0.074	0.000
C13 – There is a stronger focus on Just in Time Manufacturing	14.3	40.2	45.5	0.801	0.249	0.080
C14 – There is a strong emphasis on sustained Continual Improvement methodologies across all functional areas of the business	4.3	19.1	76.5	0.788	0.559	0.172

anticipated, statement C13 on JIT manufacturing exhibits a similar pattern to the previous statement on lean manufacturing, as they are interrelated and work together to reduce waste, ensure timely delivery and enhance customer satisfaction. Thus, there exists the potential to enhance the comprehension and implementation of these practices across all sectors, given their importance as drivers of continuous improvement.

On the other hand, statement C14 received a high level of agreement (76.5%), indicating that the packaging industry is well entrenched with the ideas of continual improvement. This is consistent with the findings of Sreedharan et al. (2017) who argued that organisations can foster a culture of continuous improvement by adopting fundamental quality management principles that reinforce a positive quality culture.

### Organisational effectiveness and leadership practices across business operations

The results pertaining to organisational effectiveness and leadership practices across business operations are presented in Table 3.

There is a 74.8% agreement for statement C15 that there is positive employee engagement across the packaging industry. This positively supports ISO 9001 emphasis on employee engagement, which corroborates with Eldor and Vigoda-Gadot (2017) that when people are respected and positively engaged, with clear understanding of the vision of the business, they will be supportive of the business goals and will positively contribute to achieving them. The  $p$ -value (0.000) for the packaging material sector was statistically significant, indicating that there was a significant difference in the perception of employees in different sectors.

The substantial level of consensus (approximately 77%) for statement C16 indicates that business data is effectively used in business decisions across the packaging industry, correlating with the findings of Wilson and Campbell (2016) and Mitchell and Lewis (2017) who found that organisational or business knowledge as data and information provide objectivity and confidence in decision making. Additionally,

the  $p$ -value of 0.017 for the packaging material sector was found to be statistically significant, indicating that there may be a substantial variance in employee perspectives across the various sectors.

For statement C17, approximately 77% of the respondents agreed that their internal auditing systems are effectively used within the business to identify opportunities for improvement, as well as areas of commendable practice. This is aligned with Chiarini et al. (2021) who stated that internal audits are structured methods that focus on auditing key performance indicators as well as economic and financial indicators and controlling improvement initiatives. A similar finding is reflected from the positive responses to statement C18 (82.6%), confirming the efficacy of internal auditing closeout to facilitate business process enhancements, particularly in cases of system failures within the South African packaging industry. This finding lends credence to Chiarini et al.'s (2021) assertion that the majority of management system standards endorse the adoption of internal audits as a means to continually enhance the QMS performance.

The agreement level of 83.4% for statement C19 indicates strong support from leadership in the packaging industry towards QMS requirements. This support is crucial for achieving quality objectives in a dynamic industry through positive employee engagement and effective policies and systems (Abuazza et al., 2019). Notably, the  $p$ -value of 0.011 for the packaging material sector was statistically significant, indicating a meaningful difference in the perceptions of employees across diverse sectors.

For statement C20, approximately 76% of the respondents concurred that resources are made available in support of continual improvement. This is promising within the packaging industry in South Africa especially when reference is made to promoting a culture of continual improvement and employee empowerment as highlighted by Palange and Dhatrak (2021). On the other hand, the relatively substantial proportion of neutral responses, amounting to 21.7%, implies that the matter of resource availability for continuous improvement may still pose a significant challenge for certain

**TABLE 3:** Results pertaining to organisational effectiveness and leadership practices across business operations.

C15 to C23 – Business management disciplines	Disagree	Neutral	Agree	Communality	$p$ -value (Certified length of time)	$p$ -value (Packaging material sector)
C15 – There is a positive focus on people engagement across all the business functional areas for clear business communication	5.2	20	74.8	0.629	0.313	0.000
C16 – Business data across the functional areas are collected and analysed as part of routine business reporting and decision making	6.1	17.4	76.5	0.684	0.876	0.017
C17 – The internal systems audit process is value adding	3.5	19.1	77.4	0.707	0.718	0.013
C18 – The internal audit non-conformity or findings are acted upon for continual improvement	5.2	12.2	82.6	0.632	0.592	0.235
C19 – Leadership is fully supportive of ISO 9001 business requirements	0.9	15.7	83.5	0.664	0.114	0.011
C20 – Leadership provides resources for continual improvement	2.6	21.7	75.7	0.795	0.944	0.004
C21 – Decision making is always based on factual information	3.5	20	76.5	0.709	0.346	0.071
C22 – Relationships with all critical suppliers are driven by top management	6.1	18.3	75.7	0.79	0.157	0.302
C23 – Relationships with all critical customers are driven by top management	3.5	20	76.5	0.725	0.109	0.181

organisations or that such entities may not accord priority or active support to continuous improvement initiatives. Furthermore, the  $p$ -value (0.004) associated with the packaging material sector was statistically significant, indicating that differences in industry sectors may account for the variance in resource availability for continuous improvement.

