A SYSTEMS ENGINEERING APPROACH TO BUSINESS SUSTAINABILITY

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ABSTRACT

Sustainability is recognised as one of the key challenges of modern-day businesses. The need for, and pressure on, businesses to incorporate aspects of sustainability into all business processes that result in the delivery of products and/or services, in terms of social equity, economic efficiency and environmental performance, has increased over the past few decades. Consequently, a number of business sustainability frameworks and approaches were developed to support businesses in incorporating these three elements of sustainability into business processes. However, these frameworks present challenges on how elements of sustainability could be incorporated into business processes. One such challenge is that these business sustainability frameworks and approaches, to a large extent, regard a business as a 'black box'[i], meaning that these frameworks and approaches address the sustainability objectives of the business as a whole and do not regard the business as multiple individual components working together as a whole.

This paper investigates a systems engineering (SE) approach to business sustainability and aims to deconstruct the business environment as it relates to the internal and external factors influencing business outputs, as well as various business components. This approach makes it possible to deconstruct the challenge created by the 'black box' approach to business sustainability into a subset of business sustainability focus areas, before seeking to find a solution to the sustainability of each part of the subset. Ultimately, the paper argues the case for an SE approach to business sustainability through the conceptualisation of the process of addressing business sustainability by applying the proposed SE approach. This process, which could be applied beyond the scope of the research enquiry, would facilitate the development of a business sustainability framework that addresses sustainability at the level of individual business components.

Keywords: business environment, business sustainability, systems engineering approach

[i] The concept of a 'black box' is a metaphor for modular components of argumentative discussion that are, within a particular discussion, not open to expansion (Jackson 2008).

INTRODUCTION

Over the past decade, individual business concepts in the business environment have become well-known topics for discussion in the fields of research and professional practice (Lüdeke-Freund & Dembek 2017). At the same time, sustainability has come to be recognised as one of the key challenges facing modern-day businesses. Sustainability experts have begun to investigate how the business environment and sustainability actions can be integrated into one system or model (Lüdeke-Freund & Dembek 2017). The need for, and pressure on, businesses to incorporate aspects of sustainability into all business processes that result in the delivery of products and/or services, in terms of social equity, economic efficiency and environmental performance, has increased over the past few decades. Consequently, a number of business sustainability frameworks and approaches were developed to support businesses in incorporating these three elements of sustainability into business processes. However, these frameworks present certain challenges in terms of how they incorporate elements of sustainability into business processes (Lüdeke-Freund, Massa, Bocken, Brent & Musango 2016).

One such challenge is that these business sustainability frameworks and approaches, to a large extent, regard a business as a 'black box' (Jackson 2008), meaning that these frameworks and approaches address the sustainability objectives of the business as a whole, and do not regard the business as multiple individual components working together as a whole (Jackson 2008).

By using the systems engineering (SE) approach to address the challenge of sustainable business development, the business environment is deconstructed into a collection of business environment facets that are important to consider when developing a sustainable business, as well as a set of entities, actors, and stakeholders that influence business performance, profitability, growth and sustainability (Lüdeke-Freund et al. 2016). Examples of internal business environment facets include values, vision, mission, markets, business departments such as logistics, production, finances and corporate culture, to mention but a few. Examples of external business environment facets include both the micro and macro environments (Porter & Kramer 2011).

The environment in which a business operates is considered as the sum of all the factors and variables that influence the creation, growth and continued existence of the business, either positively or negatively; thereby promoting or hindering the achievement of its objectives (Porter & Kramer 2011). It is thus evident that business contexts and environments play a significant role in sustainable business development. However, the ever-changing nature of such contexts and environments – together with numerous elements of the business value chain that ultimately create value for customers and thus constitute the outputs of the business – has to be acknowledged and taken into account when aiming to incorporate sustainability into businesses.

This paper argues that applying an SE approach to both the business environment and business sustainability considerations will contribute towards addressing the challenge associated with the 'black box' perspective of sustainability frameworks. Sustainability is approached as it applies to each of the elements of a business, with the objective of unearthing the status quo of sustainability as it relates to each element, namely with the objective of determining how each element contributes to, influences and/or enables businesses to produce value to society. This paper therefore allows the proposal of the perspective taken on business sustainability along the multiple dimensions that may be used to consider a business.

SUSTAINABILITY FRAMEWORKS FOR THE BUSINESS ENVIRONMENT

As mentioned, sustainability is recognised as one of the primary challenges facing modern businesses. A number of frameworks and approaches have been developed to support businesses in incorporating the three elements of sustainability into business processes (Lüdeke-Freund et al. 2016). Rautenbach, De Kock and Brent (2017) evaluated the available measures of business sustainability, sustainable business frameworks and definitions of business sustainability. This evaluation by Rautenbach et al. (2017) identified and subsequently evaluated the eight most prominent business sustainability frameworks found in the literature, and concluded with frameworks that are the most comprehensive and deemed most appropriately constructed to evaluate, facilitate and guide a process of improving business sustainability. Table 1 provides an overview of the business sustainability frameworks mentioned above, the key areas of application and the focus areas of these frameworks, as well as an overview of the various indicators included in each framework.

Actors are the different groups that are connected to each other in a network. These actors may be humans or non-human objects. A network is the outcome of a process that connects two or more actors (Dankert 2011). The discipline of the assessment framework refers to the specific academic discipline covered by the framework. The framework can range from a generalised framework to a more specific discipline framework that focuses on certain commitment initiatives (Krishnan 2009).

Table 1: A summary of the dimensions at the various sustainability assessment frameworks (adapted from Rautenbach et al. (2017))

Sustainability measurement framework	Economic	Environ-mental	Social	Actors and Networks	Discipline
Global Reporting Initiative G4 Sustainability Reporting Guidelines	x	x	x	Business, governmental, non-governmental organisation (gold community, knowledge unit, GRI and governments)	Any discipline, and additional to the following sectors: airport operators, food processing, construction and real estate, electric utilities, financial services, media, mining and minerals, NGO, oil and gas, etc.
CDP Environmental Disclosure System	-	x	-	Companies, cities, states and regions, investors, purchasers, non-governmental businesses, inter-governmental businesses and governments	General and supply chain
United Nations Commission on Sustainable Development	x	x	x	Countries at the national level, as well as international, governmental and non-governmental businesses	General, Higher Education Sustainability Initiative (HESI), Partnerships for Small Island Developing States, Every Woman Every Child, Global Water Partnership, etc.
International Union for Conservation of Nature	-	x	-	Governments, NGOs, scientists, businesses, local communities, indigenous people's businesses	Business and biodiversity, climate change, economics, ecosystem management, environmental law, forests, gender, global policy, social policy, species, water, world heritage, etc.
Environmental sustainability index	-	x	-	Governments, the private sector, communities and individual citizens	General
Global Scenario Group	x	x	x	Researchers, decision-makers, general public	Market forces, policy reform, fortress world, great transition

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Sustainability measurement framework	Economic	Environ-mental	Social	Actors and Networks	Discipline
Sustainability Accounting Standards Board	x	x	x	Public corporations, market actors, investors, accountants	Consumption, health care, infrastructure, financials, renewable resources and alternative energy, technology and communications, resource transformation, transportation, etc.
United Nations Global Compact Communication on Progress	-	x	x	Government groups, local networks, private working groups	Human rights, peace, humanitarian action, food and water, climate action, breakthrough innovation, sustainability reporting, supply chain, financial innovation, etc.

