A Balanced Scorecard Framework for Measuring Sustainability Performance of Business Organizations

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Abstract

A Balanced Scorecard Framework for Measuring Sustainability Performance of Business Organizations

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Sustainability is about meeting the needs of today without compromising the needs of future generations. It involves focus on three main dimensions economic, environmental and social for achieving overall performance. Majority of the companies are adopting sustainability for business growth and boosting their corporate image for long term competitiveness, thereby receiving financial benefits as well. Sustainability is a concept that has come into picture a few years back and presently making a big mark in every field.

In the thesis, we propose a balanced scorecard framework for measuring sustainability performance of business organizations. We begin by studying, why the companies should invest in sustainability initiatives and what are the tools used for measuring sustainability. We investigate different scorecards for measuring sustainability and propose a new sustainability scorecard model to measure organization's overall sustainable performance. Our sustainability scorecard encompasses four main dimensions namely organization, process, core and learning. Each of these dimension comprises of various indicators obtained from GRI and corporate reports of 100 most sustainable companies- Forbes. The application of the sustainability scorecard is performed via multi criteria decision making technique called- Analytical Network Process (ANP). A numerical study is provided.

The strength of the proposed model is that, - it overcomes the problems faced by the traditional balanced scorecards in sustainability evaluation of organizations. It provides a strong framework, has great flexibility and allows the opportunity to study the impact of one indicator over the other through the means of sensitivity analysis to identify improvements.

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List of Acronyms

BPM - Business Process Measurement

SS- Sustainability Scorecard

BSC- Balanced Sustainability Scorecard

WBS- Work Breakdown Structure

Y- Yes

NI- No Incident

N- No

NV- No Violation

NA- Not Applicable

NDA- No Data Available

ANP- Analytical Network Process

MBO- Management by Objectives

GRI- Global Reporting Initiative

USEPA- United States Environmental Protection Agency

CSR- Corporate Social Responsibility

Chapter 1

Introduction

1.1 Background

Sustainability is about meeting the needs of today without compromising the needs of future generations. “It is about improving the standards of living by protecting human health, conserving the environment, using resources efficiently and promoting long-term competitiveness” (1). It requires the integration of environmental, economic and social priorities. According to Brundtland Commission of the United Nations (1987), “Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Majority of the companies (private, government or NGO) are moving towards sustainability. Now the question arises why the companies or bigger firms are looking forward or investing in the sustainability, the concept or term that was no-where a few years back but presently making a big mark in every field.

According to a global survey by Mckinsey and Company (2010), “More than 50 percent of executives consider sustainability- the management of environmental, social and governance issues-“very” or “extremely” important in a wide range of areas, including new product development, reputation building and overall corporate strategy”. The result shows the top reason for adopting sustainability is managing or improving corporate reputation that is directly linked with the business point of view, more positive the image of the company more investors it can attract. The other reasons to invest in sustainability can be meeting customer expectations, to have a competitive edge, leadership etc. Fig 1.1

shows the result of survey. No doubt, going green comes with a cost. Whether the goal is to switch to alternative fuels for vehicles or getting certified to be green, the cost of environmental responsibility can reduce a company's profits and slow the growth of its stock. However, the long term benefits and business advantages overpower the initial costs.

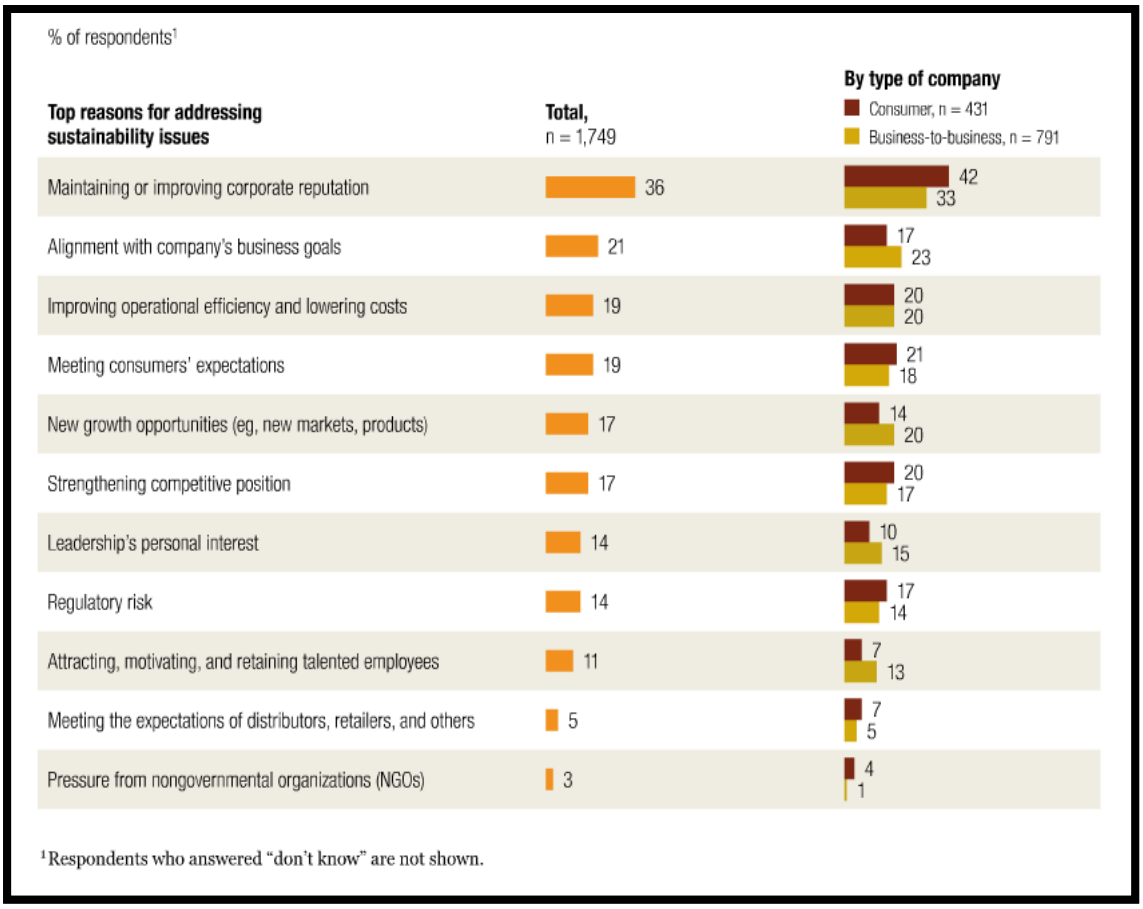


Figure 1.1 .Sustainability Survey (source: Mckinsey Global Survey 2010)

According to a business review by Harvard(2012) " In the past decade, investor demand has increased transparency and communication, creating a large and growing pool of data on corporate sustainability". Resource efficient companies- those that use energy, water sustainably and create less waste, generate more revenue. Consumer wants to know each

and every aspect of the product or service they use and how it impacts the environment and human well being that- gives rise to the sustainability.