As predicted, the positive results (77% agreement) for statement C21 are consistent with the feedback obtained for statement C16. This consistency can be attributed to the extraction of factual information from the 'critical to quality' areas of the organisation's operations and the utilisation of existing process data to enhance decision-making accuracy and precision (Evans & Lindsay, 2019). Supporting this argument, Mitchell and Lewis (2017) assert that decisions based on existing process data analysis and evaluation are more likely to result in favourable outcomes. Therefore, prioritising evidence-based decision-making over subjective beliefs is crucial for businesses. However, the relatively high neutrality rate of 21.7% suggests that some organisations may still encounter difficulties in making decisions, possibly because of a lack of awareness regarding the decision-making processes employed within the organisation.

The high level of agreement (76%) for statement C22 highlights the crucial role of top management in cultivating sustainable relationships with critical suppliers through a strategic partnership approach. This finding is consistent with the recommendations of Ramsay (2022) for establishing long-term, risk-oriented and sustainable partnerships with suppliers, rather than focussing solely on price. Similarly, statement C23 reveals that 76.5% of respondents concurred that top management drives relationships with critical customers. This aligns with the recommendations of Abuazza et al. (2019), who suggest that effective management of relationships with all stakeholders, especially customers, is essential for sustained success.

Overall, the results in this section suggest that leadership is a critical factor for the successful implementation of ISO 9001 in the packaging industry at all hierarchy levels. At the operational level, statement C15 highlights the importance of people engagement for clear business communication, which is essential for frontline employees to understand their roles and responsibilities. At the tactical level, statement C16 emphasises the importance of collecting and analysing business data for decision-making purposes, indicating the need for middle management to have a good understanding of business operations. At the strategic level, statement C19 indicates that leadership support is critical for meeting ISO 9001 business requirements, while statement C20 highlights the importance of leadership providing resources for continual improvement. In addition, statements C22 and C23 emphasise the role of top management in driving relationships with critical suppliers and customers, indicating that strategic leadership is essential for maintaining business relationships.

## Discussion and recommendations

The study addressed its research questions by identifying a significant correlation between the timeframe for implementing ISO 9001 certification and its influence on organisational performance. The extended implementation periods yielded more pronounced benefits compared to shorter durations, highlighting the importance of continuous monitoring and evaluation of the results of certification outcomes. The study also uncovered a bias towards prioritising manufacturing systems and process controls to meet customer quality requirements. However, this emphasis came at the expense of neglecting other essential business processes, thus deviating from the process-centric approach advocated by ISO 9001. Furthermore, it was established that there is a clear emphasis on lean and JIT manufacturing practices within the packaging industry, suggesting a need for alignment with ISO 9001 principles, while also adapting them to the specific material sectors for effective implementation. Lastly, leadership emerged as a key determinant of ISO 9001's success across all hierarchical levels, emphasising the critical role of effective leadership in harnessing the ongoing adaptations and benefits of ISO 9001 implementation.

Arising from the results and the principal findings, the authors propose an integrated QMS framework as depicted in Figure 2, capable of thriving in the VUCA environment. The foundational structure of the framework incorporates the seven quality principles, integrated within the PDCA cycle. Essential input variables derived from both suppliers and customers act as the principal catalysts driving the subsequent processes. These variables are underpinned by a three-tier auxiliary structure, encouraged by Moons' (2022) Quality and Risk Management cascading hierarchy. Each layer is underpinned by the PDCA philosophy, to execute the business operations which start with the customer requirement and culminate in customer satisfaction and business sustainability. The framework is based on the premise of a cyclic closed-loop system that constitutes an integrative process approach where the output of one process becomes the input of another. Therefore, the sequences and interactions of such processes are vital, and must be shown within the quality system enabling effective decision making on process throughput, as well as during troubleshooting, when processes fail to deliver intended results (Evans & Lindsay, 2019). If every process within the business is managed in this way, the overall output will meet customer requirements.

At Level 1 of the framework, leadership undertakes the responsibility of integrating risk management, cultivating a quality-oriented mindset and embedding sustainability principles within the organisational structure. Zhao et al. (2023) observed a similar pattern in Pakistan, demonstrating that an integrated QMS structure can enhance organisational performance and social sustainability. The integrated approach not only strengthens the organisation's strategic trajectory but also facilitates collaborative initiatives across the entire supply chain.