From the overview of the business sustainability frameworks, it is evident that these frameworks address business sustainability aspects as an overarching approach to the business and not in terms of the individual components of a business. Even though the internal[ii] business components are not considered in these frameworks, the external environment (non-governmental organisations, governments, communities, etc.) are considered to varying degrees. This research enquiry accordingly focuses on the 'internal' business environment. From this perspective, and considering research done by Dyllick and Muff (2015), debating business sustainability challenges thus implies that businesses within the above mentioned business sustainability frameworks are mainly considered as a whole, and not as a product of a number of parts. In other words, there is a lack of integration of different business components and sustainability actions, or a lack of integration of sustainability actions and micro-level actions for the business (Dyllick & Muff 2015). It is evident how this focus on the external environment contributes to a 'black box' (Jackson 2008). A perspective on business sustainability and the decoupling of the business environment, together with sustainability actions, are required to address the aim of business sustainability.

As indicated in the introduction, one contribution of the 'black box' perspective to challenges in business sustainability may be attributed to the fact that measures of the three elements of sustainability and potential in terms of the three elements of sustainability are not necessarily similar across different (internal) business components. Thus, the sustainability targets for individual business components differ in terms of the various sustainability elements (Dyllick & Muff 2015). Recognising this will contribute to sustainability initiatives that are more focussed and defined at a greater level of detail and are therefore more likely to be effective in achieving their full potential.

Another challenge in realising business sustainability, given the 'black box' perspective of business sustainability frameworks, could be that businesses adapt their business processes to a recommended framework that considers sustainability only at an aggregate level, or does not consider all the elements of sustainability. This would result in the business not addressing sustainability across all levels of an organisation or across the various business components and/or business functions (Dyllick & Muff 2015); or in businesses operating in a sustainable manner to a limited extent only, rather than aiming to achieve holistic sustainability (Rautenbach et al. 2017).

[ii] Internal business environment refers to internal resources and factors that affect the running of the business and fall within the control of the business (Aastha, Harsimran, Harleen, Dhanvir, Banjul and Gaurav Sharma, 2011).

Sustainable development objectives should align with the existing strategies of the business and should complement each other. However, from the 'black box' perspective, the frameworks define objectives that seek to achieve the sustainability of the business as a whole, but these are not translated into sub-objectives that would guide the various business components and/or functions to address sustainability. In line with the arguments set out in this section, it is argued that this increased level of granularity is essential to enable businesses to achieve their full potential in terms of sustainability.

If business sustainability, and thus business sustainability frameworks, were to consider the individual components that make up the system, as well as the relationships between the respective components, it would be possible to address the shortcomings associated with sustainability frameworks. The SE approach allows for deconstructing a problem into a subset of functional parts and subsequently for developing a solution for each part in every subset. Eventually, the set of solutions developed are evaluated from a collective perspective, as the set of solutions should ultimately address the original problem at an aggregate level.

SYSTEMS ENGINEERING APPROACH

SE is defined as "an approach to translate operational needs and requirements into operationally suitable blocks of systems" (Blanchard & Fabrycky 1998). The SE approach thus provides a mechanism to address the critique levelled at the 'black box' argument of sustainability frameworks by unpacking the business into subsets and understanding how each of these subsets contribute to and interact within the business environment system.

Figure 1 illustrates the SE approach as a system problem that is complex as a whole (Quadrant I), but can be broken down into smaller sub-problems (Quadrant II). In the second quadrant, the definition of the individual sub-problems facilitates a greater understanding of the problem as a whole, as the sub-problems are viewed as single components that can be analysed more easily. Sub-solutions can be found for the sub-problems (Quadrant III) and, finally, these sub-solutions can be pieced together to find an ultimate solution for the whole (Quadrant IV) (Snyman, Kennon, Schutte & Von Leipzig 2014).

Built-in feedback systems contribute to problem solving and ensure that a desired objective is achieved using the SE approach. In the real world, this feedback system is enclosed between each of the quadrants, aiming to solve the problem (Snyman et al. 2014).

The motive is to unpack the business environment in different subsets and emphasise that sustainability performance and targets differ for the various subsets. Thus, the comparison of sustainability to the different subsets is required for a more comprehensive understanding of sustainable business development.

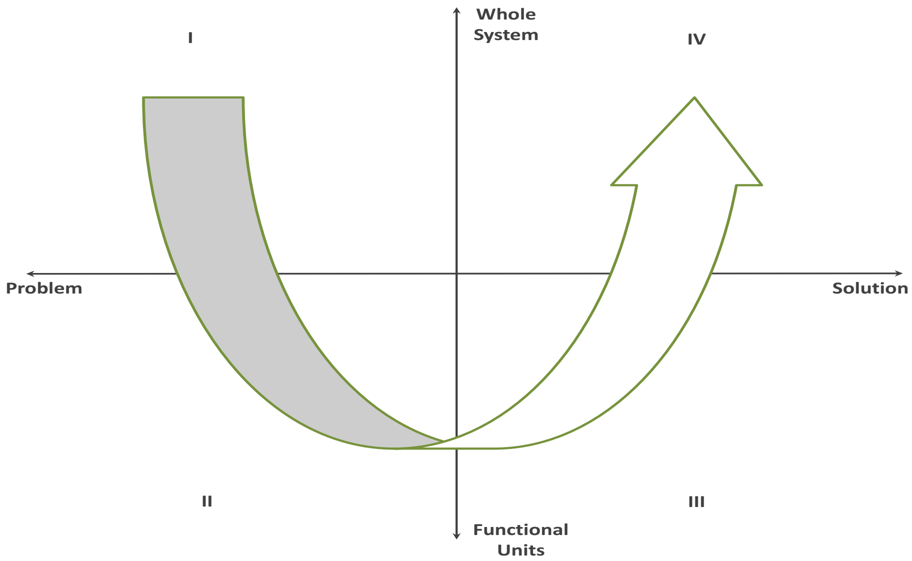

Figure 1: Flow of real-world problem solving (adapted from Porter (1991))

BUSINESS ENVIRONMENT

The environment in which a business operates should be fully understood to ensure the business is operating successfully at any given time. As the environment changes, the successes and failures of businesses are influenced by the challenges experienced, for instance rising customer expectations, increasing competition and expanding markets (Flamholtz & Aksehirli 2000).