Sustainable management practices and sustainable products or services open up a new source of revenues and new markets, therefore bringing new business models with high involvement of sustainability in the corporate strategy (Gomes et al 2015). Stakeholders and societies value companies that believe in developing sustainably. In fully realising the sustainability or the sustainable development, sustainable design has an important role to play (Küçüksayraç, 2015). Some of the drivers of the sustainable development are; customer demands, government regulations, industrial sector initiatives etc. The research study shows the most important drivers for sustainable development are boosting "brand value" and "reputation of the firm". According to a study by Massachusetts Institute of Technology (2012)"Sustainability is Profitable", survey done in collaboration with Boston Consulting Group, gathered more than 4000 responses from executives and managers across all industries and regions. The overall results show that companies are taking sustainability seriously and reaping financial benefits with the adoption of the sustainable business practices.

1.2 Problem Definition

The aim of the thesis is to develop a sustainability scorecard framework to measure the sustainability performance of business organizations. To achieve this goal, we will address the following problems in our thesis:

1. Identifying criteria for measuring sustainability performance.
2. Developing a sustainability scorecard for measuring sustainability performance.
3. Evaluating the sustainability performance of business organizations.

The first problem involves the identification of indicators that can be used for measuring the sustainability of business organizations.

The second problem involves the development of the sustainability scorecard based on indicators identified in step 1.

Thirdly, we will apply the proposed sustainability scorecard framework using multi criteria decision making technique called ANP to evaluate the sustainability performance of business organizations.

1.3 Thesis Outline

The rest of the thesis is organized as follows:

In chapter 2, we present the literature review on sustainable business performance measurement and balanced scorecards.

In chapter 3, we present our solution approach for measuring sustainable business performance of organizations.

In chapter 4, we present numerical application of the proposed approach and conduct analysis.

In chapter 5, we present conclusions and future works.

Chapter 2

Literature review

2.1 Business Performance Measurement

A business should closely measure and manage its success to ensure if the set objectives are being met timely. Using performance management systems are a great way of recording the business health and suggesting future improvements. It gives all the vital information that leads to implementation of the strategies for growth and competitiveness. Business Performance Measurement (BPM) systems have grown in use and popularity over the past few years. Firms adopt BPM systems to improve their control over the firm in a way that traditional measurement systems have not allowed. BPM's helps to choose key performance indicators to measure and suggest improvements and helps to keep main points in mind when setting business targets. Performance measurement can help turn assumptions to real facts and shows the way to healthy improvements, which further becomes the necessity to grow professionally. Fig 2.1 shows the business process improvement cycle. Business performance measurement is required to know:

1. How well our organization is progressing with respect to our missions and goals?
2. What should we measure? How to set KPI's? How important is the measurement?
3. When should the return be expected?
4. How should we report and discuss our performance internally?
5. Where should we focus to achieve sustainability in long run?
6. How can we most effectively measure and stay competitive?

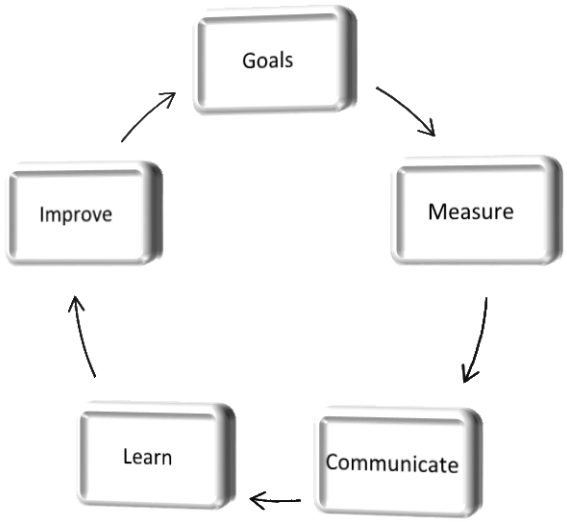


Figure 2.1: Business Process Improvement Cycle (Source: 2)

2.2 Sustainability in Performance Management

Sustainability can drive significant business benefits. However, in many organizations its value is not fully realised. Sustainability performance management can unlock this value. Sustainability, when integrated with the corporate strategy and operations can drive value through:

1. Revenue generation: new products, services and markets.
2. Cost control: resource efficiency, low energy consumption and waste minimisation.
3. Reputation building: enhancing brand value and promoting a positive culture.
4. Risk management: by complying with rules and regulations.

"Sustainability and the value it creates must be quantified and linked to the business performance if the case for sustainability is to be made and the benefits are to be realised" (Accenture sustainability performance management report, 2011). Sustainable business

performance management provides the information required to identify and create value. Sustainability adds value to the business performance which is depicted in Fig 2.2.

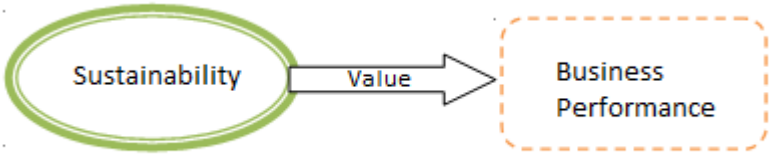


Fig 2.2: Sustainability adds value to Business Performance

2.2.1 Why sustainability is vital for business performance?

Sustainability in business was traditionally an item on the corporate social report of the companies but now this has turned to be an opportunity. Investors see the risks in companies that are depleting the natural resources through wastewater, emissions, not nurturing the talent etc. Rise in the energy prices, increasing cost of operations of business are just a few factors that have led companies to think about sustainability in business performance measurement. Sustainability is seen as a way to unlock new revenue sources, attract investors, drive out costs and increase efficiency. Creating long-term customer relationships, maintaining stakeholder's interest can be delivered by the sustainable development policy. According to the UN Global Compact-Accenture CEO (3) "We are moving towards an era in which businesses will no longer focus purely on profit and loss as the primary means of valuation but rather take into account also the positive and negative impacts on society and environment."

2.3 Tools for Sustainability Performance Measurement

Sustainability can be developed along three dimensions i.e. environment, social and economic, therefore there are different assessment tools for each dimension. We provide

here some of the tools that can be either used individually or combined with other techniques for sustainability measurement.

