

Setting a framework for organisational sustainable development

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Abstract: Increasing worldwide demand for products and services is applying a significant pressure on firms and supply chains operationally and financially, along with negative implications on our planet and the public. New perspectives and approaches are required to be adopted by all members of the society, including the businesses for sustainable development. However, enabling such integration from an organisational management perspective is not straightforward, due to complexities and conflicts associated with balanced integration of economic, environmental and social agendas. Aimed towards addressing this important industrial and societal research requirement, a tailored framework is presented, constructed upon the deeply rooted management principles of quality management (QM) and supply chain management (SCM) to facilitate integration of triple bottom line sustainability into business management. The framework outlines the practical steps for implementation of such an approach, including the quantitative, current state maturity assessment as one of the key application steps. This approach is taken forward to an application step, at an organisation in Cyprus, undertaken through the action research study method that enabled demonstrating both its application, and its positive effects on the sustainable development of the participating organisation. Several contributions are made, including the formulation of a practical approach to organisational integration of triple bottom line sustainability through QM and SCM. Particularly, a new management perspective was introduced with implications to many organisational managers that adopt ISO 9001 and supply chain integration principles, setting a framework for extending these principles beyond their original QM and SCM agendas towards organisational sustainable development.

Keywords: Sustainability; Quality management; Supply chain management; Sustainable supply chain quality management; ISO 9001; Supply chain integration.

Paper type: Full length article

1. Introduction

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs” lies at the heart of sustainability and sustainable development (Keeble, 1988). The pressure applied on firms and supply chains driven by the highly growing nature of worldwide consumption rate, and demand for products and services is offering significant challenges for our environment and public (Rajeev et al., 2017). Considering our inclining consumption trends, the boundaries of our natural resources and society, radical changes are required to be adopted by all actors of the society including the organisations (Keeble, 1988; Morioka and Carvalho, 2016a).

This strategically positions sustainability as an increasingly growing imperative as a market, societal, legislative and stakeholder requirement for firms, imposing alignment of management activities for sustainable development (Garvare and Johansson, 2010; Morioka and Carvalho, 2016a; Siva et al., 2016). In the context of firms, the three dimensional nature of sustainability was articulated as the business case (economic or profit), the natural case (environmental or planet), and the societal case (social or public), which was conceptualised by Elkington (2013) as triple bottom line (TBL) (Dyllick and Hockerts, 2002; Engert et al., 2016).

The practical means including tools, techniques, concepts and mechanisms for business managers to integrate, measure, communicate, drive and improve sustainability internally and across the supply chain network still remains as a highly current need for academics and practitioners (Engert et al., 2016; Kiron et al., 2015; Lozano, 2015; Millar et al., 2012; Morioka and Carvalho, 2016a; Rajeev et al., 2017; Schrettle et al., 2014; Williams et al., 2017). This viewpoint stems from a number of challenges associated with the managerial integration of sustainability including the following:

- The multi-dimensional agendas introduced by SM are offering not only internal but also external conflicts and complexity for integration, strategy formulation, action deployment and sustainable development (de Brito and Van der Laan, 2010; Engert et al., 2016; Kiron et al., 2015; Kuei and Lu, 2012; Machado et al., 2017; Morioka and Carvalho, 2016b; Schrettle et al., 2014; Seuring and Müller, 2008; Williams et al., 2017).
- Current models and methods are falling short in systematically and strategically directing sustainability integration efforts in organisations (Engert et al., 2016; Hahn,

2013; Keskin et al., 2013; Machado et al., 2017; Williams et al., 2017).

- Existing approaches are lacking industry (manufacturing, service etc.) and organisational scale (SMB, SME or Large) specific guidance (Rajeev et al., 2017; Reefke and Sundaram, 2016), involving long-term changes that are not straightforward to implement with significant capital investment implications.
- Although the guidelines and standards introduced by Global Reporting Initiative (GRI) and performance assessment frameworks such as Chardine-Baumann and Botta-Genoulaz (2014), a considerable level of difficulty and ambiguity is associated with the definition and elaboration of sustainability in the organisational context. This includes the challenges associated with how it is represented in organisational management, which managerial processes or mechanisms can be used to aid its integration; acting as a major road block for organisations looking for integration and implementation of sustainability practices (Hart and Milstein, 2003; Morioka and Carvalho, 2016b).

These challenges point towards a key industrial need for new and holistic management approaches that will act as a catalyser for the intricate but important matter of integrating sustainability into organisational and supply chain processes (Beske and Seuring, 2014; de Brito and Van der Laan, 2010; Engert et al., 2016; Lozano, 2015; Rajeev et al., 2017; Reefke and Sundaram, 2016; Williams et al., 2017; Winter and Knemeyer, 2013). This fundamental management research problem is resonated by a number of authors in the literature (Kiron et al., 2015; Machado et al., 2017; Schrettle et al., 2014), including Engert et al. (2016) that put forward the following statement:

“Future research should move from focusing on whether or not companies need to integrate corporate sustainability into their management structures; to how this could be done in practice.”

Satisfying or excelling stakeholder and customer needs is central to quality management (QM), including coordination, management and alignment of organisational products, services and processes (Evans and Lindsay, 2010; Fernandes et al., 2017). As a strategic management approach, QM facilitates parameters key to sustainability of firms such as continuous improvement, performance measurement and customer satisfaction improvement through widely established principles, tools, techniques and practices (Evans and Lindsay, 2010; Fernandes et al., 2017; Nguyen et al., 2018; Talib et al., 2011).

Supply chain management (SCM) revolves around planning, execution and control of material, information, logistics and relationships internal and external to firms, seeking to meet customer and stakeholder requirements (Chen and Paulraj, 2004; Lambert and Enz, 2017). Hence, SCM is a fundamental parameter for business continuity, performance and improvement of firms along with significant impact on how they are perceived by their stakeholders and sustainability (Rajeev et al., 2017; Reefke and Sundaram, 2016). On this basis, research streams started embedding sustainability considerations in supply chain management practices, leading to the growing research stream of sustainable supply chain management (SSCM) (Ansari and Qureshi, 2015).

Recent systematic review contributions on the integration of QM and sustainability (Siva et al., 2016), the integration of SCM and sustainability (Rajeev et al., 2017; Reefke and Sundaram, 2016), and the collective integration of QM, SCM and sustainability (Bastas and Liyanage, 2018a), not only outline the supporting role of QM and SCM for integration of sustainability but also highlight the need for further adaptation and pioneering of extant QM and SCM approaches for sustainable development. Through established stakeholder focus, deep functional and operational scope within and outside the boundaries of firms, and inherence in almost every organisation globally, QM and SCM approaches are in pole position for facilitation and catalysis of embedding sustainability into organisations and supply chains, especially when compared to relatively newer management approaches such as circular economy and lean, that are arguably more limited and less popular in terms of industrial scope and management awareness (Bastas and Liyanage, 2019; Rajeev et al., 2017; Siva et al., 2016).

Although the remarkable potential of QM and SCM approaches indicated by a wide base of authors, that could set the way for organisational managers to integrate and improve triple bottom line sustainability, a framework is highly required to establish the conceptual perspective and practical steps towards implementation and operationalisation of such an approach. This research originates from this remarkable and highly current management research problem, aiming to address the following research objectives to accelerate our organisational transition into integrated and holistic sustainability management practices under the facilitation of QM and SCM approaches:

- Set a management framework through integration of QM, SCM and sustainability methodologies with a view to facilitate sustainability integration, and improvement of organisations. This will outline both the conceptual approach and practical steps

necessary for implementation.

- Implement the framework in its intended context (organisational management), demonstrating its application, and establishing its effects and influences on the sustainable development of the participating entity. This will provide the potential implementors of the framework with practical application insights into successful and effective operationalisation of this new approach.

The rest of this article is structured as following; the integrated approach of sustainable supply chain quality management (SSCQM) is introduced in Section 2; along with the critical review of extant approaches business integration of sustainability; the conceptual framework synthesised for organisational sustainable development is presented in Section 3; this approach is applied through the action research methodology in Section 4; the results and observations obtained from this practical implementation are outlined Section 5; and finally the philosophical discussion of the outcomes are provided in Section 6, along with the research implications and future directions.

2. Literature Review

2.1. *Emerging Lens of Sustainable Supply Chain Quality Management (SSCQM)*

First put forward by Bastas and Liyanage (2018a), and constructed into a theoretical framework by Bastas and Liyanage (2019), the emerging and fruitful perspective of sustainable supply chain quality management (SSCQM) synthesises the deeply rooted and widely adopted management principles of quality management (i.e. ISO 9001:2015 principles of customer focus, leadership, engagement of people, process approach, improvement and relationship management) and supply chain management (i.e. supply chain integration and leadership) for organisational sustainable development, as portrayed in Figure 1.

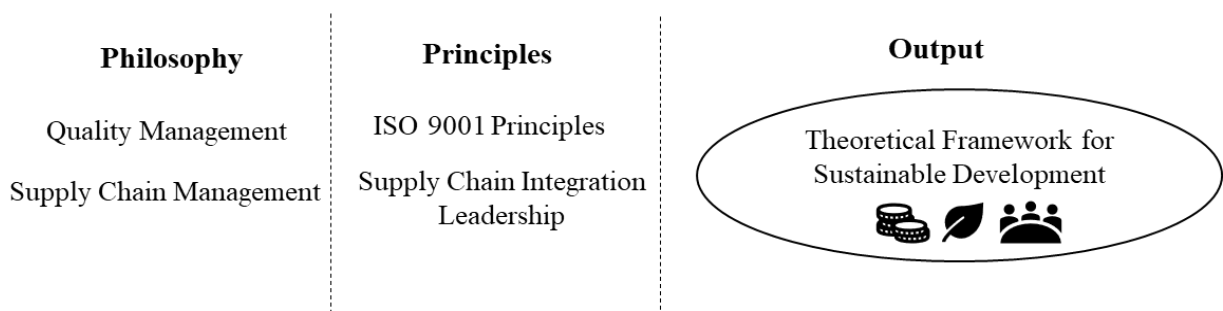


Figure 1: Eight principles extracted from QM and SCM, forming the SSCQM Theory

The utility, reliability and rigour of this new theoretical approach was recently verified through an international, subject matter expert Delphi panel (Bastas and Liyanage, 2018b). On the other hand, managerial application, effective operationalisation and industrial deployment of the SSCQM approach is of utmost value for organisational practitioners currently facing the global sustainable development challenge, signifying the importance of a practical and systematised conceptual framework for implementation.

2.2. Review of Extant Approaches for Business Implementation of Sustainability

As part of the conceptual development stage of the research, it was important to capture and analyse the approaches already introduced for organisational sustainability integration and implementation to drive an informed and value-adding conceptual framework and application road map construction. This enabled not only capitalising the advantages of the extant methods, but also provided a platform for addressing the evident gaps, weaknesses and opportunities established in the existing approaches. From this perspective, many approaches could be included in such a broad context however, only the approaches identified in the existing literature that were highly relevant to the scope of this research (i.e. organisational sustainability integration and implementation from a business management principles, systems, processes and action deployment perspective) were included in this analysis. The individual tools, principles and techniques captured as part of the state of the art model and framework constructs were assessed to provide an overall, comprehensive picture regarding the existing approaches at a higher management level, as opposed to a review conducted at a lower level (individual tool and technique level).

Based on this rationale, a brief overview of each approach was provided, assessing the key principles, tools and techniques adopted, and evaluating the weaknesses. The findings of this critical and comparative review are presented in Table 1.

Table 1: Comparative analysis of extant approaches for business implementation of sustainability

Authors (Year)	Key Principles, Tools & Techniques Adopted	Weaknesses
Asif and Searcy (2014)	<p><i>PDCA Structure:</i> Continual and cyclic structure for integration and improvement of sustainability</p> <p><i>Plan:</i> Integrated and cross-functionally collaborating management approach to sustainability, stakeholder identification and engagement, organisational direction establishment</p> <p><i>Do:</i> Execution of processes in line with sustainability objectives and development of structures and infrastructures for sustainability</p> <p><i>Check:</i> Assessing impacts of sustainability initiatives and sustainability audits</p> <p><i>Act:</i> Sustainability reporting, stakeholder communication and continuous improvement</p>	<p>The implementation steps are highly abstract, subjective and not properly defined.</p> <p>The approach has not been verified or validated.</p>
Asif et al. (2011)	<p><i>BEMs:</i> BEMs (e.g. EFQM) fully embraced and implemented for operational excellence</p> <p><i>GRI:</i> GRI framework is fully embraced for sustainability performance measurement and reporting</p> <p><i>Context specific sustainability indicators development:</i> Activities and factors unique to every business are captured</p>	<p>The implementation steps are highly abstract and not properly defined along with a lack of step-by-step approach for industrial operationalisation.</p> <p>The model was developed purely from a strategic level (tactical and operational levels are not considered for deployment and diffusion across the business)</p>
Garcia et al. (2016)	<p><i>Evaluation of actual state:</i> CS indicator selection based on stakeholder requirements, goal and priority setting, aggregation and initial performance measurement</p> <p><i>Selection of management options:</i> defining management options and selecting best actions for improvement</p> <p><i>Evaluation of achieved state:</i> checking the effects of actions implemented and performance evaluation</p> <p><i>Assessment of achieved state:</i> checking performance realised against goals, feedback and control</p> <p><i>GRI Indicators:</i> utilised for definition, measurement and reporting of TBL sustainability</p>	<p>The analytical model for sustainability indicators and performance normalisation, aggregation and evaluation are highly complex.</p> <p>The model was developed purely from a strategic level (tactical and operational levels are not considered for deployment and diffusion across the business)</p>
Gond et al. (2012)	<p><i>Maturity Assessment:</i> Organisational management and sustainability control system integration maturity is assessed (diagnostic vs. interactive)</p> <p><i>Organisational Configuration Identification:</i> Organisational configuration is identified from the eight configuration categories, based on sustainability and management system maturity.</p> <p><i>Strategy Formulation and Implementation:</i> Business improvement strategies are formulated</p>	<p>The model was developed purely from a strategic level (tactical and operational levels are not considered for deployment and diffusion across the business)</p> <p>Does not guide CS indicator definition, measurement, performance evaluation according</p>