Business development, organisational growth, strategic planning, performance management, organisational structure, management and leadership development, and culture management are all components that need to be considered when analysing the business environment. Every component is discussed in detail below, followed by a brief discussion of the business value chain system. The respective components are subsequently analysed in relation to the value chain system, and the discussion concludes with findings on the business sustainability argument.

Business components

There is an ever-increasing need to understand the business environment and organisational growth, and to discover the motive behind successes and failures over the long term (Aastha, Harsimran, Harleen, Dhanvir, Banjul & Gaurav Sharma, 2011). Thus, a business environment and the elements that constitute a business – in addition to processes, procedures, and activities – are all the external factors, forces and institutions affecting the functionality of the business enterprise (Flamholtz & Randle 2007a). Understanding this environment requires a clear picture of the various components that make up a business structure. The following paragraphs thus focus on the various business components that are discussed in the literature.

Business development

A business structure consists of six factors that are built on a business foundation, including business strategy, strategic mission and vision, and the values and principles covered under the business concept. Business strategy entails the central theme for planning how the business aims to compete in terms of achieving its strategic mission. The strategic mission defines what the business wants to achieve over a certain period, while the business concept defines the business function and goal. According to Flamholtz and Randle (2007a), the six factors that are the key drivers of organisational success, based on the business foundation, are as follows:

i. Markets: When developing an organisation, the initial step is to identify and define the market and niches the business will address. A market is defined as the potential buyers of the products or services that a business intends to sell (Flamholtz & Randle 2007a). The market niche is a place in the market where specific customer needs and competitor challenges are addressed (Miller 2010).

ii. Products and services: This factor entails the process of analysing potential customer needs to ensure the developed product or services satisfy these needs. However, the ability to design a product or service and at the same time produce that product or service for the chosen market is equally important (Flamholtz & Randle 2007a).

iii. Resource management: Resources need to be developed for current and foreseen future operations. These resources are required to effectively develop the product or services for the identified market (Flamholtz & Randle 2007a). Among these resources are human resources, financial resources, and technological and physical resources that contribute to the design of new innovations (Miller 2010).

iv. Operational systems: Operational systems are required for developing mandatory functions for day-to-day operations. Well-known operations include accounting, billing, collections and sales (Flamholtz & Randle 2007a).

v. Management systems: Management systems are made up of all the functions required to operate a business over the long term. These systems include strategic planning, organisational structures, management development, and performance management. Strategic planning involves all the decisions behind long-term strategies and business development. The organisational structure comprises the business-related activities among the employees, reporting lines and how these are organised. Management development involves planning to ensure that employees are available to operate the organisation and sustain growth. Performance management comprises the processes and methods used to motivate employees and to ensure that organisational goals are achieved (Flamholtz & Randle 2007a).

vi. Corporate culture: Corporate culture includes the development of business values, beliefs, and norms that influence the behaviour of the employees. Values are the beliefs or ideals adopted by the business and ideally shared throughout the organisation in order to enhance the business environment as it relates to its customers, co-workers and product quality (Flamholtz & Randle 2007a). Beliefs are the expectations that employees develop about the business and their co-workers. Norms are the actions and behaviour of the employees in their day-to-day operations that will prompt high levels of customer services (Guiso, Sapienza and Zingales 2013).

The following six factors presented by the Pyramid of Organisational Development, as shown in Figure 2, can be used as a tool to improve an organisation's strengths and opportunities that are identified systematically over time. Moreover, it can be applied to assess the level of strategic organisational development and increase the probability of sustainable success. With the focus on these six factors and improvements, maximised organisational effectiveness and efficiency will rise (Flamholtz & Randle 2007e).

Figure 2: Pyramid of Organisational Development (adapted from Flamholtz & Randle (2007d))

Organisational growth

Identifying stages of growth can be a worthy goal for businesses to set and aim to achieve. Organisational growth is a measurement of entrepreneurial success and deemed an important factor for economic development (Brush, Ceru and Blackburn 2009). The different growth stages of an organisation are defined and examined across the different levels of the Pyramid of Organisational Development to ensure sustained growth, from the inception of a new enterprise up to the time it has reached maturity (Flamholtz & Randle 2007e).

Figure 3 indicates the seven stages of growth of a business life, namely new venture, expansion, professionalism, consolidation, diversification, integration, and, lastly, decline and revitalisation. The first four stages illustrated in Figure 3 comprise the process from inception of a new enterprise to the realisation of the mature business. Once the business has reached maturity, the actions relating to long-term sustainability should be considered; these are indicted in the last three stages of Figure 3 (Flamholtz & Randle 2007e). It is evident that management, finance and marketing have emerged as core concepts and thus have a larger probability to have an impact on the organisational growth of a business (Brush et al. 2009).

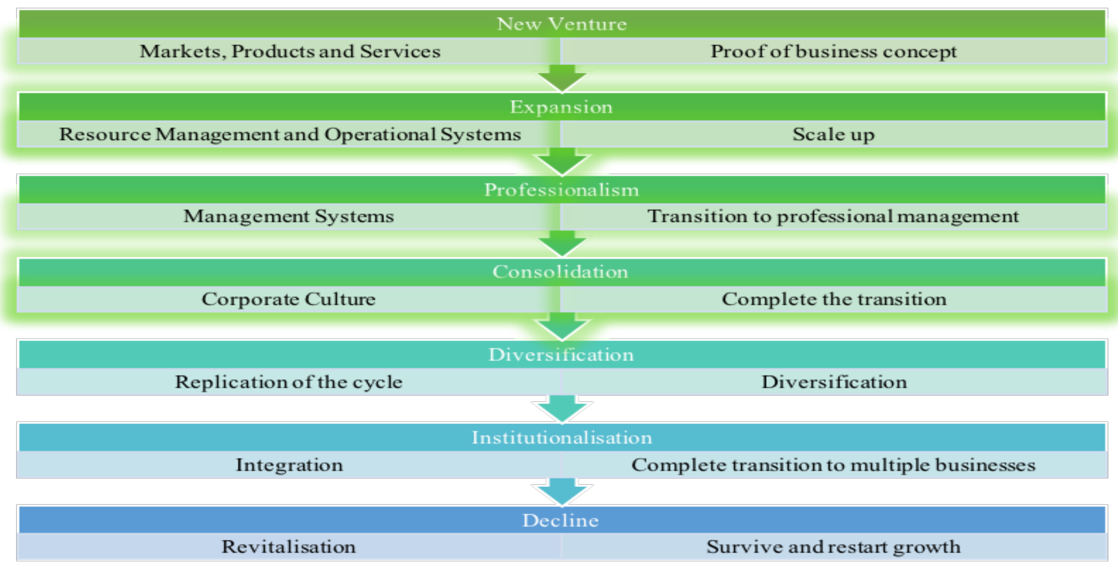

Figure 3: Stages of organisational growth (reproduced from Flamholtz & Randle(2007e))

i. New venture: This initial stage of organisational growth involves the establishment of a new enterprise. The business should follow soon with the first two tasks of organisational development, namely defining markets and developing products and services. These tasks are of critical importance, because without customers and products or services to provide to customers, no business can exist. The goal at this stage is to establish authentication of the business concept (Flamholtz & Randle 2007e).