2.3.1 Decision Making Tools

These are the tools that are used to select a course of action among several possible alternatives. Several tools have been developed in last few decades to measure sustainability in the business organizations. Some of the tools that are actively used by the business organizations are:

1. ISO 14001: ISO 14001 first published in 1996 was developed to provide an environmental management system to help organizations reduce their environmental impact. ISO standards are developed through consensus- based approach. Each member country of ISO develops its position and negotiates with the other member countries. Within a country different organizations (government or private) or non-governmental organizations take part in the process of development of draft e.g. "EPA and the States participated in the development of the ISO 14001 standard" (USEPA). The drivers of adopting ISO are improving environmental performance, matching competitor's action (Prajogo et al, 2012). The factors that affects the implementation of ISO are-not enough emphasis on substandard processes by ISO standards as ISO certifications do not indicate how to improve efficiency. ISO 14001 has "a focus on documentation and formalization in itself, forcing some managers to view ISO as nothing more than another documentation-driven process for bureaucrats to approve." (Curkovic et al, 2005).

2. Life Cycle Assessment: LCA methods are used for addressing social, economic as well as environmental problems. (Clune & Lockrey, 2014) introduces a process to develop environmental strategies by using LCA and design thinking. "LCA is the compilation and

evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle" (ISO 14040:2006). Sustainability as earlier discussed is divided in to three, so different types of LCA's are required: E-LCA stands for environmental LCA and SLCA stands for social LCA (Hoogmartens et al, 2014). ELCA is used to determine environmental impacts such as emissions, wastes etc. while S-LCA is used to assess the social and socio- economic impacts throughout the life cycle (Ramirez & Petti, 2011). Life cycle Costing (LCC) analysis can be used to determine the economic impacts. LCA methods have been developed to address social, environmental and economic issues but they fail to integrate to narrow down to one assessment (Adinyria et al, 2007). Data collection is very crucial and important for life cycle analysis to yield accurate results. Different variants of LCA are cradle- to- grave, cradle-to-gate, gate-to-gate, economic input- output life cycle assessment, ecologically based LCA. There are four steps involved in the LCA technique namely goal and scope definition, inventory analysis, impact assessment and interpretation of the results which are shown in Fig 2.3.

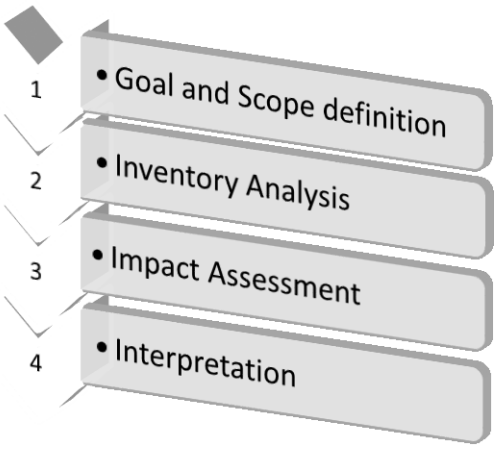


Fig 2.3: Steps in LCA

In a manufacturing company, a life cycle analysis would involve taking measurements e.g. raw materials used during manufacturing, GHG emissions during usage and disposal of the product. It helps manufactures to get a detailed data on how much waste is generated at each stage of the product‘s life cycle. After the detailed collection of the data, the second stage is to interpret the data and make the judgements. After the analysis, we can study about the product e.g. how much emissions the product is generating and what should be the amount, so as not to harm the environment and human health. LCA’s can be conducted by any company who wants to identify the areas of improvement. Many organizations claim their product is eco-friendly with the support of LCA. Companies like Outotec have done LCA analysis to study the environmental impact of the construction material. The main weakness of the LCA is that it requires a lot of time and very complex data gathering.

3. Multi Criteria Decision Making Tools: (Milutinović et al, 2014) talks about the importance of the multi criteria tools when a lot of criteria are involved in the assessment of sustainability. In their research study AHP is used as the sustainability assessment tool for waste management. AHP stands for Analytical Hierarchy Process, its hierarchical structure allows users to easily understand the problems in terms of criteria and sub criteria’s. MCDA tools make it possible for the user to consider large number of data, objectives and other information that is required to tackle with real world complex problems (Egilmez et al, 2015). Their study discusses the fuzzy MCDA approach. MCDA provides a transparent method of sustainability assessment (Rosén et al., 2015). MCDA allows to take in-to consideration wide range of assessment data like environmental impact, distribution equity (Medineckiene et al, 2015). ANP is an alternative to other multi

criteria approaches as it allows users to incorporate interdependencies among nodes and clusters (Lin et al, 2015).

4. Indicators for Sustainability Assessment: The research study by (Moreno & Fidélis, 2015) explores the importance of setting up of indicators for sustainability assessment. They describe the sustainability indicators on environment, social and economic issues and explain the major driving forces of those indicators. Corporate sustainability indicators integrate three spheres of sustainability and highlight the contribution to the sustainable development (Lodhia & Hess, 2014). The study uses the integrated indicators like water consumed per revenue dollar earned. "Sustainability indicators are considered very vital in developing the awareness for urban sustainability" (Michael et al, 2014). The development of indicators has become a very important task to examine the sustainability of private as well as governmental corporations, advocacy groups. The environmental dimension deals with the ecosystem and protecting it, the economic dimension deals with the growth and development of the economy and the social dimension deals with the wellbeing of humans, human rights, corruption, fair practices etc. Another study (Mohamed et al, 2014) reveals the importance of indicators for sustainability assessment.

5. Sustainable Value Stream Mapping: It is built upon the traditional value stream mapping which is based on reducing non-value added activities and focusses on lean manufacturing. Lean manufacturing techniques are increasingly obtaining importance for their ability to develop better strategies for green and sustainable manufacturing (Faulkner & Badurdeen, 2014). Sustainable value stream mapping promotes sustainability by analyzing greenhouse emissions while product manufacturing, though a very effective technique, it lacks to directly incorporate social factors. The papers talks about combining

additional metrics for the social improvements. The research study by (Brown et al, 2014) explores how sustainable value stream mapping can be used in the different industries with the help of case studies (satellite dish manufacturing, dispenser cathode assembly production). Another mapping technique called waste flow mapping (WFM) has been discussed by (Kurdve et al, 2014) reduce the wastes. WFM combines value stream mapping with cleaner production and material flow cost accounting strategies.