	and implemented, with a view to improve sustainability and management system control maturity and sustainability integration	to a standard (e.g GRI) The implementation steps are highly abstract and not properly defined (lack of a step-by-step approach) for industrial operationalisation
Machado et al. (2017)	<i>Maturity Levels Assessment:</i> CS integration progression through the levels of "compliance and conformity, ops eco-efficiency, sustainability management system, network and stakeholder integration, sustainable operations integration <i>Key Process Areas:</i> Inbound and outbound logistics, ops., marketing and sales, after-service, firm infrastructure, HRM, tech. development, procurement <i>Specific Goals:</i> Design for sustainability, life-cycle management, SSCM, Sustainable Production, Integrated Performance Management, CSR	Does not guide CS indicator definition, measurement, performance evaluation according to a standard (e.g GRI) The implementation steps are highly abstract and not properly defined (lack of a step-by-step approach) for industrial operationalisation
Meza-Ruiz et al. (2017)	<i>Sustainability maturity-level assessment:</i> Organisation categorised into four key levels of beginner, elementary, satisfactory and sophisticated to direct CS integration progression <i>Use of standards and certifications:</i> Using standards such as GRI and management system certifications such as ISO 9001 to guide integration <i>Utilisation of BEMs:</i> Systematic implementation and embracing of EFQM, MBNQA and TQM principles <i>Adoption of key processes:</i> Using the processes of self-assessment, benchmarking, corporate reporting, strategic planning, and systematic training for CS integration	The implementation steps are not properly defined (lack of step-by-step approach) for industrial operationalisation Does not specify a clear and systematic road map to guide CS integration and improvement
Morioka and Carvalho (2016a)	<i>Principles:</i> Stakeholder engagement, product life-cycle and triple bottom line for CS integration and performance measurement <i>Core Elements:</i> Alignment of; processes and practices (production and SCM), capabilities (human, financial, tools and tech.), offerings (products and services) and contributions (short, medium, long term impacts), with CS performance measurement <i>Context Factors:</i> Alignment of internal (strategy, corporate governance and structure, culture and values) and external (legislation, industry specific factors, society and environmental pressures) factors with CS	The implementation steps are highly abstract and not properly defined (lack of a step-by-step approach) for industrial operationalisation Does not specify a clear and systematic road map to guide CS integration and improvement
Nawaz and Koç (2018)	<i>Vision, scope and principles:</i> Leadership recognising the necessity and relevance of sustainability to their business and presenting a vivid description of its ambitions in accordance with the scope of the organisation <i>Criteria, risk assessment and objectives:</i> Identification of stakeholders and their requirements, determining high risk CS issues and formulating goals <i>Initiatives for risk reduction:</i> Implementation of risk reduction initiatives, managing uncertainty, conflict with other objectives, and the fail-safe condition	Formulated purely from the focal organisational point of view in the absence of a supply chain view. SCM principles not considered for integration and collective improvement for sustainability.

	<p><i>Preparation and organisation:</i> development of organisational capacity and resources; and preparation of data gathering and analysing procedures</p> <p><i>Implement, monitor & analyse:</i> adaptive monitoring and control</p> <p><i>Review and continuous improvement:</i> Review of system's performance to identify improvement opportunities in the subsequent cycle</p>	
Peace et al. (2018)	<p><i>Materiality setup:</i> Determination of the most significant CS issues for the business, setting clear targets</p> <p><i>Integrated qualitative screening:</i> Assessment of TBL issues and opportunities along with identification of associated technological solutions</p> <p><i>Quantitative assessment:</i> Evaluating the hot-spots in the business processes through CS data input, aggregation and evaluation, evaluating the technological solutions for improvement</p>	<p>High level framework from the perspective of a project team for organisational change</p> <p>Does not guide CS indicator definition, measurement, performance evaluation according to a standard (e.g. GRI)</p> <p>The implementation steps are vaguely defined for industrial operationalisation</p>
Perrott (2015)	<p><i>Sustainability issue identification and prioritisation</i></p> <p><i>Sustainable strategy action planning</i></p> <p><i>Implementation, tactical management, cultural change management</i></p> <p><i>Monitoring and Measurement of progress</i></p> <p><i>Review and strategic issue assessment</i></p>	<p>Formulated purely from the focal organisational point of view in the absence of a supply chain view. SCM principles not considered for integration and collective improvement for sustainability.</p> <p>The implementation steps are highly abstract and not properly defined</p>
Witjes et al. (2017)	<p><i>Growth curve:</i> Generation of past, present and future regarding CS (Maturity assessment) for vision and direction</p> <p><i>Triggers:</i> Establishment of internal and external CS motivators of the business</p> <p><i>Elements to ensure CS:</i> Implementation of key elements for CS (vision, strategy, management system, change agent and performance assessment)</p> <p><i>Physical and social focus of integration activities:</i> Inclusion of physical (result, process, product, resources) and social (behaviour, leadership, shared belief) factors</p>	<p>Highly contextual (SMEs only)</p> <p>Does not outline the steps required for a successful and systematic implementation</p>

BEM: Business Excellence Models, CS: Corporate Sustainability, CSR: Corporate Social Responsibility, HRM: Human Resource Management, Tech: Technology, Ops: Operations

A number of common features, themes and principles were established in the existing frameworks proposed to date for organisational management embedding and incorporation of sustainability including the following:

- Identification of key business stakeholders and their requirements, important to the organisation and its sustainability
- Adoption of GRI framework and its indicators for definition, measurement and reporting of TBL sustainability
- Selection and prioritisation of TBL sustainability indicators for risk analysis, driving formulation of associated business objectives and standards
- Progressive and cyclic approach to organisational development through various forms of maturity assessment and current / future state mapping
- Improvement strategy and action formulation through a stakeholder and risk based approach
- Performance assessment, monitoring, control and improvement action management

2.3. Research Gaps

The following opportunities were spotted across the models and frameworks reviewed for business implementation and integration of sustainability:

- Lack of a coherent, complete, systematic and practical implementation approach that takes the industrial practitioners through the key and continual steps of planning, current state and risk analysis, prioritisation, execution, evaluation, improvement and standardisation for sustainability integration and sustainable development.
- Lack of both an overall approach and an instrument / tool that enables gauging of QM and SCM principle implementation level in relation to sustainability integration and improvement.
- Lack of an overall supply chain view and highly limited supply chain principle utilisation for driving supply chain collaboration and collective improvement.

A significant opportunity was noted for setting a framework that not only capitalised on the common strengths and learnings offered by the extant approaches but also addressed the limitations of the approaches proposed to date, along with fostering the application of a QM and SCM based industrial implementation of sustainability.

3. Conceptual Framework for Organisational Sustainable Development

In the light of the critical review of the extant implementation frameworks and assessment of their strengths and weaknesses, steps key to application and operationalisation of the QM and SCM principles based SSCQM theoretical framework for organisational sustainable development were identified, described and formulated as a road map in Table 2 (Bastas and Liyanage, 2019). The framework was developed in order to guide managerial implementation of triple bottom line sustainability integration, using the QM and SCM principles as its basis. It consisted of practical steps, taking the practitioners through the essential application phases of identification of business sustainability priorities, determination of current sustainability integration levels along with maturity assessment of SSCQM principles, sustainability risk analysis, and improvement strategy formulation, paving the path to organisational sustainable development. The correctness, conciseness, completeness and clarity of this framework was validated through the input of an international and diverse base of subject matter experts using the Delphi method (Bastas and Liyanage, 2018b; Sanders and Nafziger, 2011).

The combination of steps 0 to 4 resulted in a continual, organisational improvement framework structure of Deming’s Plan-Do-Check-Act (PDCA), which is positively associated with performance improvement, change management and sustainable development (Asif and Searcy, 2014; Kuei and Lu, 2012; Rusinko, 2005; Taylor et al., 2014). The PDCA philosophy provided a platform for continual management maturity and risk assessment, action deployment, monitoring and control on the basis of SSCQM principles, contributing to organisational progression in the endless journey of sustainable development, as conceptualised in Figure 2.

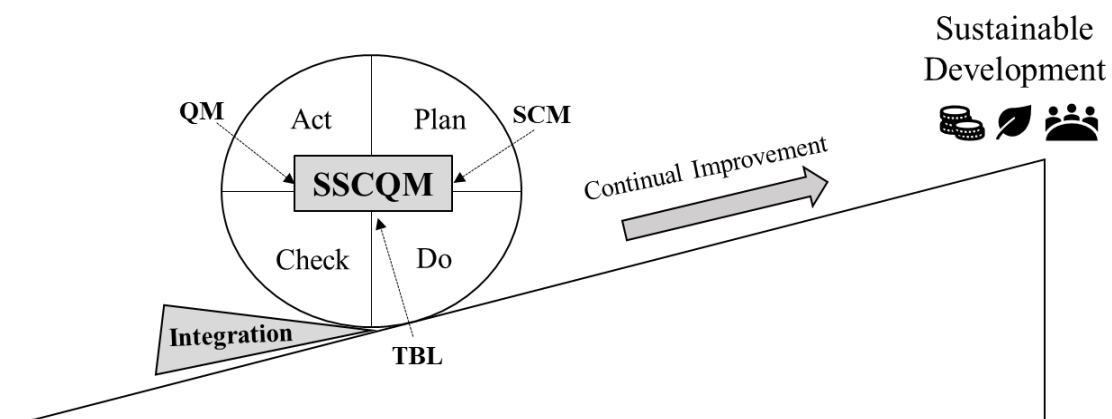


Figure 2: PDCA structure adopted for business sustainability integration and continual improvement

Table 2: SSCQM conceptual framework application stages for sustainable development (Bastas and Liyanage, 2018b)

PDCA Step	Description	Output	References
Plan – Step 0	Identify the key economic, ecologic and social sustainability requirements of the stakeholders of your organisation (voice of the stakeholders – VOS). Consider sustainability requirements of your customers and other interested parties (e.g. Public, Legislative Bodies). Establish the key economic, social and environmental sustainability indicators from the GRI framework, in line with the stakeholder requirements of your organisation, adopting a balanced view on triple bottom line.	Sustainability priorities of the organisation identified	(Cherrafi et al., 2017; Engert et al., 2016; Garvare and Isaksson, 2001; Morioka and Carvalho, 2016a; Peace et al., 2018; Perrott, 2015; Vigneau et al., 2015; Witjes et al., 2017; Zink, 2007)
Plan – Step 1	Assess the sustainable management and integration maturity of your organisation against the indicators of each principle versus economic, ecologic and social sustainability parameters identified in Step 0, as per the maturity assessment criteria (0 to 5).	SSCQM principles maturity with reference to triple bottom line sustainability established	(Gond et al., 2012; Machado et al., 2017; Mettler, 2011; Meza-Ruiz et al., 2017; Mintzberg et al., 1976; Röglinger et al., 2012; Witjes et al., 2017)
Plan – Step 2	Analyse the findings, establishing the organisational strengths, weaknesses, risks and opportunities with reference to the SSCQM principle maturity levels and embedding level of economic, ecologic and social sustainability parameters. Measure and determine current sustainability performance levels for the economic, ecologic and social parameters identified as key in Step 0. Refer to GRI framework for performance measurement and reporting. Conduct benchmarking analysis with similar organisations and operations.	Strengths, Weaknesses, Opportunities and Risks with reference to sustainable management established. Current sustainability performance levels determined as per GRI.	(Alonso-Almeida et al., 2014; Asif and Searcy, 2014; Garcia et al., 2016; Nawaz and Koç, 2018; Peace et al., 2018; Perrott, 2015; Vigneau et al., 2015; Witjes et al., 2017)
Do – Step 3	Deploy policies and improvement projects internally (within the organisation) and across the supply chain for the areas identified as high risk and requiring improvement.	Sustainability improvement strategy and action plan generated	(Asif and Searcy, 2014; Azapagic, 2003; Garcia et al., 2016; Kelliher and Reinl, 2009; Nawaz and Koç, 2018; Peace et al., 2018; Perrott, 2015; Witjes et al., 2017)
Check – Step 4	Measure and monitor effects of policies, strategies and improvement projects deployed. Redeploy improvement actions and sustain improvements through standard work as required.	The effect of improvement actions monitored and controlled for sustainable development	(Asif and Searcy, 2014; Durlak and DuPre, 2008; Espinosa and Porter, 2011; Lindenmayer and Likens, 2009; Nawaz and Koç, 2018; Perrott, 2015)
Act	Revisit Steps 0 and 1, reassessing the voice of the stakeholders and organisational maturity levels against triple bottom line sustainability for continual sustainable development.	Continual cycle of sustainable development through PDCA	(Asif and Searcy, 2014; Milne et al., 2005; Nawaz and Koç, 2018)

Quantitative maturity assessment was established at the core of the conceptual framework (*Step 1 – current state analysis*), which is achieved through assessment of maturity levels (awarding scores of 0 to 5 as per set criteria) against the indicators of each SSCQM principle with reference to economic, environmental and social sustainability parameters. Please refer to the Appendix section for the indicators of SSCQM principles. These indicators were adapted from the lens of sustainable development, and developed as a result of Delphi expert panel feedback to capture a wide scope of issues integral to implementation and organisational maturity of each principle (Bastas and Liyanage, 2018b).

The assessment scoring criteria of 0 to 5 were defined in Table 3, with a view to enable quantitative assessment, tangible and objective reference platform during evaluation, and provide a sufficient level of differentiation granularity among the maturity level categories.

Table 3: Description of each maturity assessment scoring category

Score - Category	Description
“0” - No evidence of implementation	Management mechanism or process not aligned with the sustainability measurement and reporting requirements.
“1” - Informal/inadequate processes in place	Management mechanism or process informally aligned with all or some of the sustainability priorities. Measurement and reporting informally carried out.
“2” - Partially implemented	Sustainability priorities established. Management mechanism or process formally aligned for some but not all of the sustainability priorities.
“3” - Formal process in place inclusive of all VOS TBL sustainability parameters	Sustainability priorities established. Management mechanism or process formally aligned for all of the sustainability priorities.
“4” - “3” plus evidence of continuous improvement	In addition to "3", improvement actions documented and controlled for the sustainability priorities.
“5” - Fully implemented inclusive of all GRI sustainability indicators	All GRI indicators for the sustainability dimension are in place for the management mechanism or process along with documented and controlled improvement actions.