ii. Expansion: Once the business has completed the tasks required for stage one, it is ready for stage two. Usually, new development problems and challenges arise at this stage when the business concept needs to proceed to the development phase. The required resources to execute the operational systems should be in place to facilitate the organisational growth needed. This stage marks the development of the new venture into a professionally managed business (Flamholtz & Randle 2007e).

iii. Professionalism: During the expansion stage, managers begin to notice the realisation of qualitative change in the business. This means the business has transitioned from a new venture to a professionally managed business. This change requires management systems throughout the business to continually support the future growth of the business. It is of critical importance to ensure that systems are clearly defined and roles are properly identified to prevent confusion and eliminate disorder (Flamholtz & Randle 2007e).

iv. Consolidation: This stage involves the processes to ensure a stronger business and willingness to act competitively in the business environment. Corporate culture must be established in a formal matter throughout the business to ensure that business functions operate cohesively (Flamholtz & Randle 2007f).

Strategic planning

Strategic planning plays an important role in the business environment in terms of planning activities for objectives and goals, performance indicators, developing targets, and allocation of resources (Spee & Jarzabkowski 2011). Strategic planning is regarded as a communication process and requires specific activities not only to focus on market and product or service growth, but also to develop the infrastructure required in order to improve sustainable success (Spee & Jarzabkowski 2011). Six steps have been established as being mandatory in any strategic planning process. These six steps, indicated in Figure 5, are known as environmental scan, organisational assessment, strategic issues, strategic business plan, the budget, and, lastly, quarterly management review (Flamholtz & Randle 2007g) and they are discussed below:

i. Environmental scan: The environmental scan process includes information about the market the business proposed to address, the competitive environment, and the trends that will influence the business in the future (Flamholtz & Randle 2007g).
    i. *Market analysis:* The market analysis process includes all the processes of collecting and analysing the current and potential market of the business. A clear and concise identification of the threats and opportunities that exist within this market should be part of the analysing process.

ii. *Competitive environment:* During this process, the current and potential competitors should be identified. The business should be objective when identifying these strengths and limitations. Additionally, the business should review how their customers distinguish their competitors.

iii. *Trend analysis:* This analysis includes the process of analysing the economic, political, social, culture, and legal environment and its influence on the business future.

ii. Organisational assessment: The organisational assessment includes identifying the strengths and limitations of the business at each level of the Pyramid of Organisational Development. The outcome of the environmental scan and organisational assessment may be expressed as strategic issues to be addressed by the business, as indicated in the next step (Flamholtz & Randle 2007g).

iii. Strategic issues: This step includes identifying and resolving the key strategic issues experienced by the business. Some of the important issues to address are the following:

i. *What business are we in?*
The platform and scope of the business are addressed through this strategic issue and involve some of the most important and critical decisions that a business will have to make.

ii. *What are our competitive strengths and limitations?*
The competitive analysis and organisational assessment support the information to be considered when addressing this question. The outcome will indicate which areas are of crucial importance and require attention in order to develop a suitable business strategy.

iii. *Do we have or can we develop a true market niche?*

A market niche may also be defined as a portion of a market, or a market segment, which affords the business a sustainable competitive advantage in the market. In general, a business model endorsed by an organisation can be seen as a source of sustainable advantage, indicating why the business is in business. There are two strategic reasons for this, first from an 'offensive' standpoint, e.g. the price of products is greater than that of the competitors. Secondly, from a 'defensive' standpoint, e.g. during an economic crisis period the market niche holders endure less pressure than their competitors (Flamholtz & Randle 2007g). It is evident that an understanding of market requirements is particularly important.

iv. *What do we want to become in the long term?*
When addressing this key issue, the business needs to identify their organisational goals and strategic mission for the long term, which is generally three to five years.

v. *What is our strategy for competing effectively in our chosen markets and for achieving our long-term mission?*
This key issue has to do with the way the business will compete in order to achieve the desired results once the other key issues (as indicated above) have been addressed. Figure 4 indicates three levels of strategy that will drive the behaviour of employees toward targeted results in the identified market. The first level represents the core strategy and describes how the business will compete. An environmental scan and organisational assessment are required to develop the core strategy. The second level is known as supporting strategies. These strategies describe the actions the business needs to execute

at each level of the Pyramid of Organisational Development, which then support the core strategy. The last level, namely operational strategies, illustrates how the business implements the core strategy (Flamholtz & Randle 2007g).

Figure 4: Three levels of strategy diagram (adapted from Flamholtz & Randle (2007g))

vi. *What are the critical factors that will make us successful or unsuccessful in achieving this long-term mission?*
The moment the business has identified their strategy, the focus point needs to be identified that will yield a maximum outcome over the long term (Flamholtz & Randle 2007g).

vii. *What goals shall we set to improve our competitive effectiveness and organisational capabilities in each of these critical success areas?*
The organisational goals form part of the strategic plan of the business and by achieving these goals, the business will have continued success in the future.

iv. Strategic business plan: By now, the required information should have been set out and gathered to prepare and develop the strategic business plan. A strategic business plan is defined as a "written statement of the future direction of a business based on the environmental scan and the organisational assessment" (Flamholtz & Randle 2007g). A constructive business plan consists of eight components. These components are:

  i. The situational analysis that provides a brief overview of the opportunities and threats identified in the current environment of the business, including the internal strengths and limitations (Flamholtz & Randle 2007g).
  ii. The business definition provides a statement declaring the field in which the organisation tends to operate.
  iii. The strategic mission is a statement declaring what the business aims to achieve over a specific period.
  iv. The strategy describes how the business will compete and includes core, supporting and operational strategies in a proposed plan.
  v. The key result areas are the performance areas that support the process to achieve the mission of the business.
  vi. Goals are the specific objectives the business aims to achieve.
  vii. Action plans describe the actions to be performed to achieve the desired goals.

v. Budgeting: The budget illustrates how financial resources are allocated to each section of the business plan. The budget also provides a good indication of how the business should adjust its business plan in certain sections when unplanned events occur (Flamholtz & Randle 2007g).
vi. Management review: The management review, which should be executed quarterly, provides feedback on the progress towards the organisational goals, discusses work-related issues that may influence business performance, mentions successes and failures, and indicates how these failures can be turned into successes (Flamholtz & Randle 2007g).

Strategic planning can be used as a tool for organisational management and as a driving force for the transition to professional management. The strategic planning process provides a concise business plan according to which business processes can operate at a sustainable level (Spee & Jarzabkowski 2011).