2.3.2 Environmental and Sustainability Reporting

1. GRI: Global Reporting Initiative (GRI) is a leading organization in the sustainability field. "GRI promotes the use of sustainability reporting as a way for organizations to become more sustainable and contribute to sustainable development". It is a non-profit collaborative effort to develop standards of sustainability reporting. It is also known as ecological footprint reporting, triple bottom line (TBL) reporting and corporate social responsibility (CSR) reporting. More than 4,000 organizations from 60 countries use the guidelines to produce their sustainability reports. More and more companies are publishing their reports based on the GRI indicators (Chen et al, 2014). GRI develops indicators for sustainable reporting broadly under three categories namely environment, social and economic. "GRI works with a global multi-stakeholder network that includes experts who participate in a working groups and governance bodies, reporters and report users". G4 is the latest set of guidelines developed by GRI and is used by many companies.

2. Global Environment Management Initiative (GEMI): GEMI is an organization of leading companies dedicated to promote global environmental, health and safety (EHS) and sustainability excellence through sharing of tools and information to help business

achieve environmental sustainability excellence. GEMI shares tools and practices and provides leadership in the sustainable development.

2.4 Justification of the tools used (ANP and GRI)

In the thesis, we have used ANP approach for applying the sustainability scorecard developed using indicators due to its ability to analyze inter-relationships between criteria (can be both quantitative and/or qualitative in nature). From the study of 100 most sustainable companies, we have found that majority of the business organizations are using GRI indicators to report their performance. The GRI indicators are widely divided into number of categories and subcategories, which we will see later in this report. A company in the healthcare sector has different expectations than a company in the consumer staples sector so they may be relying on different set of combined indicators (ENV, SOC and ECO). A lot of research has been done on measuring sustainability of business organizations using different approaches based on LCA, multi criteria analysis etc.(Milutinović et al., 2014). Each model has different approaches, benefits and limitations. Their paper uses AHP for sustainability assessment and selection of indicators. AHP is a structured technique for analyzing complex decisions and it is often employed as partially quantitative technique. In another paper (Ahi & Searcy, 2014) a triple bottom line approach for accessing sustainability has been discussed as organizations are increasingly incorporating sustainability in their day to day operations. The paper talks about the need of taking into account the selection measures and the need of balancing the environmental, social and the economic aspect for sustainability measurement. The paper deals specifically with the supply chain and the difficulty to obtain the required data. More quantifiable methods should be designed for the data

collection in context to the supply chains. Majority of research done has focussed on data collection, indicator development but from a single perspective and efforts should be made for whole supply chain. A paper by (Rosén et al., 2015) focuses on the use of multi criteria decision analysis to assess sustainability. The MCA approach can integrate different types of quantitative information into a solution, therefore has been suggested for sustainability assessment (Brinkhoff, 2011; Rosén et al., 2015).

2.5 Challenges in Sustainability Measurement

1. GRI reporting system is currently most widely used for sustainability reporting. A single reporting system can't be sufficient to satisfy the needs of large industrial sector, so a gap will always exist between the current reporting system and the dynamic needs of various industrial sectors (Brown et al., 2009).
2. The business organizations face challenges in establishing a connection between the indicators e.g. studying the impact of a product or service on the community.
3. Integration of sustainability with the strategy and aligning its principles with the core value of the organization can be a challenge for business organizations. There are very few companies in the world that are responding to sustainability problems in an efficient manner (Wilenius, 2005).
4. The traditional data collection methods do not provide flexibility and the details that is needed now. The business organizations require more robust data collection methods to prepare reports in a timely and more cost effective method.

2.6 KPI's for Sustainability Measurement

In this section, we will discuss how to set key performance indicators specific to each industry. Although Global Reporting Initiative has provided a set of universally applicable factors but it lacks to elaborate the fact on, how to determine the industry specific indicators for sustainability reporting. Some countries have already made it mandatory to report sustainability performance. The key performance indicators that should be used by a business organization should focus on the needs of the prospective stakeholders and the sustainability data. Industry specific KPI's can help collect the relevant information that needs to be reported and also help identify the sustainability impacts.

2.6.1 How to set KPI's

To develop a set of KPI's for the specific industry we will start by knowing the sustainability risks that could be applied to the industries in all the sectors. The second step is to identify our own industry and shortlist the potential sustainability issues that are very important to address the sustainability followed by ranking of the sustainability issues. Understanding the stakeholders of the business and the fact should be thoroughly understood on how the potential sustainability risks can have an adverse effect on the stakeholders. The top level goals should have a clear link with the KPI's and they should be quantified meaning measurements can be easily reduced to numbers. The measurements should be consistent, particularly a team should be devoted to carry out the measurements otherwise if different people will carry out the measurements it can give inconsistent results. Finally there should be some control over the business environment for achieving the KPI's e.g. a machine operator should have some control over the final output and can make some changes by adjusting the setting of the machines. The strategic

goals are delivered by the KPI's which can be used to find out the opportunities and areas to improve. If we aren't satisfying the indicator set, it means we are moving in the wrong direction and have problems to take care of. Some examples of KPI's for financial performance are gross profit margin, return on investment etc.

Performance Indicators			
Airlines	**Social Media**	**Manufacturing Industry**	**Construction**
Emissions	Response rate	Emissions	Defects
Fuel Efficiency	Share ability	Resource Utilization(energy, water, fuel)	Client Satisfaction
Cancelled operations	Interaction	Waste(solid, water)	Costs
Percent of flights on time	Paid Advertisement reach	Quality(conformance)	Environment
Fatalities	User Activity	Cost (setup, inventory, overhead)	Working Conditions
Harm to animals	Fan Growth	Delivery (on speed, time)	Productivity/ Profitability
Customer Complaints	Product Feedback	Employee, Supplier	Skills

Table 2.1: KPI's in Different Industries

From Table 2.1, we can see the KPI's for different sectors i.e. airlines, social media and manufacturing industry and conclude that all three have different KPI's for performance. The social media business is a start-up company, so they have developed their own set of indicators to measure and report the performance. More KPI's can be added depending upon the growth and needs of the company and the stakeholders. From the comparison, we can state that there are similarities in some of the KPI's but they are independent from each other and are completely aligned with objectives of the company. So different business organizations in different sectors may use different set of indicators for performance monitoring.