The inclusion of sub-indicators provided a three-level granularity as conceptualised in Figure 3, that comprised of principle, indicator and mechanism / process levels for breaking down the maturity assessment and associated improvement action formulation into manageable, representative and meaningful chunks.

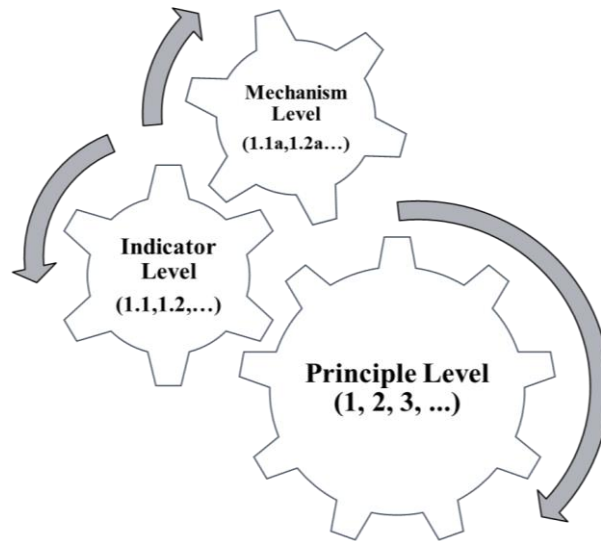


Figure 3: Three-level granularity adopted for SSCQM principle maturity development

4. Application of the Framework

4.1. Action Research - Design and Methodology

4.1.1. Overview

The methodological requirements regarding the application research strategy and methods were formulated as following:

- Enabling of the appropriate conditions for application of the conceptual framework, tackling the organisational transformation challenges with regards to integration of sustainability into business management practices.
- Facilitation of a collaborating environment between the researcher and the participating organisation, enabling the researcher to conduct detailed observations and rigorous data collection with reference to application of the solution.
- Compatibility with the application study being mainly carried out in the field (at the implementing organisation), with a practical, change and futuristic focus.
- Fostering delivery of practical insights to industrial practitioners for implementing and operationalising the solution, outlining the key factors for successful implementation.

The two main strategies that can be considered in the light of requirements above, in the operations management domain were noted as action research and case study (Dresch et al.,

2015). Although the two approaches have certain aspects in common (e.g. both concentrate on specific contexts, both develop insights on how things are / how they behave in their natural settings etc.) (Dresch et al., 2015); a key difference is the role and position of the observer during the implementation and data collection stages (Baskerville, 1997). In case studies, the researcher is an observer of the phenomenon under investigation with limited or no participation in the situation being researched (Yin, 2003), whereas in action research, the researcher is in close cooperation with the participants, experiencing the phenomenon under investigation through introducing the actions jointly and observing their effects at first hand (Brydon-Miller et al., 2003). The participative, change-oriented, problem-driven and collaborative essence of action research was reflected upon as a better fit to the aim and objectives of this research, where the management solution formulated would be applied together, in collaboration with the senior leadership of the participating organisation with a direct positive effect on the level of engagement and depth of data collected.

Action research philosophy captures novel knowledge or develops insights through changing systems (Lewin, 1946), researchers being fully immersed in situations to interact and observe the phenomena of interest from within (Checkland and Holwell, 1998). Action research studies possess the key characteristics of problem and change orientation, high level of engagement by the researcher, and close cooperation between the researcher and the group operating under the specific context being investigated (MacDonald, 2012). All of these elements were reflected as highly applicable to this research and its objectives, enabling capturing of the comprehensive level of data necessary for not only demonstrating application of the novel SSCQM solution developed in practice but also observing its influences in the organisational application domain. The implementation of research outcomes through an action research study further provided the valuable opportunity of assessing SSCQM implementation's impact on the organisation's sustainability management decision making, action deployment, and its overall contribution to the sustainable development of the organisation.

The SSCQM conceptual framework developed was fully applied for steps 0 (identification of sustainability priorities), 1 (current state analysis / maturity assessment) and 2 (identification of risks, opportunities – improvement strategy formulation) in the action research study. Although this was a partial implementation (in the absence of steps 3 and 4), it was justified that the steps 0, 1 and 2 not only include the application of the maturity assessment aspect as a key element of the research, but also enable addressing of the fundamental inquiries set out above, in line with the principle aim of the research.

At the end of step 2, it was envisaged that the participating organisation would possess a comprehensive analysis regarding its current level of sustainability integration, its maturity, and provided with a clear set of strategies and actions, listing the priorities and outlining the path for integrating sustainability through SSCQM principles.

4.1.2. Company Introduction, Business Process Overview and Engagement Level

An engineering and distribution organisation in the Cyprus region was selected for the action research study due to the strong interest demonstrated by the management team, the willingness of senior leadership to integrate and improve sustainability, its multi-sectoral exposure (chemical and construction), its wide operational range (service, manufacturing, distribution, retail) and possession of ISO 9001 quality management system certification for a significant period of time (since 2011). Due to the research containing sensitive information about the participating organisation, its stakeholders and its sustainability, the name of the organisation was kept confidential. Hence, the participating entity is referred as “Organisation X”, throughout the research. The key statistics of the participating business are provided in Appendix A. As part of the engineering and manufacturing activities of the firm, construction and chemical products such as paint, concrete making materials and insulation materials are both developed, tested and manufactured.

A top to bottom approach was adopted during the action research study, engaging with organisational members across different layers of the organisation including the director (managing director), middle management, team leaders and operators. Such a top to bottom approach contributed towards establishment of the big picture, highly supporting the maturity assessment step of the application. Engaging with business members from various levels of the organisation (including the operators) not only contributed towards change management due to enhanced and direct communication of the change at all levels, but also resulted in establishment of both sides of the story, facilitating gauging of sustainability integration and maturity levels.

The director of the business participated in all the data collection phases of the study. Additionally, the business assigned their continuous improvement manager (management representative) for the activity. Around 12 organisational members across various levels were consulted and took various parts in the study. This included the relatively younger and inexperienced operators (22 years old with 2 years of experience), and the managing director

(55 years old with 35 years of experience). The level of engagement adopted during the application study is demonstrated in Figure 4.

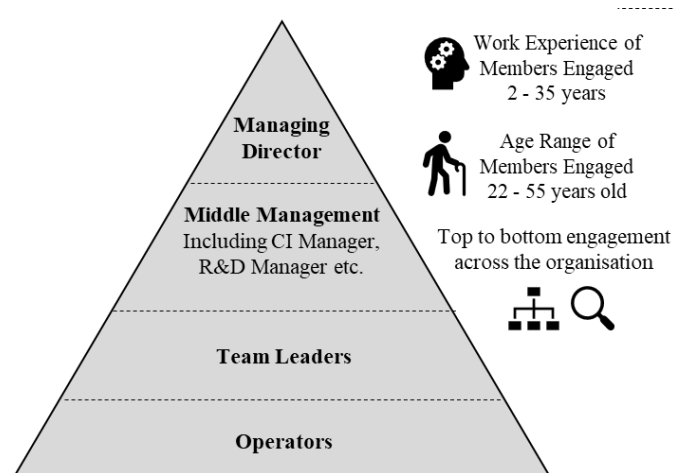


Figure 4: Top to bottom approach adopted across the layers of the organisation

The business processes of the participating organisation were reviewed (please refer to Appendix B for further details). The manufacturing and logistics operations were observed as two key processes with the highest impact on the triple bottom line sustainability performance of the organisation due to financial resource requirements, impacts on environment (waste, emissions, compliance), and social considerations such as health and safety, and local community impact.

4.1.3. Design, Process and Data Collection

A purely qualitative or quantitative design was reflected as not sufficient to address the intricacies and depths of the implementation and associated contextual observations, pointing towards the mixed method design (Creswell and Plano Clark, 2011; Ihuah and Eaton, 2013; Johnson et al., 2007). A convergent parallel mixed method design was adopted in the action research study, triangulating qualitative and quantitative methods for an in-depth assessment to capture practical insights into the application and operationalisation of the management solution developed (Creswell, 2013; Farquhar, 2016; Jick, 1979; Saunders et al., 2015).

For demonstrating the application of the SSCQM conceptual framework, the qualitative method of participative observation was utilised, which is a highly fruitful and rigorous organisational management research approach for “eliciting new information” during occurrence and application of new phenomena under investigation, in their natural settings (Kawulich, 2005; Savage, 2000; Vinten, 1994). This approach enabled the researcher to

freely interact, record observations continuously, and transparency between the researcher and the participating organisation. During the application of the SSCQM conceptual framework, formal relevant documentation and data regarding sustainability and stakeholders of the participating organisation were reviewed to confirm the implementation stages such as definition of the sustainability priorities of the organisation based on the GRI framework, establishment of the key stakeholder requirements, and assessing the SSCQM maturity levels of the organisation. The participation of the researcher as part of the action research study, was conducted in a collaborative and constructive manner, holding open discussions with the leadership of the organisation and taking observatory notes regarding the application of the framework. Due to its established strengths in analysis of qualitative information collected and structured generation of key themes, the thematic synthesis method was adopted for establishment of key information within the qualitative data captured (Barnett-Page and Thomas, 2009).

For determination of the effects that arise from the implementation of SSCQM approach, including its impact on the triple bottom line sustainability integration levels and SSCQM principle maturity levels, quantitative methods were justified to be utilised for tangible and objective measurements of the associated levels, before and after the application activity. The levels of sustainable management maturity (i.e. SSCQM principle maturity) and sustainability integration were quantitatively evaluated, using the business diagnostic tool developed, to draw a clear picture regarding the current state of the participating business with reference to management sustainability integration, as a fundamental step of the conceptual framework. The quantitative findings of the maturity diagnostic tool assessments were analysed through a comparative, before and after analysis approach, laying out the situation before and after the application (Gravelle et al., 2007), and outlining the improvements, contributions and impacts realised post the implementation of the SSCQM philosophy.

Due to the essence of the action research, both the qualitative (e.g. stakeholder identification and prioritisation matrix, improvement action plan etc.) and quantitative data (e.g. maturity assessment tool screens, SSCQM maturity levels, sustainability integration levels etc.) generated during the study were generated together with the relevant and key stakeholders of the organisation, confirming accuracy of the information at all stages. The maturity assessment conducted, improvement strategy formulated and sustainable development glidepath proposed were all based on quantitative assessment conducted during the activity as per defined criteria (Table 3). Based on the aforementioned rationale, the data generated

during the action research study were reflected upon as having acceptable validity and reliability levels.

4.3. Implementation of SSCQM Conceptual Framework

4.3.1. Step 0 – Identification of Key Stakeholders and Sustainability Priorities

The stakeholders of the participating organisation were identified along with the determination of their sustainability agendas (voice of the stakeholders – VOS). For deriving the sustainability priorities of the organisation, the stakeholders and their sustainability agendas were analysed with a view to generate the key issues for the organisation.

A highly recognised tool for prioritising stakeholders and their associated agendas is the mapping of stakeholders based on their influence / power and interest, categorising the stakeholders into the four quadrants of “key players, meet their needs, show consideration and least important” (Ackermann and Eden, 2011; Brugha and Varvasovszky, 2000; Bryson, 2011; Newcombe, 2003). Following a similar approach, the stakeholders were categorised through analysing the context and participative input from the leadership as shown in Figure 5.

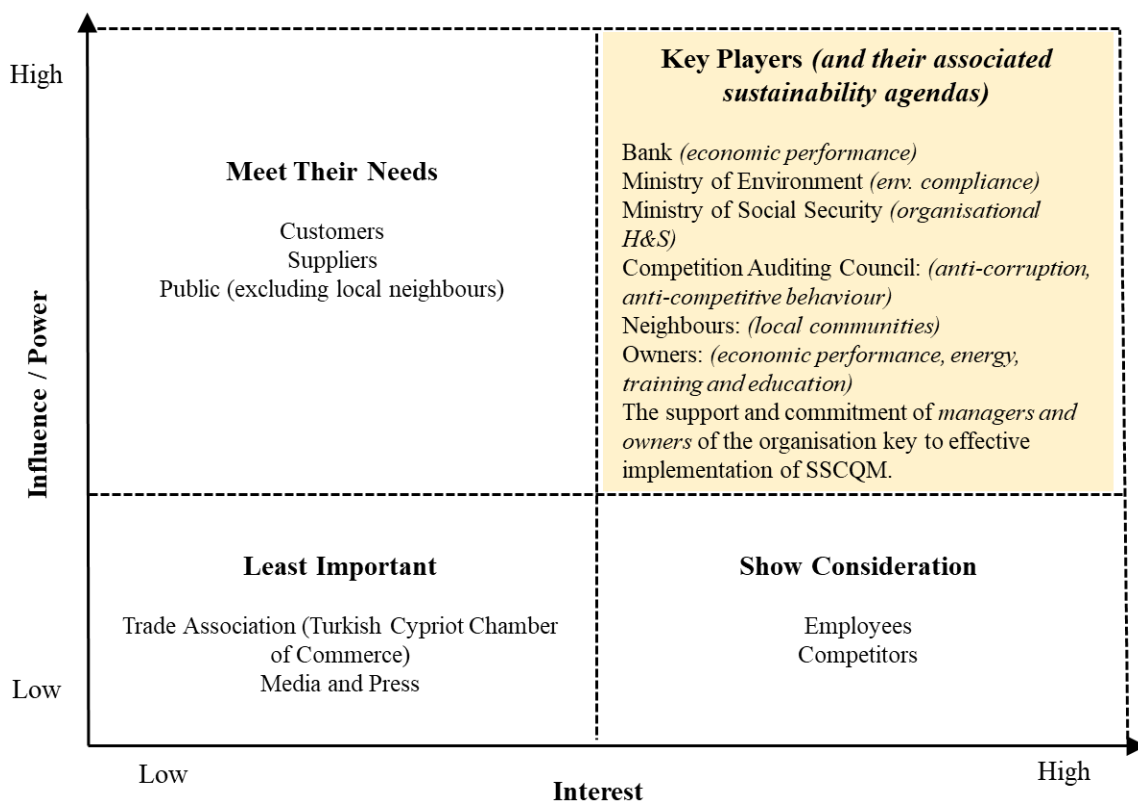


Figure 5: Stakeholder impact and influence matrix analysis

It was agreed with the leadership of the participating organisation that prioritisation of stakeholders categorised as “key players” and their relevant sustainability agendas would be more “value-added” for the business, particularly in the short-term. It was also concluded that this approach would provide an initial platform for the business to direct sustainability integration and improvement efforts, as these stakeholder groups would influence the sustainability of the organisation the most, in relation to the other stakeholder groups with lower levels of interest and/or power.