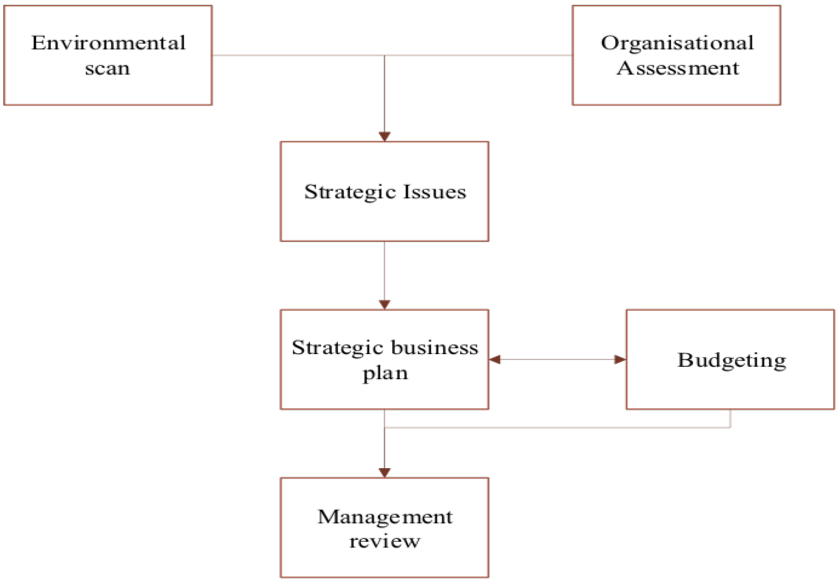

Figure 5: Strategic planning process (adapted from Flamholtz & Randle (2007f))

Performance management

Performance management, also known as the organisational control system, is a mechanism designed to manage the performance of employees in the business and represents a critical aspect of business effectiveness (Gruman & Saks 2011). The aim of this system is to motivate employees to achieve the organisational goals and to influence their behaviour in a certain way. Control systems enable the business to perform their tasks, ensuring the employees' behaviour are persistent with the organisational goals (Flamholtz & Randle 2007b).

Performance management can be used as a strategic and tactical tool, aiming to achieve several and various objectives. The strategic goals support top management to achieve strategic business objectives. The organisational goals should be linked with individual goals and enable the performance management system to continually improve the process of achieving organisational goals (Gruman & Saks 2011). Tactical goals are designed to provide important information regarding employee decisions, including promotions, salary adjustments, retention and termination, and to identify poor performance (Gruman & Saks 2011).

Flamholtz and Randle (2007h) developed a model that illustrates the connection between seven components that must be managed, linked and effectively designed. The Performance Process Management model is shown in Figure 6 and each component is subsequently discussed.

i. Key result areas: As mentioned earlier, key result areas are known as the success factors that form the basis of the business mission. Therefore, key result areas need to be defined at all levels of the business (corporate, strategic, department and individual).
ii. Objectives: These are objective statements to be achieved in each key result area. Objectives support the organisation and employees to achieve the required results.
iii. Goals: Goals are used to determine the desired performance levels and serve as a benchmark for measuring performance. Goals are set to facilitate control before, during and after performance.
iv. Measurement: Measurement represents the characteristics of an object in numerical terms. Measurement serves two purposes, first to provide information that can be used when evaluating performance, and secondly to measure financial and managerial performance.
v. Progress review: Information about cost reports, financial statements and performance reports serves as crucial feedback on the operations and management of the business. A scorecard is a typical output of assessed performance, and scorecards can be used at any business level.
vi. Performance evaluation: Performance evaluation is a systematic process that allows businesses, departments and individuals to monitor how effective the process of achieving goals has been over a specific period. Evaluation includes positive feedback and criticism that employees can use to understand what is required to improve performance or keep performance at an improved level.
vii. Rewards: Rewards are given when the desired outcome of the various performances has been achieved. It is important to reinforce valuable performances and to encourage in order to improve poor performance.

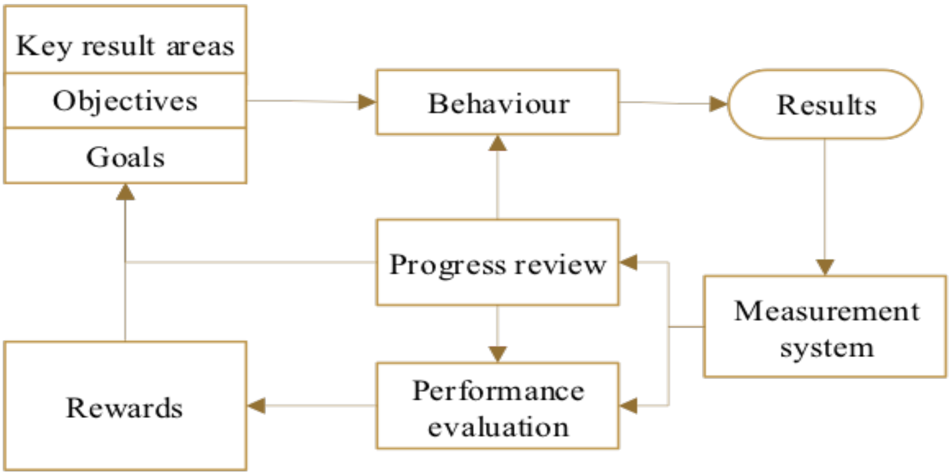

Figure 6: Performance Process Management (adapted from Flamholtz & Randle (2007g))

The operational system is affected by all the components of the Performance Process Management system model. The required action to increase the probability of achieving the desired outcomes is to establish key result areas, objectives and goals. By adding measurements and feedback processes, the probability will increase to a more desired result. Improved performances may be expected by adding evaluation and rewards components.

Organisational structure

An organisational structure indicates how employees are organised in a hierarchy to perform effectively while achieving the goals and objectives of the strategic business plan. The aim of an organisational structure is to define roles that are set out in a specific pattern according to relationships with a view to achieving certain goals (Flamholtz & Randle 2007h). These roles include responsibilities within individual tasks, departmental activities, descriptions of what can be expected by co-workers.

The four most important aspects of organisational structures are centralisation, formalisation, complexity and integration. Centralisation describes the way decisions and evaluation activities are executed. Formalisation measures to what extent an organisation implements rules and procedures to regulate behaviour. Complexity describes to what extent the various functions are identified in terms of goals and task orientation. Lastly, integration describes the activities of individuals in the business and how these are coordinated through an appropriate coordination systems (Liao, Chuang and To 2011).