2.7 Sustainability management in different sectors (example from Mining and Energy industry)

Mining industries provide very vital raw materials but are often seen as hazard to the environment, biodiversity and disturb the ecosystem balance of the nature. It is a challenge for the mining industries to prove they contribute to the well-being without compromising with the needs for future generations (Vintró et al., 2014). Various programs have been initiated to support the sector e.g. “Towards Sustainable Mining” by Mining Association of Canada. “Mining operation have an impact on surroundings”. The small and medium sized mining companies in Spain are following: the environmental management systems like ISO 14001, The European Eco-Management and Audit Scheme EMAS, and some companies use UNE 22480 (Spanish norm for sustainable management in mining activities). The companies are trying to integrate sustainability in- to their core values and are redefining their business policies to better respond to the environmental and social concerns, investment in energy saving processes, improvement of workforce safety etc. Another study by (Gomes et al., 2014) establishes a positive connection between sustainability adoption and business performance in the mining industries and reports that the companies are widely following the GRI set guidelines for sustainability reporting. The research shows sustainable management of supply chain, continuous improvement in environmental area, health and safety, respect for local community are the most significant factors that lead to business performance improvement in the mining sector. In the study of (Kostevšek et al., 2015), a review was performed for neighbourhood sustainability assessment tools. The results revealed benchmarking schemes, certifications,

sustainability indicators, sustainability assessment models as the sustainability tools being commonly used.

2.8 Performance Measurement Tools

KPI's and the balanced scorecards are considered as two of the best tools for measuring the performance of a business organization, the indicators used in the KPI are equal to or same as the metrics used in the balanced scorecard approach. Balanced scorecards are flexible compared to KPI's and provide overview of the organizational performance while the KPI's are very specific and entail to the improvement of a very specific indicator that may be related to environmental or financial category. Balanced scorecards can be integrated with other measures provided that the measure should align with the underlying strategy of the balanced scorecard. For e.g. if we want to measure from the sales and the growth perspective, the various metrics can be; increase in market share, customer retention, new customer attraction, sales figure etc. Several indicators can be included under one perspective while in the case of KPI it will focus on a particular indicator say customer retention or sales figure. Balanced scorecard provide the overall picture that leads to the improvement.

2.9 Balanced Scorecard Approach for Business Performance Measurement

A scorecard is a statistical tool that is used to measure and report the progress towards the achievement of a particular goal in a structured way. It provides visually appealing summary that conveys overall success or failure of an organization (Niven, 2006). Fig 2.4 gives the overview of a balanced scorecard. Scorecard is based on collection of key performance indicators (KPIs). Balanced scorecard is a strategic system that provides the

feedback in order to align the perspectives in a balanced way to achieve the desired business outcome.

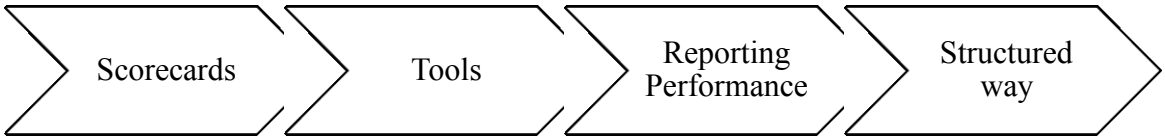


Fig 2.4: Balanced Scorecard overview

2.9.1 Concept

Kaplan and Norton, a book followed in 1996, first published balanced scorecard in 1992. Traditional performance measurement only focuses on financial perspective (profits, ROI). The balanced scorecard approach provides balance to the financial perspective with the rest of the perspectives used in the model. Fig 2.5 shows the balanced scorecard by Norton and Kaplan.

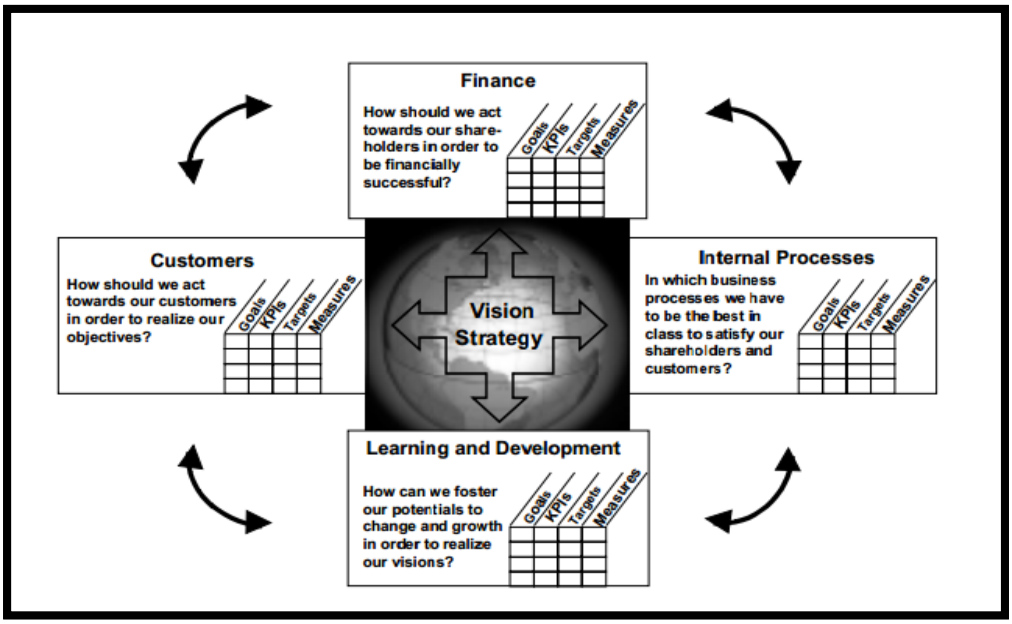


Fig 2.5: Balanced Scorecard by Kaplan and Norton (source: 4)

The balanced scorecard model suggests that we view the organization from four perspectives, then key performance metrics under each perspective should be developed by involving the required members of interest, collecting data and analyzing it relative to each of these perspectives.

Four business perspectives:

1. Financial: What must we do to create sustainable economic value and identifying responsibilities towards stakeholders?
2. Internal Business Process: In which business processes we need to be best to satisfy stakeholders?
3. Learning and Growth: How does our employee performance management system, including feedback to employees, support high performance?
4. Customer: What do our customers require from us and what are we doing according to those requirements?

2.9.2 Why balanced scorecards are used?

Efficient performance management systems act as a useful tool that helps to monitor and control the firm's performance (Lin et al., 2014). The basis of the balanced scorecard is that no single measure can tell the whole performance. A competitive strategy combined with the balanced scorecard can have a significant impact on the firm performance. The balance scorecard method has been emerged as a method where multiple performance measures are involved (Ekmekçi, 2014). The balanced scorecard has recently been considered as a tool for the evaluation of the corporate sustainability (Nikolaou & Tsalis, 2013). Balanced scorecard leads to the improvement of organizational and personal performance. Their research study show balance scorecard can generate a series of

benefits that are far more than expectations. The research study by (Lin et al., 2014) show over 83.1 % of respondents confirming that BSC has been adopted in their organizations.