Subsequent to establishment of key stakeholders, their sustainability agendas were analysed, and the GRI framework consulted to select the associated indicators for integration, performance measurement and reporting (GRI, 2018; Vigneau et al., 2015). As a result, the specific triple bottom line sustainability indicators to be prioritised were determined using the GRI framework as listed in Figure 6, taking into account the voice of the key players.




Voice of the Stakeholders (VOS) GRI Sustainability Indicators Summary										
Economic 		Ecologic 		Social 						
Economic performance	Y	Materials	N	Employment	N	Forced or compulsory labour	N	Marketing and labelling	N	
Market presence	N	Energy	Y	Labour management relations	N	Security practices	N	Customer privacy	N	
Indirect economic impacts	N	Water	N	Occupational H&S	Y	Rights of indigenous peoples	N	Socioeconomic compliance	N	
Procurement practices	N	Biodiversity	N	Training and education	Y	Human rights assessment	N			
Anti-corruption	Y	Emissions	N	Diversity and equal opportunity	N	Local communities	Y			
Anti-competitive behaviour	Y	Effluents and waste	N	Non-discrimination	N	Supplier social assessment	N			
		Environmental compliance	Y	Freedom of association & c.b.	N	Public policy	N			
		Supplier environmental assessment	N	Child labour	N	Customer H&S	N			
No. of GRI indicators included for Economic (out of 6)	3	No. of GRI indicators included for Ecologic (out of 8)	2	No. of GRI indicators included for Social (out of 19)						3

Figure 6: Sustainability priorities summary as per voice of the stakeholders analysis

4.3.2. Step 1 – Current State Analysis and Application of Diagnostic Tool

Following the identification of sustainability priorities, the initial management maturity and sustainability integration levels were evaluated. Several visits were conducted to the participating organisation, and a series of meetings held with the senior and middle management across various functions, allowing for detailed assessments to be carried out with reference to each SSCQM principle and their indicators.

The management practices, processes and mechanisms currently in place, specified by the indicators for each SSCQM principle (e.g. customer focus, leadership etc.) were reviewed against the sustainability priorities established in step 0 (e.g. energy and environmental compliance for the ecologic dimension). This review involved appraising each SSCQM principle sub-indicator (e.g. 1.1a, 1.1b etc.) against each prioritised sustainability indicator. For instance, for the review and scoring of leadership principle’s sub indicator 2.2b outlined





below, it was assessed whether there were objectives in place, and at what implementation level, for the economic, ecologic and social sustainability priorities of the organisation:

***Indicator 2.2b:** “Sustainability objectives for economic, social and ecologic sustainability in place, in line with the voice of the stakeholders analysis of the organisation”*

In the case of indicator 2.2b, there were some objectives in place for some of the sustainability priorities of the business, in the absence of a formal process for documentation and periodic review, leading to an evaluation of “informal/inadequate processes in place” hence, the business was awarded a score of “1” for all the TBL sustainability dimensions. In accordance with this approach, scores were awarded as per the assessment criteria (0 to 5), enabling generation of an evidence based, quantitative current state map of the participating organisation with reference to SSCQM principles and associated sustainability integration levels.

The individual, principle level maturity scoring assessments conducted and associated screens produced from the maturity assessment (business diagnostic) tool for the participating organisation are **enclosed in Appendix C**. The assessments of the sub-indicators at the process / mechanism level (e.g. 1.1a, 1.1b etc.) as per the scoring criteria, resulted in the principle indicator scores (e.g. 1.1, 1.2 etc.), the aggregation of the indicator scores providing the principle maturity levels for each sustainability dimension.

Ultimately, the outcome of maturity assessment undertaken is shown in Figure 7, demonstrating the maturity levels gauged for each SSCQM principle, corresponding sustainability dimension integration levels, and the overall organisational SSCQM maturity score generated. The initial scores for economic, ecologic and social sustainability integration levels were noted as 15%, 9% and 7% respectively, resulting in an overall organisational SSCQM maturity score of 10%, mainly due to informal and/or inadequate management processes and mechanisms in place. These assessment results pointed towards a significant organisational improvement potential through adoption of sustainability synergistic SSCQM principles.

SSCQM Principle	Maturity 	Economic 	Ecologic 	Social 
1 - Customer Focus	11%	20%	8%	7%
2 - Leadership	10%	16%	7%	6%
3 - Engagement of people	7%	12%	7%	3%
4 - Process Approach	10%	11%	9%	9%
5 - Improvement	10%	18%	8%	5%
6 - Evidence Based Decision Making	10%	13%	12%	6%
7 - Relationship Management	22%	26%	22%	19%
8 - Supply Chain Integration	2%	5%	1%	0%
Unidimensional TBL score		15%	9%	7%
Organisational SSCQM Score				10%

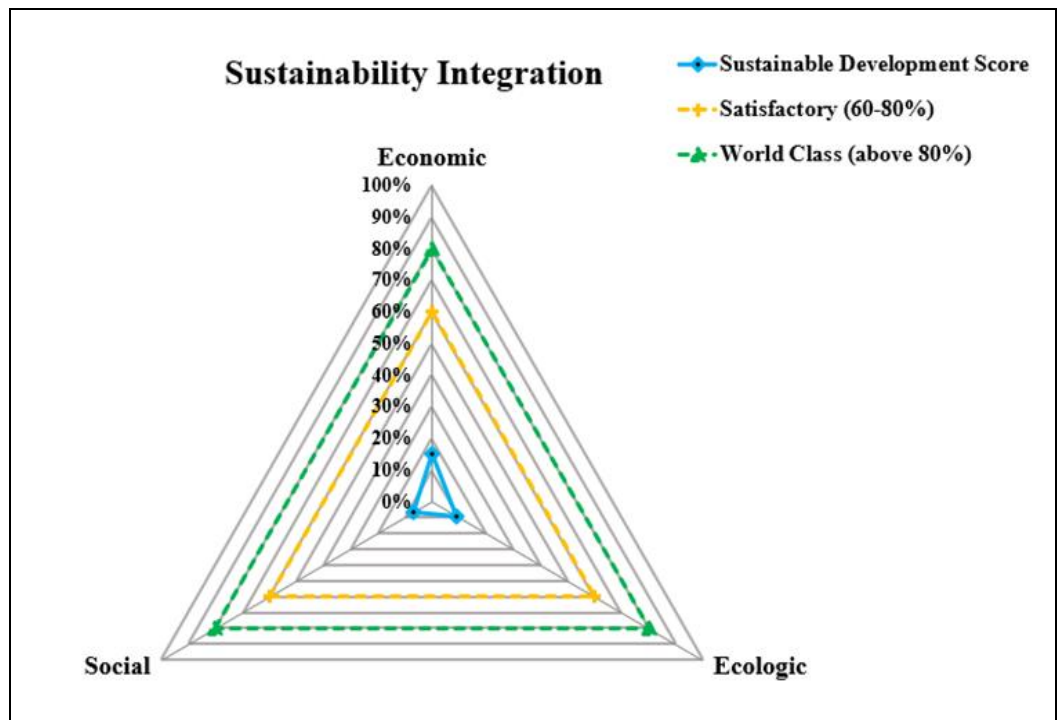
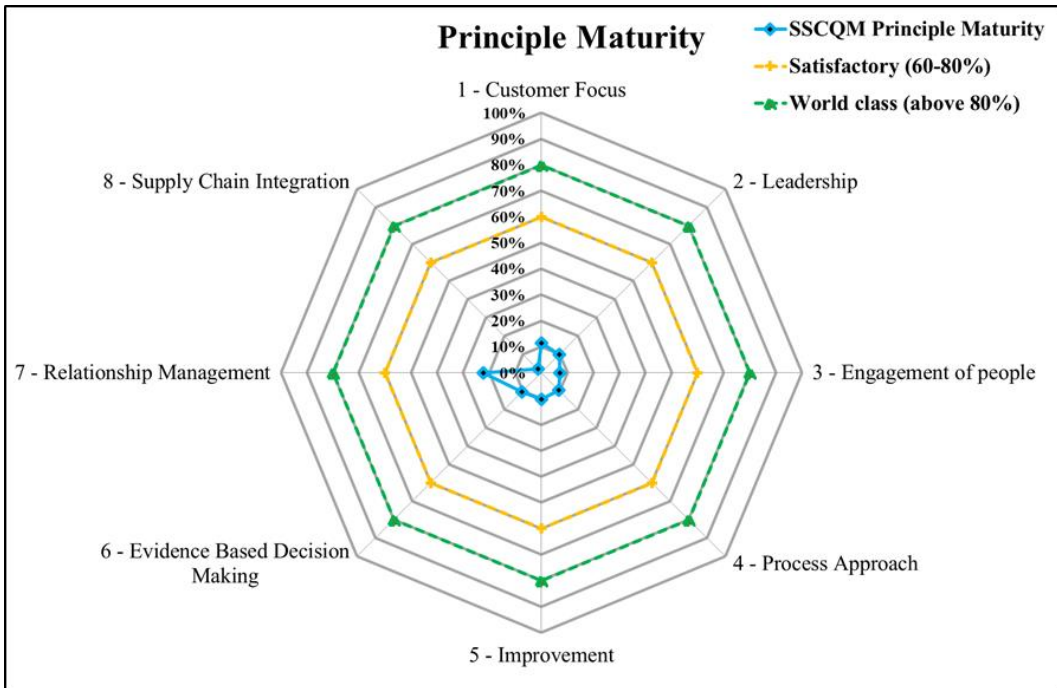


Figure 7: Maturity and sustainability integration levels diagnostics summary

4.3.3. Step 2 – Identification of Risks and Opportunities

Following on from step 1, the outcome and findings of the current state analysis and maturity assessment conducted were discussed with the key internal stakeholders including the business ownership (managing director) and middle management, with a view to determine the organisational risks and opportunities with reference to the firm’s sustainability integration and improvement. The strengths, weaknesses, opportunities and threats (SWOT) established during the assessment are illustrated in Figure 8.

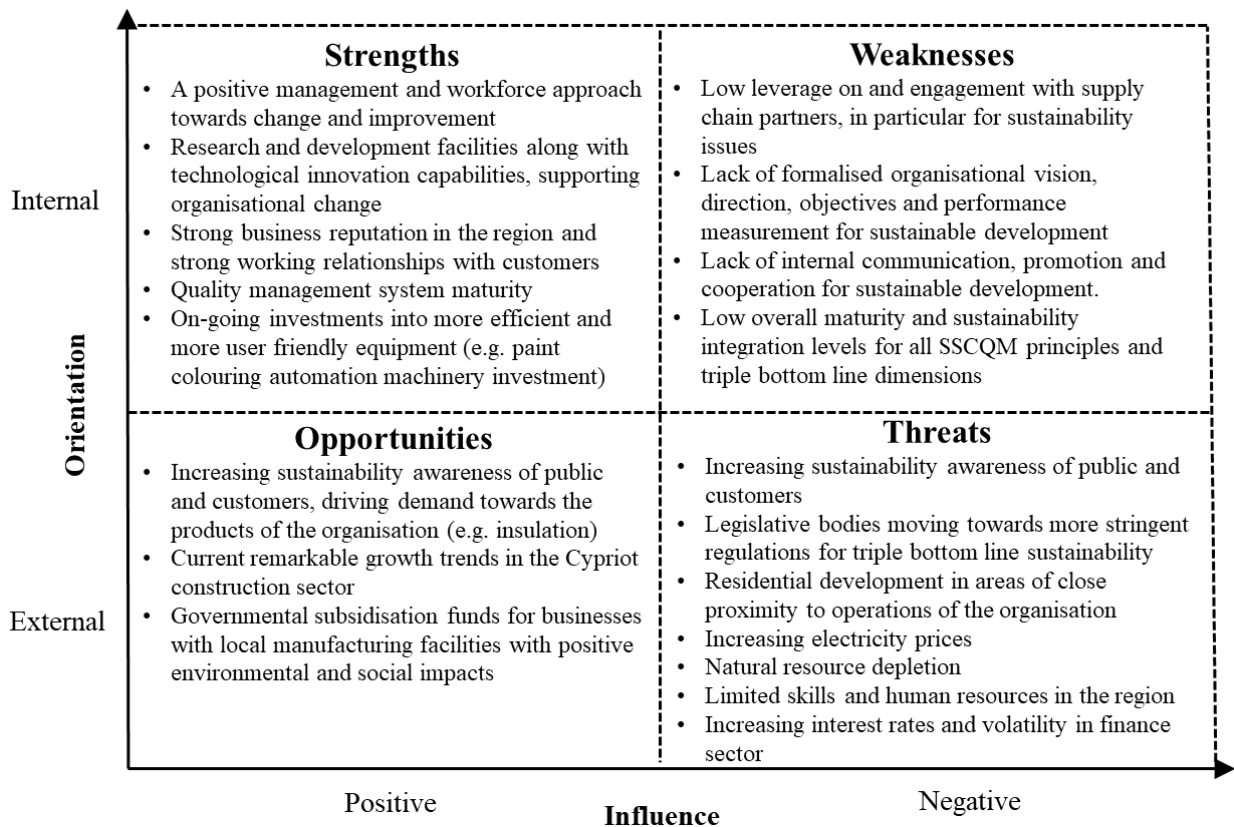


Figure 8: SWOT analysis for SSCQM maturity and sustainability integration

In addition to the overall low maturity scores for each SSCQM principle and triple bottom line sustainability dimension, the topic of sustainability was observed to be a highly new area for the organisation, along with mainly reactive sustainability practices in the absence of a formalised vision, objectives, ownership, and processes for integration, performance measurement and improvement. Such a lack of formalised organisational processes and structure is not uncommon for businesses in SME and SMB categories (Jansson et al., 2017). An unbalanced approach to sustainability was observed, economic sustainability being relatively more mature (15%) than ecologic (9%) and social (7%), which is a highly common industrial case (Neri et al., 2018).