A set of eight criteria mentioned and discussed below, may be used to assess the effectiveness of the current organisational structure or to design the future organisational structure.

i. Structure alignment: The extent to which the structure supports the achievement of the organisational goals. The business should develop an understanding of its mission and objectives, organisational structure (in terms of macro- and microstructure), and supporting systems, which should be evaluated to ensure that goals are achieved.
ii. Functional contribution: The extent to which a function in the organisational structure has a clearly defined role that adds value to the defined structure.
iii. Clarity and contribution of individual roles: Each individual role has a clearly defined function and contributes to the effectiveness and efficiency of the organisational goals.
iv. Clarity and structure of reporting relationships: Reporting relationships and decision-making should be clearly structured and identified to support the underlying rationale in order to facilitate the process of achieving organisational goals.
v. Appropriate span of control and number of organisational levels: The number of employees who reports to a manager and how this effectively supports the process of achieving the organisational goals.
vi. Appropriate management/leadership and technical skills: The skills and leadership characteristics each individual has to fulfil his/her role and responsibilities. Regular assessments are required as employees' performance improves and roles change.
vii. Effective coordination: The way current employees coordinate functions between business units throughout the organisational structure.
viii. Appropriate supporting systems: The way in which operational, management and culture systems support the functioning of the organisational structure.

It is of crucial importance that management considers the type of systems, structures and processes required to ensure the organisational structure is executed effectively and efficiently (Flamholtz & Randle 2007h). The above set of eight criteria enables any business to identify the strengths and weaknesses throughout the structure and allows the business to address any findings accordingly.

Management and leadership development

Management development supports employees in developing their competencies to manage their day-to-day tasks in the business. Leadership development focuses on supporting employees in developing their competencies required to manage their business, departments and team strategically. To ensure maximum effectiveness, a management development programme should focus on skills development as well as support to employees to understand their roles as team members, managers and leaders (Flamholtz & Randle 2007i).

The functions of management development are to support the process of defining or redefining corporate culture, promote the desired style of leadership required by the business, and lastly reward good managers. By applying these functions and the critical dimensions of management and leadership development, any employee will achieve success at a particular level of the organisational hierarchy. The critical dimensions are indicated in Figure 7 and are mentioned and discussed in greater detail below (Flamholtz & Randle 2007i).

i. Role concept: Involves the process of changing from one role to another and aiming to be successful at the new role, whilst understanding and accepting the responsibilities of the new role, and attempting to become an effective manager (Flamholtz & Randle 2007i).
ii. Management/leadership skills: "This dimension involves a sequential pattern of behaviours performed in order to achieve a desired output" (Cameron & Whetten 1984). Work-related interpersonal skills, for example motivation, communication and leadership, are required to oversee employees and manage day-to-day people management problems. Additionally, administrative skills such as planning, supervising, conducting meetings, budgeting, performance evaluation and control are required to be effective in the specific roles (Flamholtz & Randle 2007i). The Pyramid of Management and Leadership Development is a framework that consists of five levels of different skills managers require to develop their careers and be effective in their particular roles. These five levels are (Flamholtz & Randle 2007i):
    i. *Core management skills:* Managers require all the skills at this level of the pyramid, regardless of the level at which they operate. These skills refer to the ability to use tools, procedures, and techniques in a specialised field (Viitala 2006).
    ii. *Operational management skills*: Skills to manage day-to-day operations and administrate employees are required at this level. Known skills at this level are training and coaching, motivation, performance appraisal and management of meetings. In addition to the skills required at the previous level, these are the skills required by first-line supervisors to effectively execute their roles (Flamholtz & Randle 2007i; Viitala 2006).
    iii. *Organisational management skills* include planning, management development, financial management, organising employees, designing and effectively using control or performance management systems, and team building. Middle managers effectively use these skills (Flamholtz & Randle 2007i; Viitala 2006).
    iv. *Organisational development skills:* These competencies include strategic perception, decision-making and board management skills. These skills require the ability to think and operate in terms of systems and to know how to lead systems, whilst providing direction, vision and focus to the business (Viitala 2006).
    v. *Transition management skills* include understanding the need for transition and being able to manage the transition of the business and its employees. These skills are

required to understand and manage the need for change (Flamholtz & Randle 2007i; Viitala 2006).

iii. Attitudes or psychological factors: This dimension includes changes in an employee's attitude from a performance-orientated psychology to a management-orientated psychology. This dimension emphasises the way managers think in order to be more effective in their role. Managers should use the specialist skills of their employees effectively to achieve the goals of the business (Flamholtz & Randle 2007d).

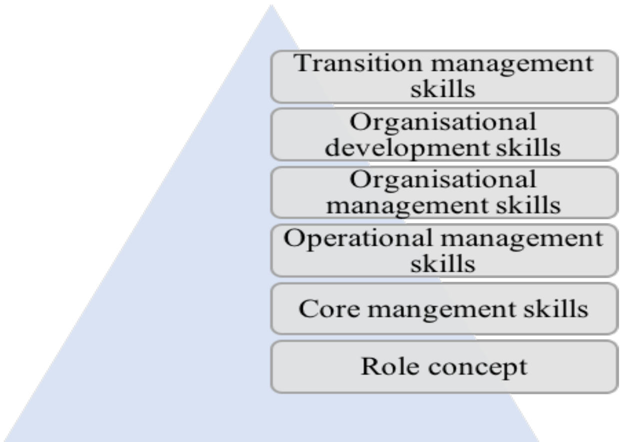

Figure 7: Levels of management skills (adapted from Flamholtz & Randle (2007c))

The process of management development involves building on the potential performance capabilities of managers. Additionally, these functions promote a particular leadership style that shapes corporate culture and rewards managers.

Culture management

The corporate culture of an organisation includes the values, beliefs and norms that influence the behaviour of the employees. Values are those actions the business considers most valuable with respect to the employees, clients and business operations and strives to perform at its best level of professionalism at all times. Beliefs are the acceptance employees have for each other, the business and clients. Norms are the way in which employees behave and interact (Flamholtz & Randle 2007d).

Additionally, corporate culture is defined by four areas that have a major impact on business success. These four areas are:

i. Customer-client orientation is the way how the business view their clients or customers. These actions involve a reflective attitude and approach to business and has an impact on how the business operates and, ultimately, on the success rate of the business (Flamholtz & Randle 2007d).

ii. Orientation towards employees is a reflection of the business's policies on the treatment and value of their employees. Job satisfaction has a bearing on employer attitudes and employer attitudes reflect in an encouraging and trusting environment (Roos & Van Eeden 2008).

iii. Standards of performance include the business's concern with the amount and quality of work that is completed, the promotion of creativity, and the customer and commercial services (Roos & Van Eeden 2008).
iv. Commitment to change involves the decision-making culture of the business that is reflected by the degree of formalisation. This is an official and productive approach that relates to satisfaction and commitment (Roos & Van Eeden 2008).

Corporate culture is part of any business and has an impact on business success. Managers should therefore learn to manage corporate culture and make the required changes as the business grows. It is important to know the nature and the meaning behind corporate culture and how it reflects in the business environment (Porter & Kramer 2011).