2.9.2.1 Strengths of Balanced Scorecard

1. The organizational units can improve themselves with the feedback mechanisms of the balanced scorecards.
2. Balanced scorecard implements the strategy that is converted in to performance metrics. They are developed in a way that specifically directs attention to the strategy and future direction.
3. Balanced scorecard encourages balanced performance, they provide the balance that is very much required for the successful execution because of its well defined strategy.
4. As scorecards are designed to offer a comprehensive view of how enterprise is doing and where it is going, the scorecard will help see if any factors are missing. Using a structured approach is very important for the success of the scorecard.
5. Reviews are more regular and thorough.
6. Strong scorecards help tell the full story of performance by letting us know how the complex variables are being balanced and optimized.

2.9.2.2 Weaknesses

1. The balanced scorecard relies on a well-defined strategy and understanding of linkages between strategic objectives and metrics. Without proper execution of the strategy, the implementation could fail.
2. All the stakeholders are not involved, that may be important to some organizations for performance measurement.

3. Use of generic metrics in the balanced scorecard makes it harder to use, as the organizations need to define the metrics specifically.

2.9.3 How balanced scorecards are used?

1. Develop Strategy: The first step is the development of the strategy, which would serve as the base to all the four perspectives. In this step, mission is clarified and it is important to align the vision. Defining the key issues that need to be addressed and based on the key issues and their relative importance, a strategy is formulated and the best ways to compete are brainstormed.

2. Plan Strategy: The second step for the execution of the balanced scorecard is to plan the strategy, strategy maps are created and the targets are selected and measured. Now the question arises, how do we define our strategy? How to measure the objectives? The objectives are measured by choosing strategic initiatives and well defining the actions that are needed to execute the strategy. It is also very essential to develop a funding plan for the initiatives. The next part of the strategy planning is to create the project teams and the leader should be chosen.

3. Aligning Organization: The third step in the balanced scorecard execution is to align the organization. The strategy should be communicated. The business units, support units should be aligned with the corporate strategy. The employees should be motivated for the strategy execution as the employees are the heart of any successful organization. The more motivated the employees of an organization are, the more innovative the company would be, so it is extremely important to keep the morale of the employees high and strategy should be communicated to each and every member of the organization starting from machine operator to shift supervisor to plant manager to operations VP to CEO, it simply

means everyone should be involved and each one should show initiatives and not just the leaders.

4. Operations Plan & Reporting: is the fourth step in the strategic balanced scorecard execution, which focuses heavily on improving the key processes and understanding of process improvements are critical for effective strategy implementation. Development of the resource capacity plan is required and understanding of linking strategy with operating plans, sales forecast or budgets needs to be established in this phase. Holding review meetings to monitor and learn and to overcome weakness if any. Updating the plans and scorecard for the next cycle.

2.9.4 Types of Scorecards

Fig 2.6 shows the types of scorecards (Stefanovska & Soklevski, 2014) (5) that are currently being used by organizations, which are discussed below:

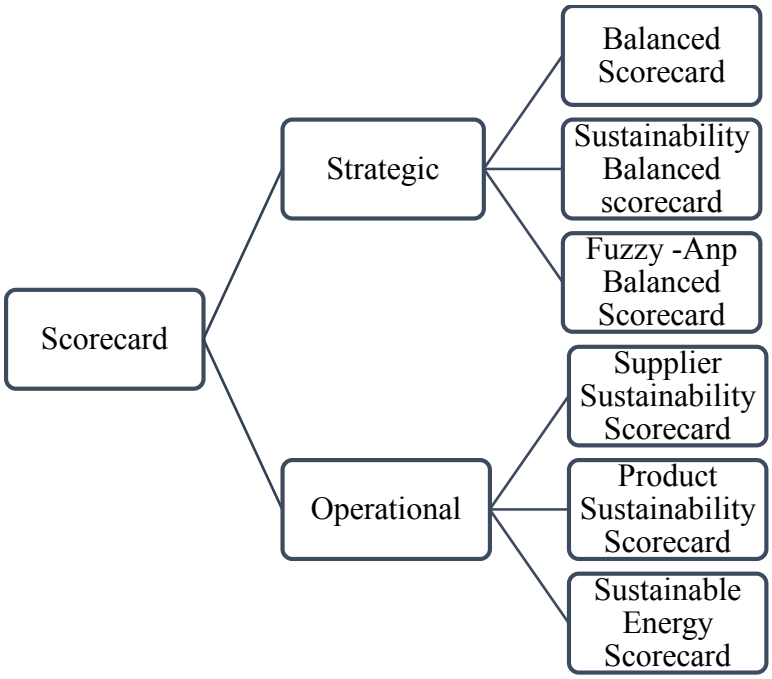


Fig 2.6: Types of scorecards

a. Operational Balanced Scorecard: These scorecards are used at functional area levels and are used at higher frequencies than strategic balanced scorecards. They are used at different department levels. Eg Finance, HR, IT.

b. Strategic Balanced Scorecard: We have discussed strategic balanced scorecard in a great detail in section 2.9.1.

c. Sustainability Scorecards: Sustainability scorecards are used to measure the sustainability of the business organizations. Some of the sustainability scorecards that are used by the organizations are:

1. Sustainability Balanced Scorecard

Sustainability balanced scorecard is an internal management tool to operationalize sustainability goals from company's strategic plan (Cerf, 2007). Sustainability balanced scorecard integrates social, economic and environmental aspects with the existing perspectives. Sustainability management with the balanced scorecard helps to overcome the shortcomings of conventional approaches to environmental, economic and social management systems by integrating the three pillars of sustainability into a single tool (Figge et al., 2002). The growing importance of the social and environmental issues in last few decades has put a lot of pressure on the companies to consider these factors in addition to the existing one's. The environmental and social factors are often not linked to the economic success of the firm and the interaction of all three remains unclear. This lack of integration turns out to be an obstacle for firms aiming to achieve simultaneous improvement of economic, environmental and social performance of business. Fig 2.7 shows the integration of sustainability with the balanced scorecard.