4.4. Sustainability Improvement Strategy Formulation through SSCQM

4.4.1. Sustainability Integration and Improvement Strategy

Given the importance of risk based prioritisation approaches for effective business sustainability integration (Asif and Searcy, 2014; Garcia et al., 2016; Nawaz and Koç, 2018; Peace et al., 2018; Perrott, 2015; Witjes et al., 2017), and limited organisational resources that can be dedicated or invested into the sustainability integration and improvement initiatives (Kelliher and Reinl, 2009), the following improvement strategies were employed in mutual agreement with the leadership of the participating organisation:

- Bastas and Liyanage (2018b) identified the most important SSCQM principles to integration of sustainability as “leadership, engagement of people, improvement and evidence based decision making”. At the first cycle of improvement, these principles and their associated mechanisms / processes were determined to be prioritised for implementation, due to higher anticipated impact on overall sustainability performance of the organisation.
- The high risk processes (manufacturing and logistics) with most impact on the organisation’s sustainability were further identified to be prioritised from an implementation perspective, SSCQM principle maturity improvement actions to be first applied to these processes.
- Strategies outlined above still resulted in a significant, initial number of actions. Impact-effort analysis was justified for sequencing the next steps and channelling the highly limited resources based on impact - effort rankings agreed among the key internal stakeholders for setting the way for a structured, effective and risk based approach to integration and improvement of the organisation’s sustainability and for building momentum towards sustainable change in the short term.

4.4.2. Action Plan Formulation

Based on the prioritisation and improvement approach established with the business leadership, the strategy was translated into a clear and specific set of actions to improve maturity of the SSCQM principles that will be first targeted. Indicators (e.g. 1.1, 1.2) and sub indicators (e.g. 1.1a, 1.2b) of each principle were reviewed, gaps in the organisational processes established (as per diagnostic tool maturity assessment results), and actions identified for integration of sustainability and maturity improvement of each principle. The actions were formulated in a congruent and complementary way that the mechanism / process

intended to be introduced covered multiple areas and principles where applicable (e.g. implementation of employee contribution and recognition scheme – covering aspects of leadership, improvement, engagement of people and evidence based decision making).

With a view to direct the organisational resources in the best possible way towards the actions that will provide the highest impact in the short term, the actions were prioritised according to their anticipated impact to sustainability integration / improvement and effort of implementation, resulting in the assignment of relative priority ratings denoted as “very high, high, medium and low priority” (Nawaz and Koç, 2018; Todnem By, 2005). The impact – effort analysis undertaken on the improvement actions is presented in Figure 9, each number corresponding to the action item number in Table 4, which demonstrates the action plan formulated for the first cycle of SSCQM principle maturity improvement for sustainability integration and development of the organisation.

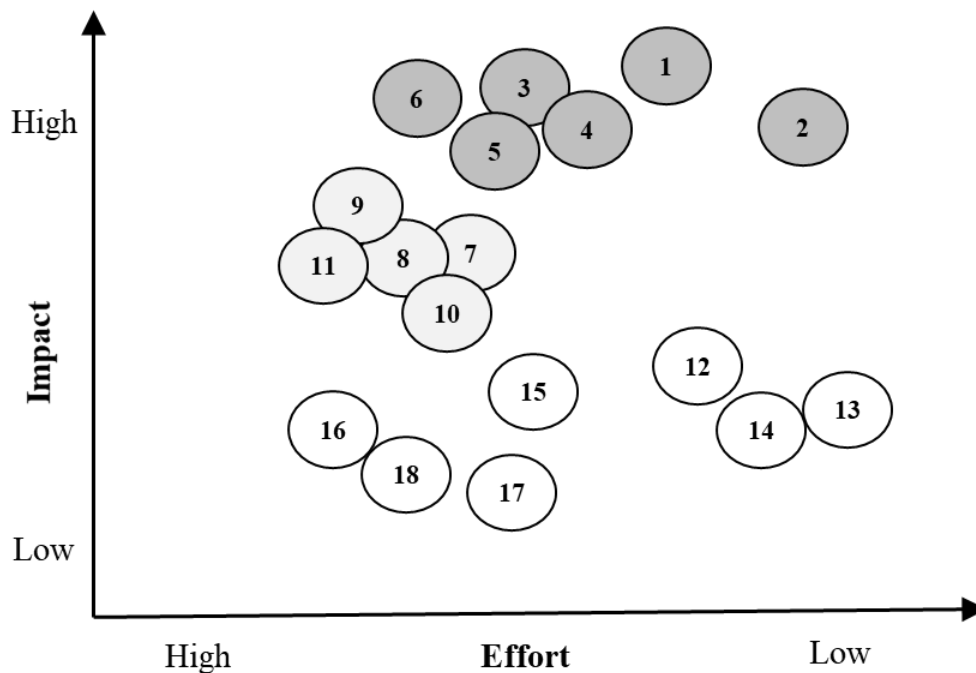


Figure 9: Impact - effort analysis for improvement action prioritisation

Table 4: Sustainability integration and improvement action plan formulated

No.	Priority Ranking	Principle	Principle Indicator	Action
1	Very High	Leadership, EOP, Improvement, EBDM	2.1, 3.4c, 5.1a, 5.2b, 6.1	Implement sustainability mission, vision, policies, objectives and KPIs for the prioritised parameters (as per GRI) and processes (hot spots)
2	Very High	Leadership, EOP, Improvement, EBDM	2.2, 3.1c, 5.1b, 5.3b, 6.2a	Articulate the sustainability mission, vision, policies and objectives across the organisation through staff meetings
3	Very High	Leadership, EOP, Improvement	2.4b, 3.8b, 3.8c, 5.2a	Establish and support the key resources required for sustainability KPI monitoring and improvement, making the same available to all employees and enabling self-performance evaluation at individual level
4	Very High	Leadership, EOP, Improvement, EBDM	2.4c, 3.4b, 3.7, 5.3c, 6.5a	Define the roles and responsibilities for the sustainability performance measurement and improvement activities with a view to achieve autonomy regarding sustainability management, monitoring and control at team level
5	Very High	EOP	3.2a, 3.8a	Align sustainability objectives with objectives at departmental, team and individual levels
6	Very High	EOP	3.2b	Establish a cross functional team to execute the sustainability improvement action plan and to foster cooperation across the departments
7	High	Leadership	2.3a, 2.7a	Define sustainability values and embed them into the recruitment process
8	High	Leadership, EOP, Improvement, EBDM	2.3c, 2.5, 3.4a, 3.5a, 3.6, 5.5, 5.7, 6.4b	Implement an employee recognition and rewarding scheme for contributions and innovations to sustainability (the most contributing individual and team to economic, ecologic and social sustainability to be identified and awarded every quarter)
9	High	Leadership, EOP, EBDM	2.4a, 3.1a, 3.1b, 3.5b, 6.2b, 6.2c	Conduct sustainability awareness and performance measurement training, reinforcing the sustainability culture, and demonstrating the importance and benefits of sustainable development (putting across what is in it for the employees)
10	High	Leadership	2.7b	Conduct sustainability values training for all leaders, ensuring leaders "lead by example", and reinforce

				the sustainable change and associated values across the business
11	High	EBDM	6.3, 6.5b	Implement a formal sustainability performance data and information capturing process including periodic reporting to high risk process owners and senior management, and formal improvement action tracking
12	Medium	Leadership, EBDM	2.8, 6.4a, 6.4c	Effectiveness of and adherence to the sustainability policies to be periodically reviewed by management, capturing employee feedback for review and improvement
13	Medium	Leadership	2.3b	Formulate organisational sustainability commitment statement and communicate it to all key stakeholders
14	Medium	Improvement	5.3a	Conduct improvement project management tools and techniques training for the cross functional improvement team
15	Medium	Improvement	5.6, 5.8	Implement a formal sustainability improvement project development and tracking process including senior management review
16	Low	Leadership	2.6	Identify similar organisations for benchmarking, information sharing and cooperation for sustainability improvement
17	Low	EOP	3.3	Implement periodic information, knowledge and experience sharing sessions through staff meetings
18	Low	Improvement	5.4	Review New Product/Service/Process introduction process and embed sustainability considerations

EOP: Engagement of people; EBDM: Evidence based decision making.

4.4.3. Next Steps

The next steps of SSCQM conceptual framework implementation (steps 3 and 4) include the actual execution of the actions detailed on the action plan, review of their effects, and taking countermeasure actions as required, revisiting the steps 0, 1 etc. periodically for a continual cycle of self-assessment and improvement, guiding the business to its sustainability vision and goals over time. The action plan formulated was handed over to the leadership of the organisation through a formal closure meeting, outlining the organisation's path towards integrating sustainability in line with its context, key stakeholder requirements, strengths, weaknesses, risks and opportunities for a continual improvement journey towards sustainable development. The implementation of steps 0, 1 and 2 provided a comprehensive assessment regarding the SSCQM conceptual framework, both demonstrating its application and paving the way for an organisation to achieve its sustainability integration and improvement goals.

5. Results and Observations

5.1. Influence on Sustainability Integration

The influence of the SSCQM implementation on the sustainability integration level of the organisation was measured through two key parameters:

- Level of GRI framework adoption (i.e. number of GRI sustainability indicators adopted for each sustainability dimension);
- Level of sustainability integration through SSCQM principles (SSCQM principle maturity associated with each sustainability dimension).

The level of GRI framework adoption by the organisation before and after the SSCQM implementation is demonstrated in Figure 10. Prior to the application of SSCQM approach, the organisation was not aware of GRI framework, in the absence of utilisation of any sustainability indicators for performance measurement, reporting and improvement.

Through the SSCQM philosophy, the key GRI sustainability indicators as per the key stakeholders and contextual risks of the organisation were established and prioritised for implementation. The economic sustainability indicators prioritised for adoption and improvement were identified as “economic performance, anti-corruption and anti-competitive behaviour”, the same for ecologic comprised of “energy and environmental compliance” and

the same for social included “occupational health and safety, training and education and local communities”.

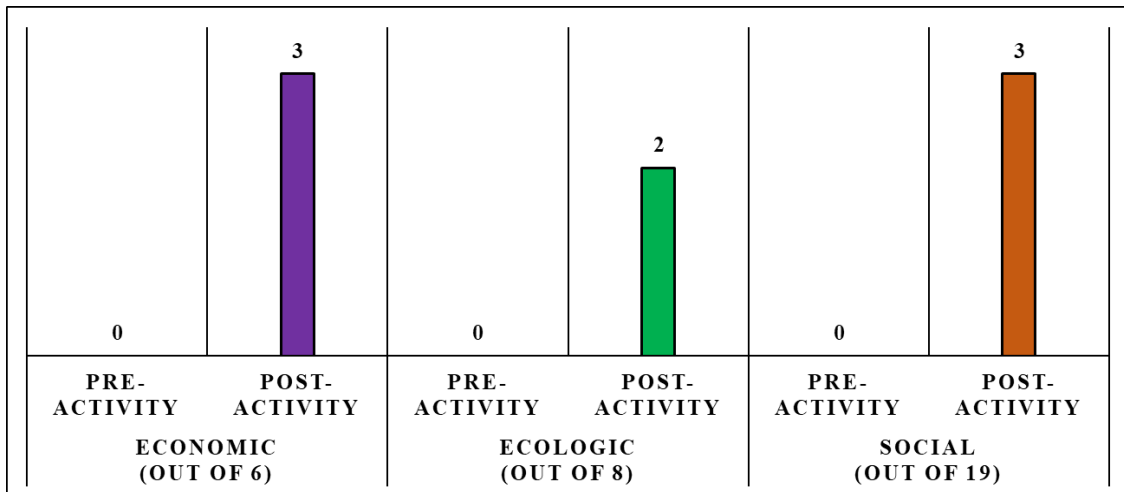


Figure 10: Influence of SSCQM on adoption of GRI at the participating organisation

Furthermore, the SSCQM approach enabled measuring the sustainability integration levels for each dimension, assessing the maturity levels of the indicators, mechanisms and processes for the eight SSCQM principles. The SSCQM implementation provided the organisation with a clear set of prioritised actions, after the implementation of which, the integration levels are anticipated to both increase and the gap between the sustainability dimensions (e.g. economic 15% and social 7%) to shrink as represented in Figure 11.

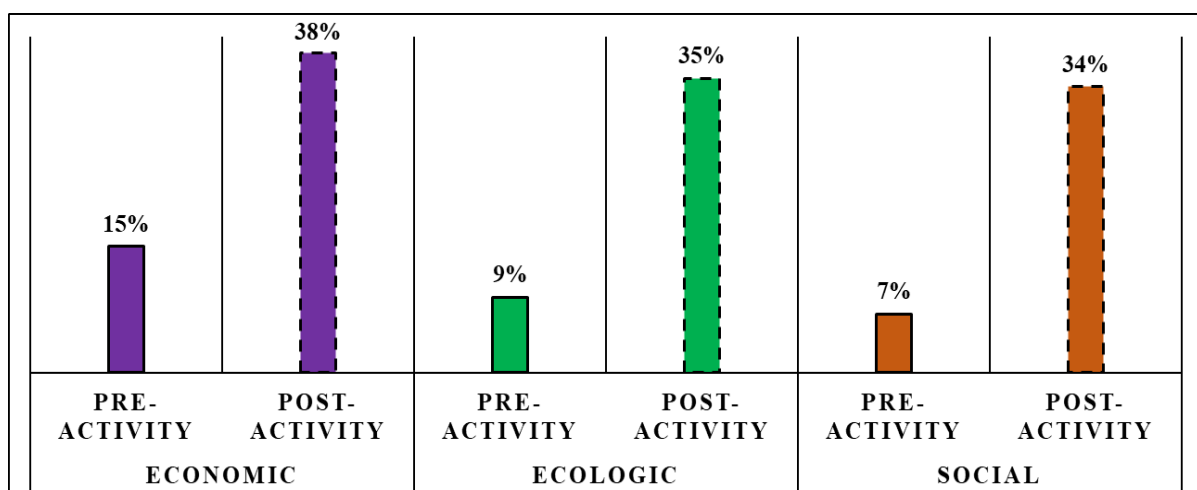


Figure 11: Influence of SSCQM on the sustainability integration levels of the participating organisation

5.2. Influence on SSCQM Maturity and Sustainable Development

The SSCQM approach provided the organisation not only with a comprehensive analysis and current state map with reference to sustainability integration but also shed light into its short, medium and long-term journey towards sustainable development through a continual PDCA, self-assessment, risk based prioritisation, and improvement cycle.