DISCUSSION

Bearing in mind the concept of SE, the contextual business environment and the ultimate aim of enabling business sustainability, the following discussion is geared towards the proposed conceptualisation of an SE approach to business sustainability. A value chain perspective is used to facilitate this.

A business value chain is described as the process of changing business inputs into outputs in such a manner that it creates value for the organisation as well as for society (Porter & Kramer 2011). The value chain perspective is linked to the principle of shared value and allows a business to revive the business success with social progress by re-evaluating the business environment aspects, aiming to realise economic and social benefits (Porter & Kramer 2011). Shared value opportunities can be created by a business in the three key ways, namely: (i) by reviewing products and markets; (ii) redefining productivity in the value chain; and (iii) enabling the local cluster development (Porter & Kramer 2011). It is argued that the value of following a shared value approach to decision-making and identification of opportunities to businesses is that a greater possibility exists that the business will uncover new approaches that will benefit society, and generate greater innovation and growth (European Union Energy Initiative 2015).

The value chain perspective, as conceptualised by the European Union Energy Initiative (2015), consists of three levels that all interact, are interrelated and influence business operation (the market chain – see Figure 8). Figure 8 provides a schematic representation of the value chain perspective, including all three levels that constitute such a value chain. Level 1 (the market chain) defines the channels through which the business moves from addressing the new market idea to executing the business processes, thus ensuring the market idea or opportunity is addressed. Level 2 (inputs, services and finance) enables the business to include inputs, services and finance in the business processes to execute the production and delivery of products and/or services. The enabling environment (Level 3) consists of the factors that act as the 'rules of the game', shaping how level 1 (the market chain) and level 2 (inputs, services and finance) operations (should) operate (European Union Energy Initiative 2015).

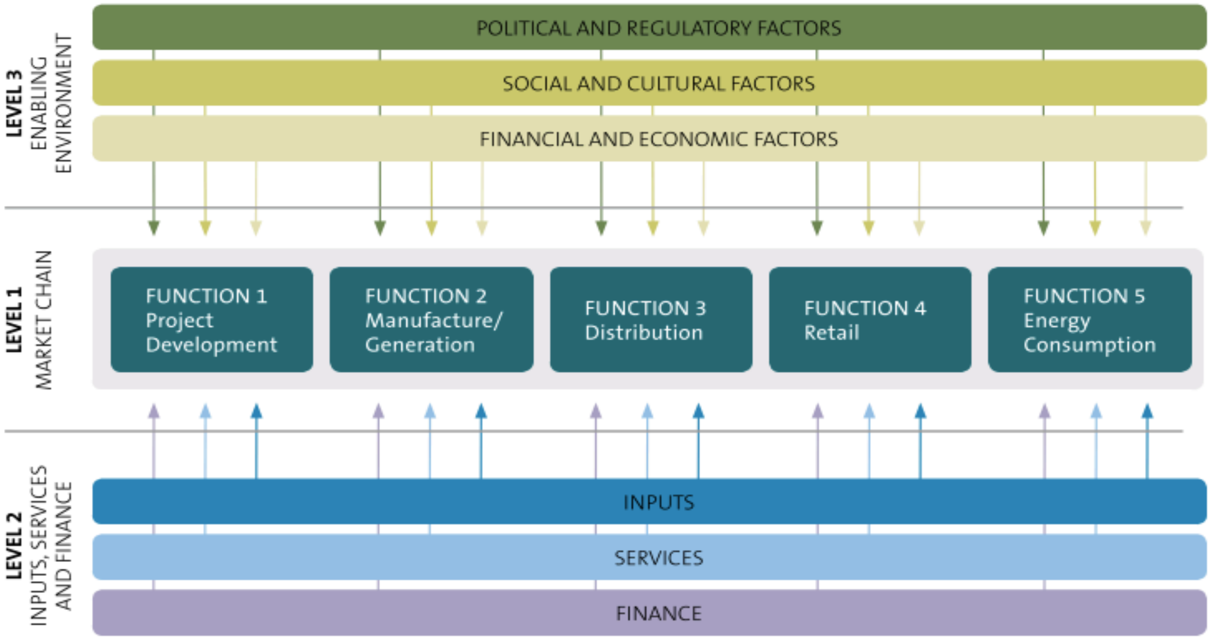

Figure 8: A summary of the business value chain including three levels (European Union Energy Initiative 2015)

Bearing in mind the analysis of the various business components, as well as the overview of the value chain perspective, the business components discussed in the preceding sections are subsequently evaluated across the three levels that form part of the value chain perspective, as discussed in the European Union Energy Initiative (2015). Table 2 indicates the categorisation of the business components given the value chain perspective.

Table 2 illustrates the relationship between the various business components of the business environment and the business value chain system. Each individual component is indicated by an 'x' showing the correlating level of the business value chain system, as well as the area of its influence. This study acknowledges that these business components are extensively interrelated and that complex interactions and relationships exist between the components, as well as between components and the various levels of the value chain perspective. However, conceptualising business sustainability from an SE perspective, requires the categorisation (and thus necessary simplification) of the above relationships between business components.

Table 2: The business components that influence the business value chain system

Business environment	Individual components	Enabling environment	Market chain	Inputs, services and finance
Business development	Markets	x		
	Products and services		x	
	Resource management		x	
	Operational systems		x	
	Management systems		x	
	Corporate culture			x
Organisational growth	New venture	x	x	
	Expansion		x	x
	Professionalism			x
	Consolidation			x

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Business environment	Individual components	Enabling environment	Market chain	Inputs, services and finance
Strategic planning	Environmental scan	x	x	
	Organisational assessment			x
	Strategic issues		x	
	Strategic business plan			x
	Budgeting			x
	Management review			X
Performance management	Key result areas		x	x
	Objectives		x	x
	Goals		x	x
	Measurement		x	x
	Progress review		x	x
	Performance evaluation		x	x
	Rewards		x	x
Organisational structure	Structure alignment		x	x
	Functional contribution		x	x
	Clarity and contribution of individual roles		x	x
	Clarity and structure of reporting relationships		x	x
	Appropriate span of control and number of organisational levels		x	x
	Appropriate management/leadership and technical skills		x	x
	Effective coordination		x	x
	Appropriate supporting systems		x	x
Manage-ment and leader-ship develop-ment	Role concept		x	x
	Management/leadership skills		x	x
	Attitudes or psychological factors		x	x
Culture Manage-ment	Customer-client orientation		x	x
	Orientation towards employees		x	x
	Standards of performance		x	x
	Commitment to change		x	x

The information contained in Table 2 thus informs the SE approach in that it assists with the deconstruction and discovery (Quadrant II) of the system problem ('black box' perspective of existing frameworks and approaches to business sustainability – Quadrant I); thus, enabling the conceptualisation of business sustainability at an increased level of granularity. Subsequently, the information contained in Table 2 (the identification of various business components) will enable a process to develop solutions (Quadrant III) for each of the identified business components in order to ultimately develop a solution (framework, approach, etc.) that will address business sustainability as a whole (Quadrant IV).