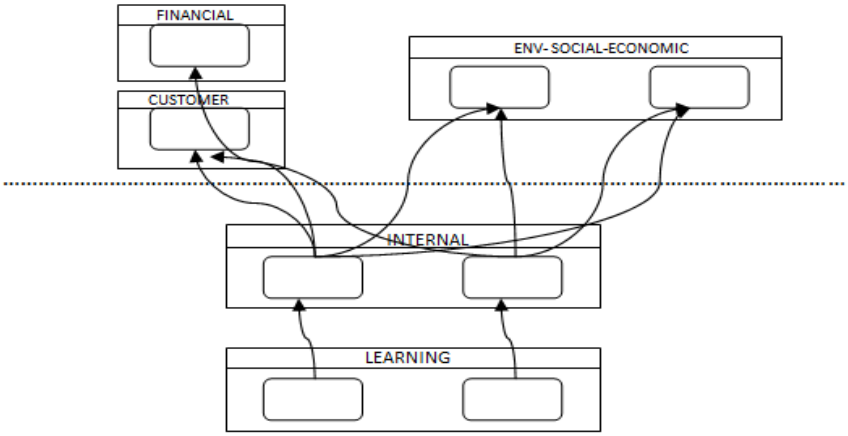


Fig 2.7: Sustainability Integration (Figge et al., 2002)

The environment perspective should be deep embedded in the strategy. Managing environmental issues requires much more than just adding an environmental perspective in the existing balanced scorecard. We need to give a thought about how environmental and social perspective impacts a strategic issue and on capturing the drivers. Treating all the issues related to sustainability separately even in its own dedicated prospective will lead to isolation and finally crashing the whole cause. Sustainability associated with financial, learning, customer and internal growth processes should be put in the objectives within the process to bring them out as a set. The main aim of the business is to generate revenues and ultimately profits by selling products and services to the customers which is done through set processes ie. manufacturing a product or generating a service, which further will link to environmental and social impacts. The processes and functions are generated through learning and innovation which thrives on the company's core values so sustainability integration should run deep into strategy and it shouldn'd be just another perspective in the integration process to take full advantage of the sustainability balanced

scorecard. A lot of research papers (Figge et al 2002) talk about the measurement of sustainability with the balanced scorecard approach.

2. Supplier Sustainability Scorecards

Supplier sustainability scorecards are used to assess the sustainability of the suppliers. The supplier sustainability scorecards are the customized tools to evaluate the existing performance of the suppliers. The supplier sustainability scorecard helps the organizations to improve the collaboration with suppliers by identifying the opportunities of performance improvement (AECOM supplier sustainability scorecard). Walmart focusses on the following criteria for assessing the sustainability of its suppliers; energy and climate, material efficiency, nature and resources and people and community, further walmart sets the indicator under each category to analyze the performance e.g. under energy and climate, indicators like green house gas emissions in the supply chain are measured. The corporate social responsibility report of the organizations links sustainability into each business process. P & G uses supply chain environmental sustainability scorecard to measure annual supplier sustainability performance ratings, business award decisions, improvement tracking, material production impacts for product designing, supply chain modelling etc.

3. Product Sustainability Scorecard

The product sustainability score card is an internal tool to measure the sustainability of the products offered by the company to help move towards the development of more sustainable products. IKEA uses product sustainability scorecard to classify the IKEA's home furnishing range. By using the product sustainability scorecard, IKEA found out

that 90% of their sales are coming from home furninishings which are marketed as “More Sustainable.” Some of the criteria that IKEA use are renewable and recycled material, product quality, transport efficiency, raw material utilization at suppliers etc.

4. Sustainable Energy Scorecards

Sustainable energy scorecards are used to rate the organization’s sustainable energy performance. With the help of the sustainable energy score cards parameters like green house gas emissions, energy consumption, wastes generated etc can be measured and improved. The sustainable enery scorecard is being actively used by United States Department of Transportation to keep a track of emissions, fuel used, renewable energy uses, emissions from the buildings etc.

5. Green Supply Chain Performance Measurement (Fuzzy ANP- balanced scorecard)

A research paper by (Bhattacharya et al., 2013) demonstrates the implementation of green balanced scorecard to measure the supply chain performance using ANP. The indicators under the four perspectices have been identified and their relationship has been studied, the indicators used are organisational commitment, eco design, green supply-chain process, eco- design, social and sustainable performance. The constructs and the sub constructs have been pairwise compared by the concerned stakeholders and the weights are normalized. The overall result indicated the organisational commitment accounts for 33.1%, eco design for 24.1%, GSC processes 10.3%, sustainable and social performance for 25 and 7.5% respectively. Another research paper by (Duarte & Cruz-Machado, 2014) talks about the measurement of the green supply chain performance with the help of the balanced scorecard.

Chapter 3

Solution Approach

In this chapter, we present the solutions of the problems explained in the first chapter. Our solution approach (Fig 3.1) comprises of three main steps:

1. Identifying criteria for measuring sustainability performance.
2. Sustainability scorecard development for measuring sustainability performance of organizations
3. Applying sustainability scorecard for evaluating sustainability performance of business organizations using multi criteria decision making approach called ANP.

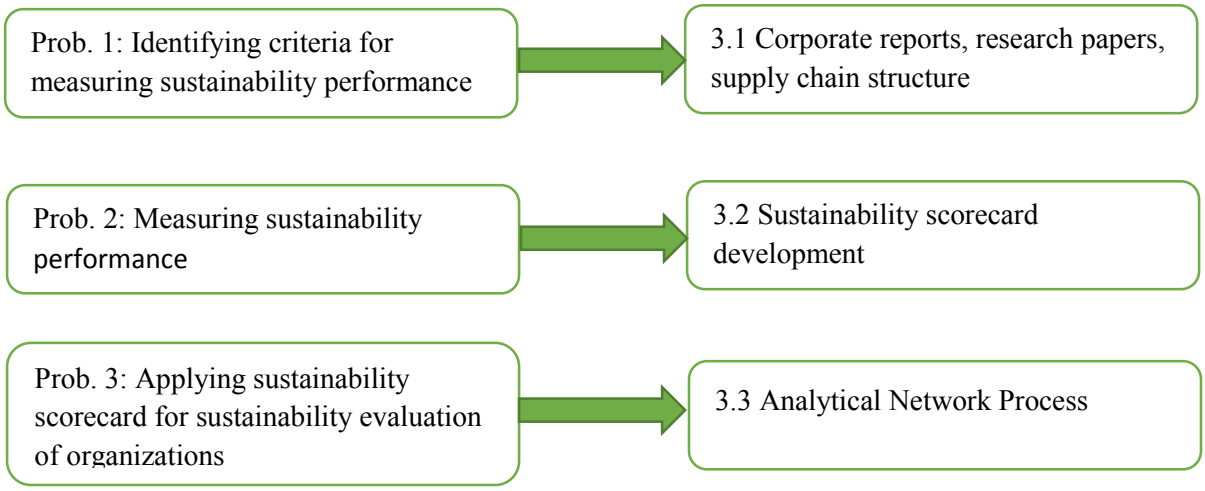


Fig 3.1 Solution Approach

These steps are explained in detail as follows:

3.1 Identifying Criteria for Measuring Sustainability Performance

To measure the sustainability performance of business organizations, we need to find out the key performance indicators for measuring business sustainability and suggesting improvements. To develop the indicators for measuring overall sustainability and business performance of the organizations, we studied the supply chain structure (as supply chain is considered as the back bone of any manufacturing, retail industry), the corporate social responsibility reports of the most sustainable organizations (Top 100) and the research papers. Following indicators were being focused upon by businesses for effective improvements.