Short-term target: Through this approach, the participating business is envisaged to progress in its sustainability integration path, represented in the form of a business glide path (Mackay et al., 2008), the implementation of the first set of actions (18 actions outlined in Table 6.5), providing an overall maturity progression from the initial level of 10%, into 36% in the short-term (this timeframe was established as 6 to 12 months for the participating organisation) (Mettler, 2011; Röglinger et al., 2012). The first maturity improvement initiative and associated 18 actions will develop the maturity in the prioritised principles of leadership, engagement of people, improvement and evidence based decision making to 60% level, that represents the satisfactory level of maturity (3 out of 5 scores for each principle indicator).

Medium-term target: Subsequent to completion of the first improvement cycle and achievement of 36% overall maturity level, the potential progression path of the organisation includes using the business diagnostic tool, re-deploying the prioritisation approach (impact/effort matrix) and developing an action plan for the remaining principles (i.e. customer focus, process approach, relationship management and supply chain integration). This sets the organisation on its glide path to sustainable development, driving the business towards its medium-term, satisfactory maturity level target of 60% (anticipated as 12-24 months) (Mettler, 2011; Röglinger et al., 2012).

Long-term target: In the long-term (anticipated as 2-4 years), the continuous improvement of triple bottom line sustainability priorities (equating to a scoring level of 4 out of 5 in the diagnostic tool), and adoption of the outstanding GRI indicators not considered as part of the initial sustainability prioritisation process (corresponding to a scoring level of 5 out of 5) will enable the organisation to completely integrate triple bottom line sustainability through the GRI framework from the management perspective, under the facilitation of SSCQM. This will confirm the organisation's sustainable development progression into the world-class maturity level target of 80% and above.

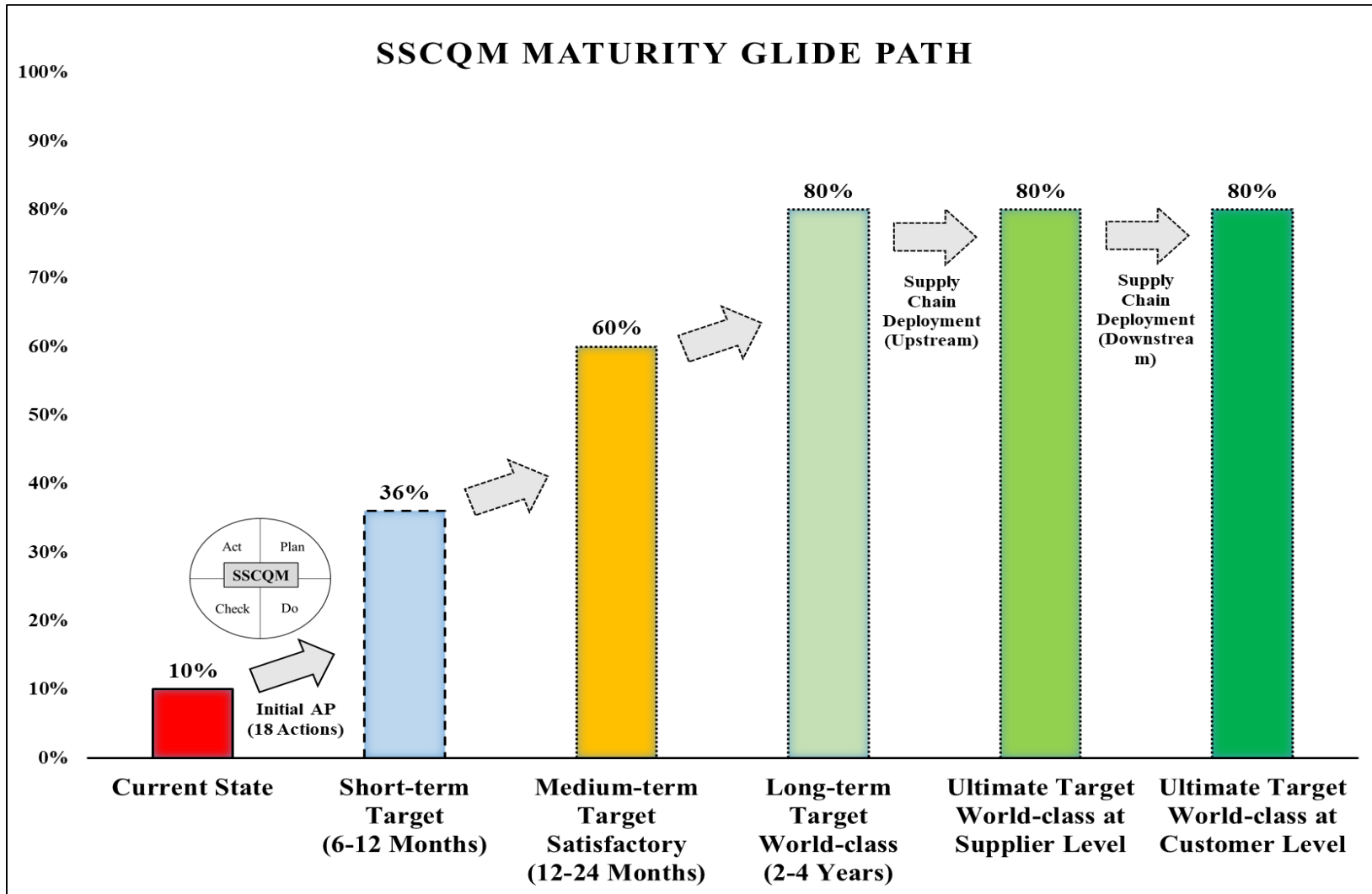
Ultimate target – deployment at supply chain level: Once the world-class level is achieved at the focal organisation level, further opportunities lie with employment of upstream

(suppliers) and downstream (customers) supply chain deployment strategies. The accomplishment of world-class SSCQM maturity levels and a complete integration of GRI framework at the organisational level, in isolation, fall short, particularly from the point of view of addressing the radical and immediate changes demanded by our planet (e.g. natural resource depletion rates, global warming) and the society (e.g. increasing negative impacts of industrial sectors on people) for sustainable development (Dunphy et al., 2000; Engert et al., 2016; Rajeev et al., 2017; Reefke and Sundaram, 2016). Furthermore, as outlined by Rajeev et al. (2017), due to increasing stakeholder pressures, organisations are following the trend of outsourcing the processes with the higher sustainability impacts into other locations and businesses, which are currently under relatively less stakeholder pressure regarding sustainability, resulting in sustainability improvements from the perspective of the relative organisation, but in reality, such a sustainability improvement from the true, global perspective is non-existent (Bastas and Liyanage, 2019).

On the basis of these arguments, development of the overall supply chain to a world-class level was defined as important for holistic sustainable development with higher collective ecologic, economic and social impacts, being set as the ultimate target of the organisation and its supply chain network. As part of the supply chain deployment strategy, a potential improvement approach includes the following key activities:

- Identification of high risk supply chains (e.g. supply, manufacture, distribution and application of chemicals such as paint, in the case of the participating organisation);
- Establishing partnerships for collaboration, exchange of information and integration with high risk supply chain members (i.e. high risk suppliers and customers for sustainability);
- Conducting SSCQM maturity assessments at upstream and downstream members, identification of supply chain sustainability hot spots, and working together to collectively improve the SSCQM maturity levels of the overall supply chain.

The maturity glide path of the organisation and its supply chain is illustrated in Figure 12, demonstrating the progressive journey in the short, medium, long and ultimate terms to sustainable development through the intermediary stages of 36% (first improvement cycle), 60% (satisfactory), 80% (world-class) at focal organisation, and 80% (world-class) at supply chain level.



AP: Action Plan

Figure 12: Maturity glide path of the participating organisation and its supply chain towards sustainable development

6. Conclusion

6.1. Research Implications and Contributions

This research provided a number of contributions and advancements to the existing body of knowledge and managerial practice in the areas of QM, SCM and sustainability. Firstly, the conceptual contribution of SSCQM introduced “a revised thinking” to the core organisational management concepts of ISO 9001 and SCM, addressing a contemporary, organisational sustainability research problem, which can be utilised by organisational leaders and decision makers towards adapting and/or expanding their existing QM and SCM practices to accommodate sustainability agendas. Taking into account over a million organisations currently certified to ISO 9001 methodology and many more that are actively pursuing ISO 9001 certification and supply chain integration, the synthesised set of theories and concepts associated with these deeply rooted management principles offer a significant deployment potential at a global and multisectoral level, implying a remarkable managerial impact for integration of sustainability through QM and SCM.

The novel developments of conceptual framework and maturity assessment diagnostic tool were introduced, offering a systematic implementation solution towards catalysing organisational transformation into sustainable development. The ISO 9001:2015 and supply chain integration principles were adapted from the lens of managerial sustainability integration including formulation of associated organisational indicators, processes and mechanisms for sustainability management and improvement. Through demonstrating the application of these novel conceptual contributions, the industrial managers and practitioners have been provided with a defined, verified, validated and applied set of steps, tools, quantitative measurement aids, and techniques key to integration and continual improvement of sustainability in organisations, presented in an adapted form of the well-known management principles such as PDCA, leadership and engagement of people.

Finally, a new supply chain sustainability measurement, integration and improvement strategy was proposed, introducing a gateway to establishment of a holistic supply chain sustainability view through maturity assessment and collective sustainability improvement across the supply chain network (SSCQM measurements at supplier, focal organisation and customer levels for sustainable development of supply chains). This novel contribution offers a clear glidepath towards sustainable development of not only organisations but also supply chains, providing an approach towards the true and global sustainable development at the supply chain level that is required by our society (Rajeev et al., 2017).

6.2. Concluding Remarks and Future Research Directions

This article addressed a highly current and important research topic; i.e. organisational integration of triple bottom line sustainability. In line with the research objectives, a management approach, integrating QM and SCM framed under the emerging framework of SSCQM was set for organisational development, constructed upon the strengths and weaknesses of frameworks in the extant body of knowledge. The application of this approach was demonstrated in a construction and chemical organisation in the Cyprus region through an action research study, the structured, systematic, risk based, and step-by-step approach introduced facilitating the organisation's management integration and improvement of triple bottom line sustainability; accelerating the organisation's transition towards integration and improvement of triple bottom line sustainability; and providing a structure for managerial strategy and action formulation for integration and improvement of triple bottom line sustainability.

Although the action research approach's suitability to the social sustainability research inquiries (Hind et al., 2013), and its highly contributory essence to the practical aspects of the research (Checkland and Holwell, 1998), certain limitations are entailed such as its sensitivity to the needs of the stakeholders involved in the research (as opposed to the needs of the research), its resource intensive nature (lack of commitment and resources delimiting the research), and its dependence on the facilitation of the researcher (requiring the researcher to possess both research and facilitation / coordination skills for an effective application) (Mackenzie et al., 2012).

In terms of future research directions, taking into account that QM and SCM approaches are well recognised and diffused across various sectors including medical, education and hospitality, it would be a fruitful research avenue to investigate implementation of the SSCQM approach in these sectors. Another future research path is suggested for studying the effects of SSCQM on the sustainability of supply chains. A strategy to guide such a supply chain level deployment was outlined, implementing SSCQM at supplier, focal organisation and customer levels with a view to generate supply chain SSCQM maturity scores, and a holistic view for sustainable development. This contribution, which is subject to further empirical evaluation, possesses the potential to provide a gateway to realise overall supply chain sustainability integration measurement, engagement and collective improvement, supporting the drastic transformation desired at the supply chain level for sustainability.

Despite the maturity assessment diagnostic tool and its indicators were validated by the

Delphi specialists representing various geographical and sectoral backgrounds (Bastas and Liyanage, 2018b), future research possess the potential to reveal further indicators, mechanisms and processes for definition and implementation of the framed SSCQM principles, especially for specific sectors. Moreover, a potential future research and refinement opportunity includes the GRI framework through identification of organisational scale and sector specific packages, along with incorporation of a maturity based approach, guiding organisations through a basic, medium and advanced levels of adoption, as opposed to exposing the framework to industrial resistance due to the remarkable learning curve associated, and the long list of indicators included (Fonseca, 2010). Finally, taking into account the fruitful nature and remarkable potential identified between SCM, QM and sustainability integration (Bastas and Liyanage, 2018a; Govindan et al., 2014; Jabbour et al., 2014), future research is advisable into further exploration of relationships between these approaches, revealing potential synergies between other QM, SCM or SCQM principles (e.g. supplier quality management) with organisational sustainable development.