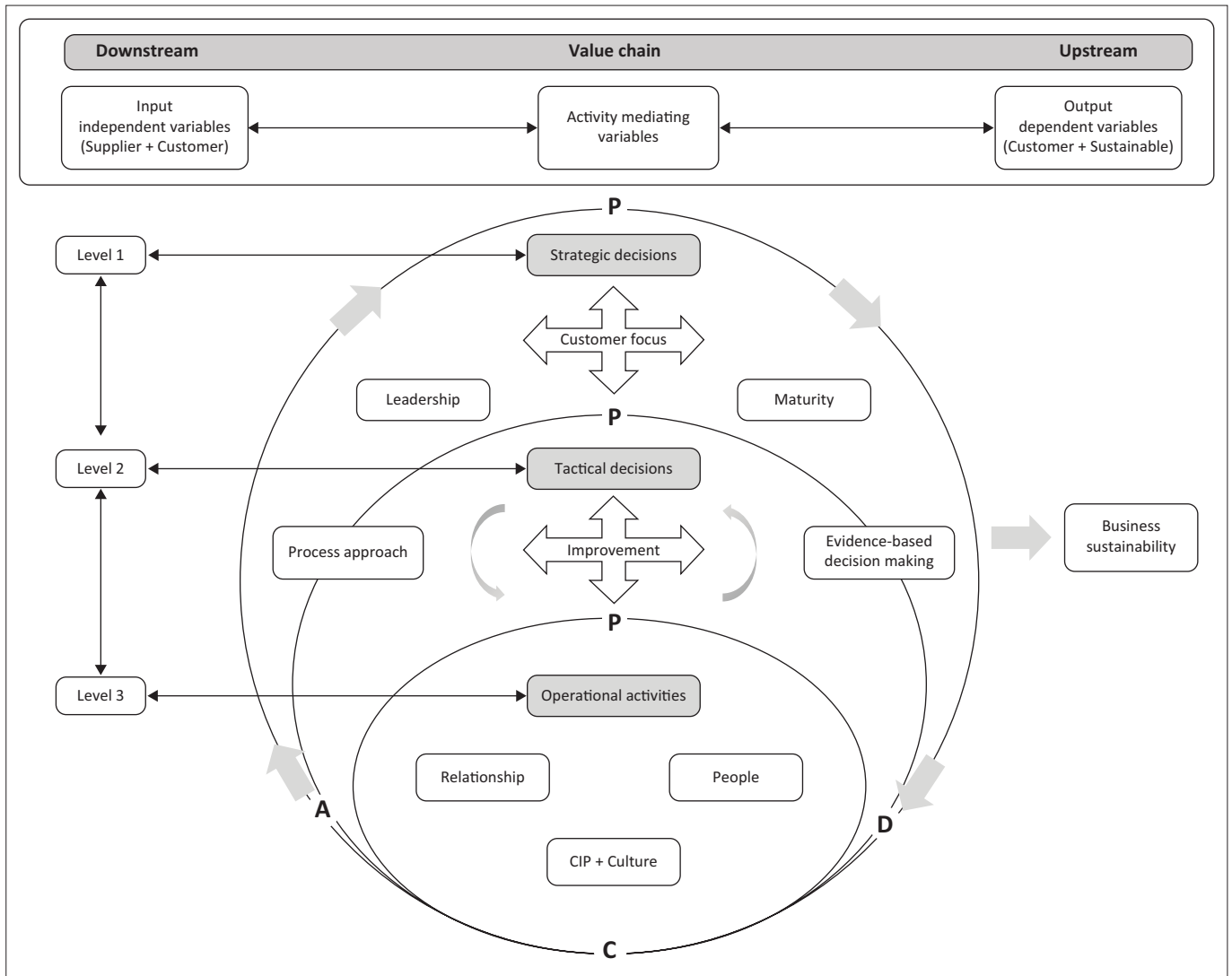


FIGURE 2: Suggested integrated sustainable quality management system framework.

At Level 2, the framework transitions towards tactical management, entailing the alignment of objectives with overarching strategy, while concurrently orchestrating risk management strategies to optimise operational efficiency. Martins et al. (2022) also recommend that organisations integrate tailored practices with risk-based thinking throughout all QMS processes, emphasising the active involvement of all departments. Level 3 of the framework is dedicated to operational execution, with a focal point on achieving and sustaining key performance indicators. This is achieved by fostering a positive organisational quality culture and active engagement with all stakeholders, thus reinforcing the foundations of social sustainability. This corresponds with Bakhtiar et al.'s (2023) study in Indonesia, where operational performance was found to be significantly influenced by a quality culture, especially wherein heightened organisational performance is notably influenced by the implementation of ISO 9001, with a quality culture serving as a mediating variable.