Figure 9 illustrates the process of the business environment components that transforms through the SE approach. In Quadrant I, the 'black box' perspective is seen as the problem that requires a solution to address the challenges brought about by a 'black box' perspective to business sustainability. Quadrant II discovers the SE approach to the business environment components and business sustainability frameworks. From this, multiple solutions can be developed in Quadrant III; thus, addressing sustainability for each identified business component. Lastly, Quadrant IV illustrates the action of combining all the individual solutions into a holistic solution aiming to inform, govern and enable business sustainability.

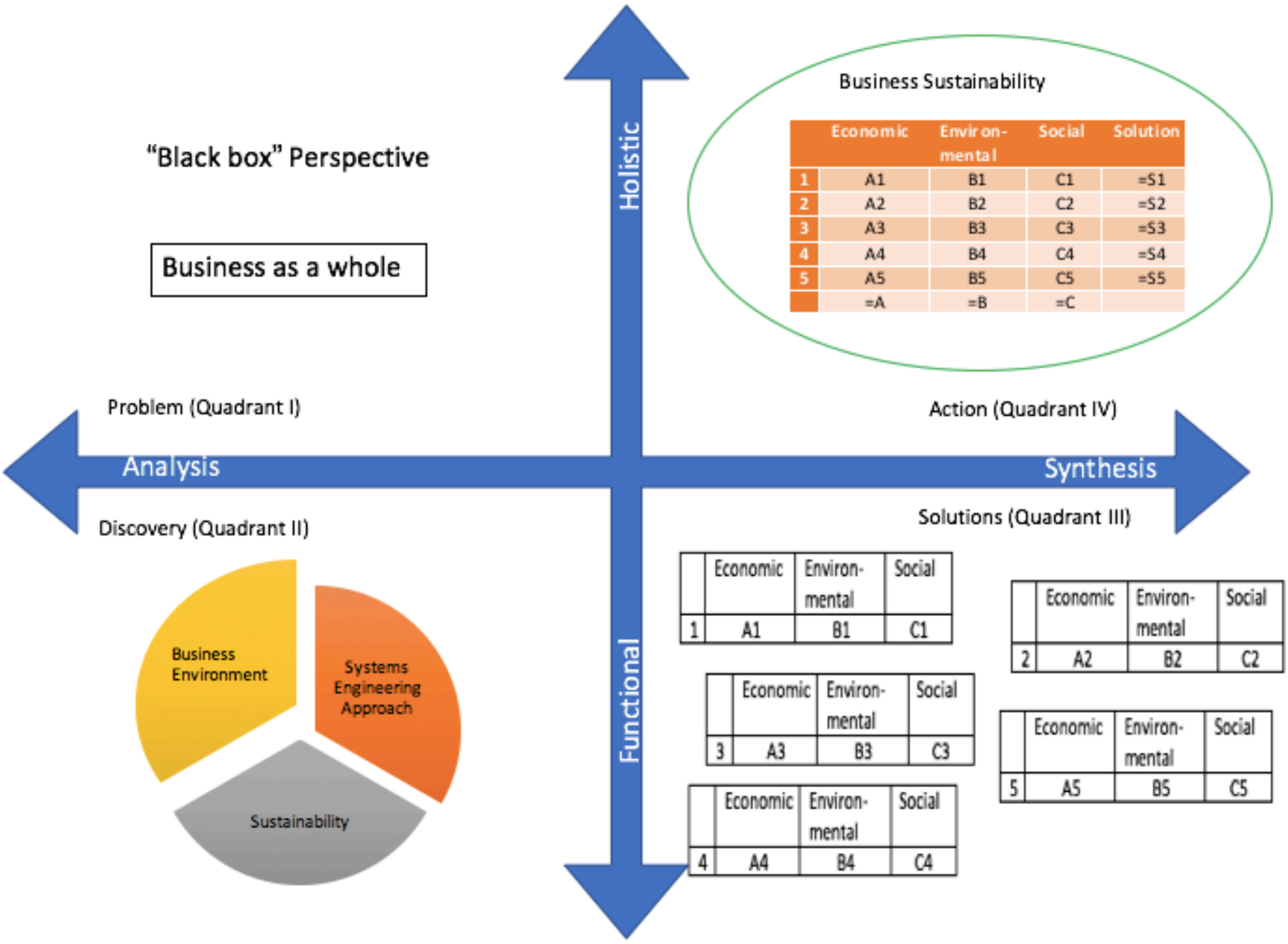

Figure 9: Proposed sustainability engineering (SE) approach to business sustainability

Table 3: Legend of Figure 8 data

	Solutions (Quadrant III)			Action (Quadrant III)
Business Components	**Economic dimension**	**Environmental dimension**	**Social dimension**	**Solution**
1: Business Development	A1: Economic sustainability (Business development)	B1: Environmental sustainability (Business development)	C1: Social sustainability (Business development)	S1: Sustainability across all dimensions for the business development component
2: Organisational Growth	A2: Economic sustainability (Organisational growth)	B2: Environmental sustainability (Organisational growth)	C2: Social sustainability (Organisational growth)	S2: Sustainability across all dimensions for the organisational growth component
3: Strategic Planning	A3: Economic sustainability (Strategic planning)	B3: Environmental sustainability (Strategic planning)	C3: Social sustainability (Strategic planning)	S3: Sustainability across all dimensions for the strategic planning component
4: Performance Management	A4: Economic sustainability (Performance management)	B4: Environmental sustainability (Performance management)	C4: Social sustainability (Performance management)	S4: Sustainability across all dimensions for the performance management component
5: Organisational Structure	A5. Economic sustainability (Organisational structure)	B5: Environmental sustainability (Organisational structure)	C5: Social sustainability (Organisational structure)	S5: Sustainability across all dimensions for the organisational structure component
	A: Composite economic sustainability measure across all business components	B: Composite environmental sustainability measure across all business components	C: Composite social sustainability measure across all business components	

CONCLUSION

This paper emphasises the detailed level of understanding and granularity of analysis required to address business sustainability using an SE approach. The 'black box' perspective is addressed by deconstructing the business 'as a whole' into various business components, and evaluating these components from a value chain perspective, ultimately to conceptualise an SE process that addresses business sustainability. This process facilitates the analysis of the business environment for the purpose of developing business sustainability measures across multiple business components and thus at an increased level of granularity. In this way, the challenges associated with the 'black box' perspective, as employed by various business sustainability frameworks and approaches, are addressed at least in part. Subsequent to the deconstruction phase, this approach in turn enables the conceptualising of business sustainability at an aggregate level by combining the various sustainability solutions at a granular level.

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