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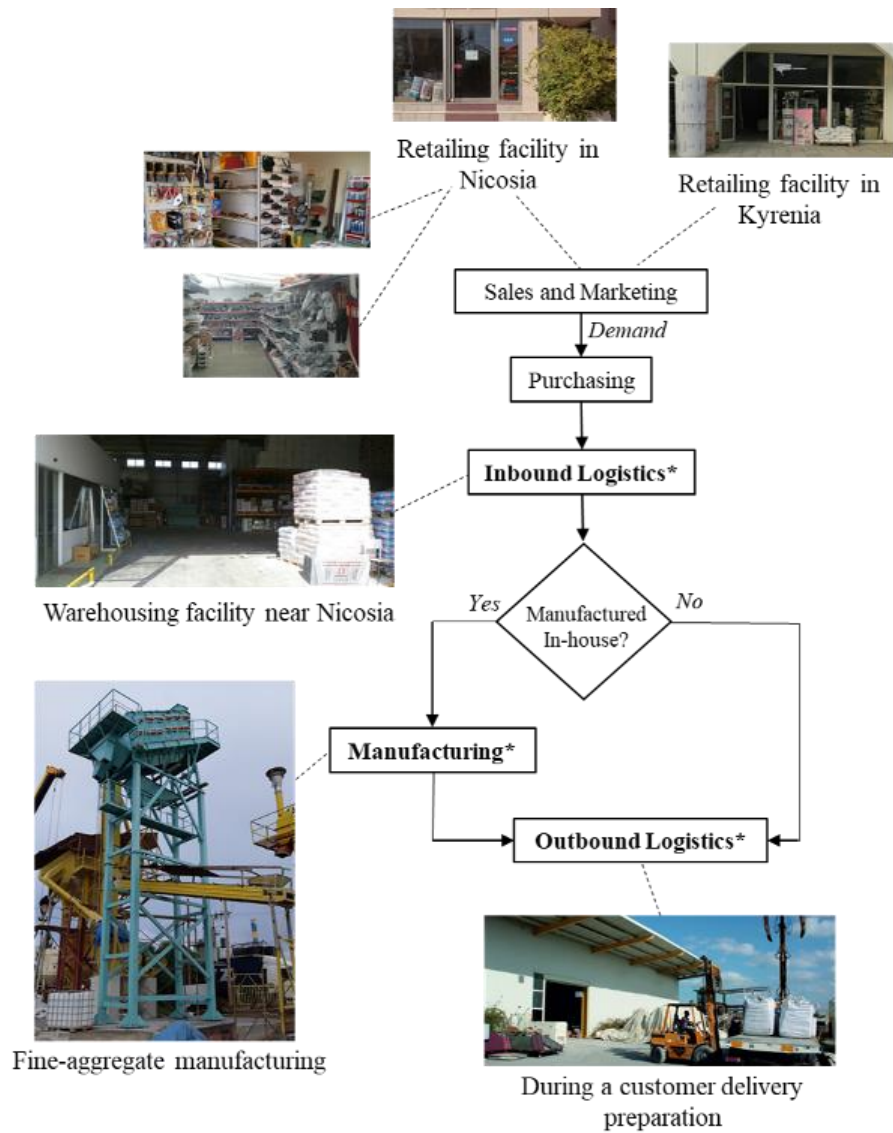
Appendix A - Key statistics of the participating organisation

Established	No. of Employees	Annual Turnover – FY 2018	Region	Business Sectors	ISO 9001 certified since
					
1984	40	€1.5m	Cyprus	Construction & Chemical	2011

No. of Warehouse Locations	No. of Retailing Locations	No. of Manufacturing Locations
		
1	2	1

FY: Financial Year

Appendix B - Key business processes of the participating organisation



Appendix C – Maturity assessment screens

SSCQM Principle 1 - Customer Focus					
Principle Maturity Indicators		GRI Indicators (as per VOS)			
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social	
<p>*0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VOS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VOS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.</p>			Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local
1.1*	Are the current and future sustainability needs and requirements of current and potential customers identified and risk analysis conducted ?	1	0	0	
1.1a	Sustainability awareness and expectations feedback sought from key markets and customers	1	0	0	
1.1b	Current and future TBL sustainability requirements of key customers identified	1	0	0	
1.1c	Risk analyses with reference to customer sustainability needs and requirements carried out	1	0	0	
1.2	Is there engagement with the customers with regards to their sustainability awareness and expectations ?	1	0	0	
1.2a	Customer and market sustainability awareness and expectations questionnaires/interviews conducted	1	0	0	
1.2b	Customer sustainability awareness training conducted periodically with key customers of the business	0	0	0	
1.2c	Sustainability improvement projects and outcomes communicated periodically to key customers	1	1	0	
1.3	Are the sustainability needs and requirements of customers aligned with the objectives of the organization ?	1	0	0	
1.3a	Sustainability needs and requirements of key customers/markets identified	1	0	0	
1.3b	Sustainability KPIs established as per GRI framework, aligned with customer/market needs and requirements	0	0	0	
1.3c	Customer sustainability KPIs are embedded into organisational objectives for monitoring and improvement	1	0	0	
1.4	Is the customer satisfaction with reference to sustainability performance of the organization measured and monitored along with implementation of actions as required ?	1	0	0	
1.4a	Customer and market sustainability satisfaction feedback captured, evaluated and actioned via questionnaires/interviews or similar	1	0	0	
1.4b	Customer satisfaction feedback capturing process includes sustainability	1	0	0	
1.5	Are the sustainability needs and requirements of customers communicated throughout the organization ?	1	1	1	
1.5a	Sustainability needs and requirements of customers communicated to employees at all levels periodically	1	1	1	
1.5b	Sustainability communication channels identified	1	1	1	
1.5c	Sustainability communication channels supported and in place	1	1	1	
1.6	Are the organizational members at all levels aware of customer sustainability needs and requirements ?	1	1	1	
1.6a	Employee awareness feedback with reference to customer sustainability requirements captured	1	1	1	
1.6b	Employee awareness feedback with reference to customer sustainability requirements evaluated	1	1	1	
1.6c	Employee awareness feedback with reference to customer sustainability requirements actioned and effects monitored	0	0	0	
1.7	Are the needs and appropriate expectations of the interested parties** that can affect customer satisfaction with reference to sustainability performance identified and actioned ?	1	0	0	
1.7a	Needs and expectations of key stakeholders(interested parties) that can affect customer satisfaction with reference to sustainability performance identified	1	0	0	
1.7b	Risk analysis conducted regarding needs and expectations of key interested parties that can affect customer satisfaction with reference to sustainability performance	1	0	0	
1.7c	Risk mitigation actions with ref. to above are taken and effects monitored	1	0	0	
1.8	Are the products, services and processes of the organization aligned with the sustainability needs and requirements of the customers and the market ?	2	1	1	
1.8a	Current product/services/processes sustainability performance monitored and controlled in line with customer sustainability performance expectations	2	1	1	
1.8b	Customer sustainability needs/requirements reviewed and implemented as part of New Product/Service/Process Introduction processes.	2	1	1	
Unidimensional TBL score		20%	8%	7%	
Principle Maturity		11%			

Figure C1: Maturity assessment conducted on the customer focus principle


SSCQM Principle 2 - Leadership				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social
<p>*0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VOS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VOS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.</p> <p>Not Implemented  Fully Implemented</p>		Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities
2.1	Are the leaders of the organization committed to sustainable development through clear mission, vision, policies and objectives ?	1	1	1
2.1a	Sustainability mission, vision and policies for environmental, social and economic sustainability in place and reviewed periodically	1	1	1
2.1b	Sustainability objectives for economic, social and ecologic sustainability in place in line with the voice of the stakeholders analysis of the organisation	1	1	1
2.1c	Performance against the sustainability objectives monitored by senior management and controlled	1	1	1
2.2	Are the sustainable development mission, vision, policies and objectives articulated throughout the organization ?	1	1	1
2.2a	Sustainability mission, vision, policies and objectives for environmental, social and economic sustainability communicated periodically at all levels of the organisation	1	1	1
2.2b	Communication channels for above identified	1	1	1
2.2c	Communication channels for above supported and in place	1	1	1
2.3	Is the organization-wide commitment to sustainable development encouraged ?	1	0	0
2.3a	Organisational sustainability values in place and part of the recruitment processes with reference to sustainable development	1	0	0
2.3b	Organisational commitment statement in place and communicated to key stakeholders (employees, suppliers, public etc.)	0	0	0
2.3c	Contribution to sustainability improvement activities encouraged, recognised and rewarded	1	1	0
2.4	Is the workforce provided with the necessary resources, training and authority to drive sustainability improvement activities ?	1	0	0
2.4a	Sustainability awareness and performance measurement training conducted	1	0	0
2.4b	Resources required for key sustainability KPI monitoring and improvement identified and supported	1	0	0
2.4c	Roles & responsibilities with reference to sustainability improvement activities defined and authority established.	1	0	0
2.5	Are people in the organization inspired and encouraged to engage in sustainability improvement activities, being recognized both at individual and team levels ?	1	0	0
2.5a	Key contributors (teams and individuals) to sustainability improvement activities at individual and team levels identified	1	0	0
2.5b	Key contributors (teams and individuals) to sustainability improvement activities at individual and team levels recognised and rewarded	1	0	0
2.6	Is benchmarking analysis conducted with similar operations and organisations ?	0	0	0
2.6a	Benchmarking analysis conducted with similar organisations and operations identified in the market for key sustainability KPIs of the organisation	1	0	0
2.6b	Sustainability information transferred between similar organisations for benchmarking, cooperation and improvement	0	0	0
2.6c	Improvement actions deployed and monitored as per benchmarking analysis outcomes	0	0	0
2.7	Are the leaders of the organization at all levels positive examples to people in the organization with reference to sustainable development ?	1	0	0
2.7a	Sustainability values of the organisation are part of the leadership recruitment process	1	0	0
2.7b	Sustainable development values of the organisation reinforced by the leaders	1	0	0
2.8	Does the organisation review the effectiveness of its sustainability leadership policies ? Is feedback collected and actioned ?	1	1	1
2.8a	The effectiveness and adherence to sustainability policies evaluated and controlled	1	1	1
2.8b	Feedback is captured from employees at all levels for evaluation, control and development	0	0	0
Unidimensional TBL score		16%	7%	6%
Principle Maturity		10%		

Figure C2: Maturity assessment conducted on the leadership principle


SSCQM Principle 3 - Engagement of people				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social
<p>*0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VOS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VOS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.</p> <p>0 Not Implemented Fully Implemented 5</p> 		Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities
3.1	Is there a common understanding and awareness of sustainability among the employees at all levels of the organization ?	1	0	0
3.1a	Sustainability awareness training conducted periodically for employees at all levels, importance of sustainability and sustainable development articulated	1	0	0
3.1b	Benefits of sustainability improvement projects demonstrated	1	0	0
3.1c	Sustainability mission, vision, policies and objectives articulated to employees at all levels	1	1	1
3.2	Is collaboration promoted for sustainable development throughout the organization ?	0	0	0
3.2a	Organisational sustainability objectives aligned with departmental, team and individual objectives	0	0	0
3.2b	Cross-functional teams and sustainability circles established to facilitate collaboration for sustainability improvement.	0	0	0
3.3	Is sharing of knowledge, experience and information facilitated among employees for sustainable development ?	1	0	0
3.3a	Information, knowledge and experience sharing sessions held periodically for employees at all levels	1	0	0
3.3b	Channels and resources for above identified	1	0	0
3.3c	Channels and resources for above in place and supported	1	0	0
3.4	Is the workforce empowered to determine constraints, challenge current practices, take initiatives and contribute to sustainable development as required ?	0	0	0
3.4a	Key contributions to sustainability improvement and learning activities at individual and team levels identified, recognised and rewarded	1	1	0
3.4b	Self-managing teams established for sustainability performance measurement and improvement	0	0	0
3.4c	Contribution to sustainability improvement encouraged through clear mission, vision, policies and objectives	0	0	0
3.5	Is there an established communication with people to promote understanding of the importance of their individual contribution to sustainable development ?	1	1	0
3.5a	Employees at all levels encouraged to participate in sustainability improvement activities and benefits of sustainability improvement projects demonstrated	1	1	0
3.5b	Sustainability communication sessions are held periodically for employees at all levels, demonstrating the importance and influence of contributions at the individual level	1	1	0
3.5c	Channels and resources for above identified, in place and supported	0	0	0
3.6	Is people's contribution, learning and improvement with reference to sustainable development recognized and acknowledged ?	1	1	0
3.6a	Key contributions to sustainability improvement and learning activities at individual and team levels identified	1	1	0
3.6b	Key contributions to sustainability improvement and learning activities at individual and team levels recognised and rewarded	0	0	0
3.7	Are roles, responsibilities and levels of authority for individuals defined with reference to sustainability ?	1	1	1
3.7a	Roles & responsibilities with reference to sustainability performance measurement and improvement activities defined	1	1	1
3.7b	Decision making, monitoring and control mechanisms and authority with reference to sustainability performance measurement and improvement activities established	0	0	0
3.8	Do the people of the organization conduct self-evaluation of performance with reference to their contribution to the sustainable development against personal objectives ?	1	0	0
3.8a	Sustainability improvement objectives of the organisation and teams are linked with personal objectives of the employees	1	0	0
3.8b	Employees can self-evaluate their performance in line with their personal objectives that are linked to the sustainability performance of the organisation	0	0	0
3.8c	Sustainability KPIs of the organisation measured and available to all employees	1	1	1
Unidimensional TBL score		12%	7%	3%
Principle Maturity		7%		

Figure C3: Maturity assessment conducted on the engagement of people principle



SSCQM Principle 4 - Process approach				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social
0- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VOS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VOS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.		Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities
0 Not Implemented  Fully Implemented 5 				
4.1	Are the sustainability objectives of the organisation defined along with the processes necessary to achieve them ?	1	1	1
4.1a	Sustainability objectives for economic, social and ecologic sustainability are in place in line with the voice of the stakeholders analysis of the organisation	1	1	1
4.1b	Sustainability KPI monitoring and improvement processes are established and in place	1	1	1
4.2	Are the high risk activities and processes determined for organizational sustainability performance (sustainability risk-based thinking) ?	1	1	1
4.2a	Risk analyses conducted for organisational sustainability performance	1	1	1
4.2b	High risk activities and processes for organisational sustainability performance determined	1	1	1
4.3	Are the high risk processes and their interrelations managed effectively and efficiently as a coherent system in line with sustainability objectives ?	0	0	0
4.3a	Sustainability performance of high risk activities and processes measured, evaluated and controlled	0	0	0
4.3b	Effectiveness of sustainability improvement projects on high risk processes evaluated periodically	0	0	0
4.4	Are the organisational capabilities understood and resource constraints established and actioned with reference to sustainable development ?	0	0	0
4.4a	Organisational capabilities, processes and resources required to achieve organizational sustainability objectives identified	0	0	0
4.4b	Organisational capabilities, processes and resources required to achieve organizational sustainability objectives supported and in place	0	0	0
4.5	Is the necessary information available to monitor, analyse and improve the sustainability performance of the overall system ?	1	0	0
4.5a	Sustainability KPI information and data of key processes and the overall system is captured periodically	1	0	0
4.5b	Sustainability KPI information and data of key processes and the overall system is reviewed periodically and actioned	1	0	0
4.6	Is there an established process to capture organisational learning with reference to sustainable development ?	0	0	0
4.6a	Process in place for sustainability information, knowledge, learnings and experiences to be documented and shared periodically among the employees at all levels of the organisation	0	0	0
4.6b	Sustainability improvement projects status and their benefits to key stakeholders documented and communicated periodically	0	0	0
4.7	Is the authority, responsibility and accountability established for managing processes in line with sustainability objectives ?	1	1	1
4.7a	Owners of sustainability objectives identified for key processes including the authority, responsibility and accountability	1	1	1
4.7b	Monitoring and control mechanisms identified and in place for management of key processes in line with sustainability objectives	1	1	1
Unidimensional TBL score		11%	9%	9%
Principle Maturity		10%		