The integrated framework serves as a structured approach for navigating unpredictable business landscapes by

blending ISO 9001, risk management and sustainability principles. According to Ganesan (2023), this is shown to be good practice for mitigating or eliminating risks arising from organisational silos. This assists organisations in invigorating their resilience, fostering supply chain collaboration and maintaining operational continuity. With leadership engagement, decisions are made in consideration of risks, while tactical management aids in project planning and risk recognition. At the operational level, employee empowerment and a positive culture enhance performance and social sustainability. The closed-loop PDCA philosophy drives iterative enhancements, while the framework aids in identifying opportunities and facilitating consistent decision-making, thus promoting business sustainability.

## Conclusion and practical implications

As the packaging sector continues to experience shifts in technology, consumer preferences and sustainability concerns, the findings from this study can be seen as instrumental in guiding businesses through these changes. Employing

proactive measures such as regular audits and assessments ensures that deviations are promptly identified and rectified, and that real-time feedback aligns with the contemporary demands of agility and responsiveness in the face of rapidly changing market conditions. Furthermore, by focussing on the systematic interrelation of processes and their optimisation, organisations can streamline operations, minimise waste and bolster overall productivity. This comprehensive perspective fosters a cohesive work environment that encourages collaboration across departments, thereby contributing to the realisation of superior business outcomes. Ganesan (2023) found this necessary in addressing cross-departmental issues through risk identification and analysis.

The proposed integrated framework contributes to the theory of QMS's by providing a structured and proactive operational tool that facilitates continuous improvement and risk control at various layers of business processes. By integrating risk assessment and sustainability initiatives, the framework enables organisations to systematically evaluate and adapt their activities regularly. This assessment process ensures that the closed-loop PDCA philosophy is employed at each layer of the framework to enhance risk control in uncertain, unforeseen and changing environmental conditions. This approach not only enhances the robustness of quality management practices, but also reinforces the theory's foundation by emphasising the importance of ongoing harmonisation for optimal decision-making, thereby advancing the understanding of adaptive and resilient QMS's.

The emphasis of the framework lies in prioritising process integration, lean manufacturing, and the pivotal role of leadership. This approach is aimed at addressing industry gaps and providing actionable insights to enhance business strategies and facilitate growth, aided by ISO 9001:2015 certification. This convergence of operational efficacy and stakeholder engagement accentuates the dynamic essence of continuous improvement, which flourishes through collaborative involvement of stakeholders and the principles of lean manufacturing. It has the ability to identify inefficiencies spanning the entire supply chain, which is achieved by thoroughly considering the various implications tied to the different input variables. As a result, this approach ensures a thorough evaluation of risks along the entirety of the supply chain, forming a solid basis for sustainable development trajectories.

Although the study's findings are rooted in the packaging sector, industries beyond packaging can extract insights from these conclusions to refine their operations, encourage ongoing improvements and nurture disciplined business management practices. This versatility across industries positions the study's results as a valuable asset for diverse sectors aiming to leverage the potential of ISO 9001 and strategic business management.

### Limitation and future research work

While surveys are recommended to collect data from a large number of people, they might not fully capture the details

and unique situations that can arise in real life. For instance, the survey questions might not delve deep enough to uncover the distinctions of people's experiences and perspectives. A qualitative approach could have provided a more profound exploration (Bazeley, 2018). Furthermore, the study was confined to organisations with an annual turnover exceeding R20 million. The inclusion of organisations below this threshold introduces the potential for different outcomes.

Regarding potential directions for future research, there is room to expand the analysis to encompass a wider array of industries. This expansion would facilitate the ability to make comparative evaluations across various sectors. Additionally, the incorporation of qualitative insights alongside quantitative data holds the potential to provide a more comprehensive understanding of the intricate mechanisms that underpin the observed outcomes (Bazeley, 2018). Another avenue to explore might involve developing frameworks that permit comparisons between diverse QMSs beyond ISO 9001:2015. This could equip organisations with a more varied set of tools to enhance their operational excellence. Lastly, a compelling area for future exploration could involve examining how external factors such as shifts in regulations or economic dynamics interact with the influence of ISO 9001:2015 on business performance. Investigating this interaction could yield valuable insights into the broader context within which ISO 9001:2015 operates.

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The authors have declared that no competing interest exists.

### Authors' contributions

R.R., M.R. and K.S. contributed equally to this article.

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### Data availability

Data are stored according to the institutional policy.

### Disclaimer

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