Figure C4: Maturity assessment conducted on the process approach principle





SSCQM Principle 5 - Improvement				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social
<p>*0*- No evidence of implementation;</p> <p>*1*- Informal/inadequate processes in place;</p> <p>*2*- Partially implemented (All VOS TBL indicators not included or implemented);</p> <p>*3*- Formal process in place inclusive of all VOS TBL sustainability parameters;</p> <p>*4*- *3* plus evidence of continuous improvement;</p> <p>*5*- Fully implemented inclusive of all GRI sustainability indicators.</p>		 Economic Economic performance; Anti-corruption; Anti-competitive behaviour	 Ecologic Energy; Environmental compliance	 Social Occupational H&S; Training and education Local communities
<p>0 Not Implemented</p>  <p>5 Fully Implemented</p>				
5.1	Are the sustainability improvement objectives implemented at all levels of the organization ?	1	1	1
5.1a	Sustainability objectives for economic, social and ecologic sustainability are in place in line with the voice of the stakeholders analysis of the organisation	1	0	0
5.1b	The sustainability objectives are communicated at all levels and are aligned with departmental and personal objectives	1	1	1
5.2	Are sustainability performance KPIs implemented along with defined measurement and improvement processes, in line with the sustainability priorities of the organisation (Step 0) ?	0	0	0
5.2a	Economic, social and ecologic sustainability KPIs for measurement, reporting and improvement established as per the GRI framework in line with the VOS analysis	0	0	0
5.2b	Improvement objectives for each KPI in place along with timescales and review mechanisms	0	0	0
5.3	Is the workforce trained and competent in promoting, tracking and completing sustainability improvement projects in line with the objectives ?	1	1	1
5.3a	Workforce trained in improvement project management tools and techniques	1	1	1
5.3b	Workforce fully aware of sustainability KPIs and objectives of the organisation	1	1	1
5.3c	Roles, responsibilities and authority for sustainability improvement projects established	0	0	0
5.4	Are the sustainability improvement considerations incorporated into the new product, process and service introduction processes ?	1	1	1
5.4a	New Product/Service/Process Introduction processes include sustainability performance considerations and improvement, in line with the organisational mission, vision, policies and objectives	1	1	1
5.4b	Sustainability aspects and impacts reviewed and actioned as part of New Product/Process/Service Introduction processes	1	1	1
5.5	Does the organisation promote innovation with regards to sustainability when developing and introducing new products and services?	1	0	0
5.5a	Key contributions and innovations for sustainable product and service development identified	1	0	0
5.5b	Key contributions and innovations for sustainable product and service development recognised and rewarded	1	0	0
5.6	Are the sustainability improvement projects' planning, implementation, completion and results tracked, reviewed and audited ?	1	0	0
5.6a	Sustainability improvement project tracking process in place	0	0	0
5.6b	Project management resources in place for sustainability improvement projects	2	0	0
5.6c	Sustainability improvement projects status formally reviewed by senior management and issues logged and actioned appropriately	2	0	0
5.7	Is organisational sustainability improvement recognized and acknowledged ?	0	0	0
5.7a	Key contributions to organizational sustainability performance improvement recognised and rewarded	0	0	0
5.7b	Organizational sustainability improvement scheme in place	0	0	0
5.8	Is there a process to implement sustainability improvement projects throughout the organization ?	2	1	0
5.8a	Sustainability improvement projects developed, evaluated, prioritised and supported based on risk analysis	2	1	0
5.8b	Resources required for each improvement project identified and supported	2	1	0
Unidimensional TBL score		18%	8%	5%
Principle Maturity		10%		

Figure C5: Maturity assessment conducted on the improvement principle

SSCQM Principle 6 - Evidence based decision making				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
<p>Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):</p> <p>*0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VOS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VOS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.</p> <p style="text-align: center;"> 0 5 Not Implemented Fully Implemented </p>		<p> Economic</p> <p>Economic performance; Anti-corruption; Anti-competitive behaviour</p>	<p> Ecologic</p> <p>Energy; Environmental compliance</p>	<p> Social</p> <p>Occupational H&S; Training and education Local communities</p>
6.1	Are the key performance indicators (KPI)s for organizational sustainability improvement objectives identified, monitored and controlled ?	0	0	0
6.1a	Voice of the stakeholders analysis conducted, identifying the TBL sustainability priorities of the organisation	1	1	1
6.1b	Economic, social and ecologic sustainability KPIs for measurement, reporting and improvement established as per the GRI framework	0	0	0
6.1c	Improvement objectives for each KPI in place along with timescales and review mechanisms	0	0	0
6.2	Is the workforce trained and competent in sustainability performance data capturing, evaluation and analysis methods ?	1	1	1
6.2a	Sustainability KPIs are communicated to employees at all levels along with defined roles & responsibilities	1	1	1
6.2b	Sustainability awareness training conducted to all personnel periodically	1	1	1
6.2c	Sustainability performance measurement tools & techniques training conducted to all relevant personnel	0	0	0
6.3	Is accurate and reliable data and information measured and evaluated for organizational decision making and sustainability improvement action deployment ?	0	0	0
6.3a	Sustainability performance data and information captured as per GRI framework guidelines	0	0	0
6.3b	Sustainability performance data reported periodically to senior management for monitoring and control purposes	1	1	0
6.3c	Sustainability performance improvement actions documented and tracked	0	0	0
6.4	Is employee feedback on sustainability within the organization captured and evaluated ?	1	1	0
6.4a	Feedback captured periodically from employees at all levels with reference to sustainability performance and improvement	1	0	0
6.4b	Employee sustainability improvement scheme in place	1	1	0
6.4c	Employee sustainability feedback analysis and improvement process in place	1	1	0
6.5	Is all data and information with reference to sustainability improvement available to the relevant people throughout the organization ?	1	1	1
6.5a	Roles & responsibilities with reference to sustainability KPI monitoring and improvement defined throughout the organisation	1	1	0
6.5b	Sustainability performance data and information captured and presented to process owners at all levels and performance reviewed by senior management	1	1	1
Unidimensional TBL score		13%	12%	6%
Principle Maturity		10%		

Figure C6: Maturity assessment conducted on the evidence based decision making principle

SSCQM Principle 7 - Relationship management				
Principle Maturity Indicators		GRI Indicators (as per VOS)		
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category):		Economic	Ecologic	Social
<p>*0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VDS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VDS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.</p> <p>0 Not Implemented Fully Implemented 5</p>		Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities
*7.1	Are the current and future sustainability needs and requirements of **interested parties identified and risk analysis conducted ?	3	3	3
7.1a	Key stakeholders identified, sustainability awareness and feedback sought from key stakeholders	3	3	3
7.1b	Current and future TBL sustainability requirements of key stakeholders identified	3	3	3
7.1c	Risk analyses with reference to stakeholder sustainability needs and requirements carried out	2	2	2
7.2	Are relationships with employees managed for sustainable development ?	1	1	1
7.2a	Employee relationship management process in place	1	1	1
7.2b	Feedback sought from employees with reference to TBL sustainability performance and improvement	1	1	1
7.2c	Employees at all levels encouraged to participate in sustainability improvement projects and benefits of sustainability improvement projects demonstrated	1	1	1
7.3	Are relationships with customers managed for sustainable development ?	1	0	0
7.3a	Customer relationship management process in place	2	1	0
7.3b	Feedback obtained from customers with reference to their sustainability needs and requirements, market analysis conducted	1	0	0
7.3c	Customers included in sustainability improvement projects, benefits of sustainability improvement projects communicated to key customers	1	0	0
7.4	Is the information, feedback, expertise and resources being exchanged with other interested parties for sustainable development ?	1	1	0
7.4a	Key information and resources required for TBL sustainability performance / priorities identified	1	1	0
7.4b	Key stakeholders identified along with their information needs and categorisation of resources possessed / availability	1	1	1
7.4c	Process in place for periodical exchange of information, expertise and resources with key stakeholders	0	0	0
7.5	Are collaborative sustainability improvement activities established with suppliers, partners and other interested parties ?	2	2	2
7.5a	Current and future TBL sustainability requirements of key stakeholders identified	3	3	3
7.5b	Risk analyses with reference to stakeholder sustainability needs and requirements carried out	2	2	2
7.5c	Sustainability improvement projects established for high risk areas with key stakeholders.	1	1	0
7.6	Are sustainability improvements and achievements by external providers and partners recognized and encouraged ?	0	0	0
7.6a	Sustainability performance and improvement part of long term business deals and contractual agreements with suppliers	0	0	0
7.6b	Improvement targets of cross-enterprise sustainability projects agreed and in place	0	0	0
7.6c	Process in place for supply chain members that take part in sustainability improvement projects to be recognised and awarded, benefits sought communicated and mutually-shared.	0	0	0
Unidimensional TBL score		26%	22%	19%
Principle Maturity		22%		

Figure C7: Maturity assessment conducted on the relationship management principle

SSCQM Principle 8 - Supply chain integration									
Principle Maturity Indicators		GRI Indicators (as per VOS)							
Assessment Scoring Criteria 0 to 5 (Please refer to the "Guidelines" tab for full description of each scoring category): *0*- No evidence of implementation; *1*- Informal/inadequate processes in place; *2*- Partially implemented (All VDS TBL indicators not included or implemented); *3*- Formal process in place inclusive of all VDS TBL sustainability parameters; *4*- *3* plus evidence of continuous improvement; *5*- Fully implemented inclusive of all GRI sustainability indicators.			<table border="1"> <tr> <th>Economic</th> <th>Ecologic</th> <th>Social</th> </tr> <tr> <td>Economic performance; Anti-corruption; Anti-competitive behaviour</td> <td>Energy; Environmental compliance</td> <td>Occupational H&S; Training and education Local communities</td> </tr> </table>	Economic	Ecologic	Social	Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities
Economic	Ecologic	Social							
Economic performance; Anti-corruption; Anti-competitive behaviour	Energy; Environmental compliance	Occupational H&S; Training and education Local communities							
8.1	Is sustainability a shared value across the supply chain network ?	0	0						
8.1a	Sustainability training and awareness sessions held with key supply chain members	0	0						
8.1b	Sustainability communicated as a core value of the business	0	0						
8.1c	Sustainability forms part of contractual supply chain agreements	0	0						
8.2	Is information being shared between supply chain members with reference to sustainable development ?	1	0						
8.2a	IT Support for sustainability information sharing in place	1	1						
8.2b	Key communication channels for sustainability performance monitoring and improvement identified and in place between supply chain members	1	0						
8.2c	Accuracy and reliability of the information periodically verified between all parties	1	0						
8.3	Are joint cooperation activities being held across the supply chain including cross-enterprise participation for sustainable development ?	0	0						
8.3a	Team members identified from each participating organisation in the supply chain	0	0						
8.3b	Joint sustainability improvement projects in place	0	0						
8.3c	Participation in joint cooperation activities agreed contractually	0	0						
8.4	Is supply chain integration for sustainable development encouraged, rewarded and benefits mutually shared ?	0	0						
8.4a	Suppliers / customers that actively take part in sustainability improvement projects identified	0	0						
8.4b	Rewarding process in place for key contributors	0	0						
8.4c	Sustainability benefits sought as a result of joint activities mutually shared	0	0						
8.5	Is future business linked to supply chain integration for sustainable development ?	1	0						
8.5a	Sustainability performance is part of supplier selection process	1	0						
8.5b	Sourcing decisions include sustainability performance and engagement of the suppliers / supply chain	1	0						
8.5c	Suppliers / customers that actively take part in joint sustainability improvement projects recognised and awarded future business	0	0						
8.6	Is risk analysis conducted, identifying high risk supply chains and suppliers for prioritisation of supply chain integration for sustainable development ?	0	0						
8.6a	Risk analyses for environmental, social and economic sustainability conducted periodically	0	0						
8.6b	High risk supply chains and suppliers for sustainability identified and prioritised	1	0						
8.6c	Sustainability improvement projects coordinated across the supply chain based on risk	0	0						
8.7	Is there an association among supply chain members based on commitment, long term orientation and trust with ref. to sustainable development ?	0	0						
8.7a	Sustainability performance and improvement is part of long term business deals and contractual agreements with suppliers	0	0						
8.7b	Improvement targets of cross-enterprise sustainability projects agreed and in place	0	0						
8.7c	Process in place for supply chain members that take part in sustainability improvement projects to be recognised and awarded	0	0						
8.8	Is a supply chain integration statement in place with appropriate KPIs to monitor effectiveness and drive improvement?	0	0						
8.8a	Declaration of commitment to sustainable development objectives in place between all parties	0	0						
8.8b	Improvement targets of cross-enterprise sustainability projects agreed and in place	0	0						
8.8c	KPIs with reference to TBL sustainability are identified, monitored and controlled by all parties	0	0						
Unidimensional TBL score		5%	1%						
Principle Maturity		2%							

Figure C8: Maturity assessment conducted on the supply chain integration principle