1. Management
2. Employees
3. Operations
4. Quality
5. Sales and Marketing
6. Service and Growth
7. Distribution Network
8. Sustainability

Supply chain management is about delievering the right product to right customer at right time at highest customer service levels while incurring minimum costs. It starts from concept generation to customer usage followed by recyling. Fig 3.2 shows the various stages where sustainability can be integrated in the supply chain.

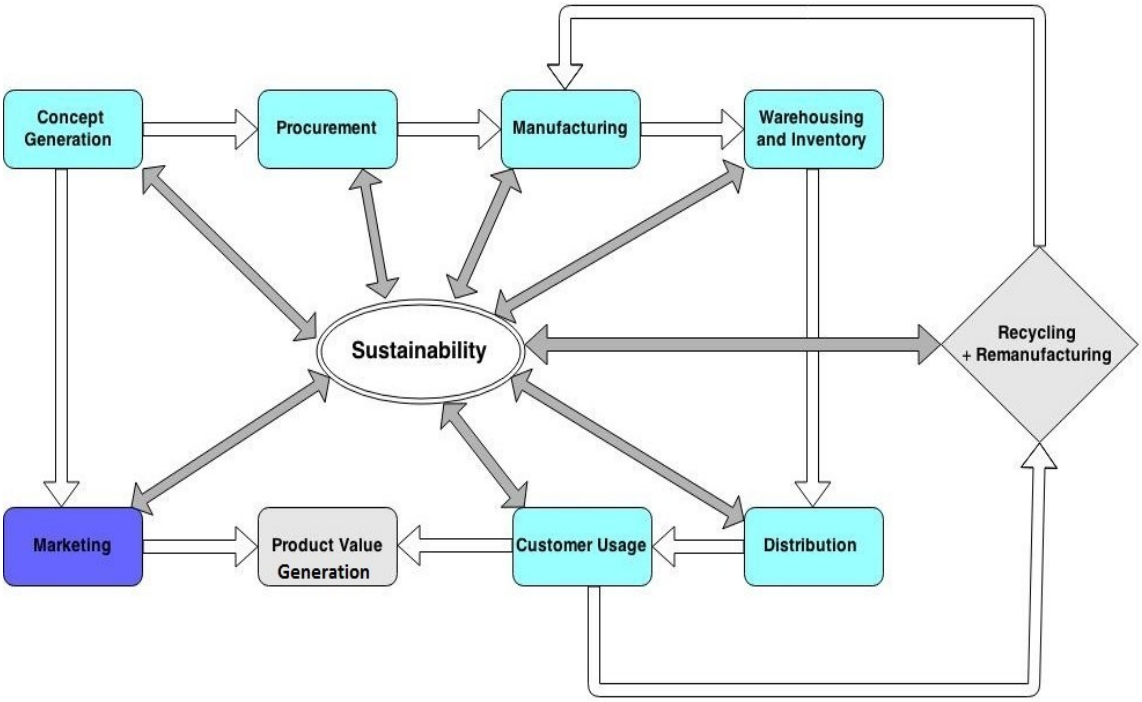


Fig 3.2: Sustainability integration in supply chain

1. Concept Generation: A "concept" is an idea, which can provide a solution to the problem. Concept generation is the first and very important step in the product development and the supply chain starts right from the concept generation. It simply means getting an idea and it often starts with the brainstorming. The first step in the process of concept generation is to determine the customer requirements by surveys, feed backs or one-on-one interactions, the next step is to convert the customer requirements to technical requirements using tools such as Quality Function Deployment. The third step is to establish a strong base for the concept and generating many concepts based on the technical requirements, then evaluation of the steps takes place and best concepts are identified followed by a reality check. The development team then focuses on to finding out the best present solution that can be used for the particular problem in order to satisfy the cause, if there is no existing solution available for the problem, the teams try to find

out the new concepts most popularly by brainstorming with the like minded to come up with the concepts that must satisfy the needs that are established and the customer specifications should be met or exceeded. After finalising the new concept, methods are sought to implement the concept. The concept generation starts with an initiative from the top management and must have a support of upper management for producing a good result. Management and employees involvement are a must in this step.

2. Procurement: Procurement is the purchasing of goods, services or works from the suppliers. The process of procurement should satisfy the constraints like quality, quantity, time and location and goods should be procured at the best possible costs to meet the acquirer needs.

Types of procurement:

a. Direct Procurement: It includes products that are used directly for manufacturing activities. The quantity and frequency of the direct procurement is usually high

b. Indirect Procurement: It includes goods and services in support of the production activities e.g. maintenance, repair etc. The quantity is usually low but with high frequency. Supplier management is included in the operations i.e. Indicator 3.

3. Manufacturing: “Manufacturing is the production of the merchandise for use or sale using labour and machine tools, chemical and biological processing or formulation” (6). The term is mostly applied to industrial production examples of major manufacturers in North America include General Motors Corporation, Procter and Gamble etc. For the industrial sector maintaining the quality of the products and services is very crucial for the success i.e. indicator 4.

4. Warehousing and Inventory: "A warehouse is a planned space for the storage and handling of goods and material" (7). The warehouse operation is composed of four key activities that are goods receipt, storage, picking and goods dispatch while inventory management is managing constant flow or products in or out of the warehouse. In the supply chain it is the part of the operations i.e. indicator 3.

Sustainability has been integrated to every step of the supply chain for sustainable output. The other indicators namely distribution network and service and growth can be applied to measure the performance in the logistics network, customer service and the pace of growth of the company.

Table 3.1 shows all the indicators with references

Indicators	References
Management	Cenovus,Centrica PLC, (Friebel & Schweiger, 2012)
Employees	(Dhar, 2015; Longoni, Golini, & Cagliano, 2014; Stumpo,) CSR(Johnson & Johnson, Cenovus energy, Centrica PLC, Monsanto)
Operations(waste management, Supplier Relationship Management, Streamlined Manufacturing)	CSR(Adidas, Biogen Idec, Cisco Systems, Johnson & Johnson) (Amoako-Gyampah & Acquaah, 2008; Fullerton, Kennedy, & Widener, 2014; Prajogo, Chowdhury, Yeung, & Cheng, 2012),
Quality	CSR(Johnson and Johnson), (Llach, Perramon, Alonso-Almeida, & Bagur-Femenías, 2013; Pereira-Moliner, Claver-Cortés, Molina-Azorín, & José Tarí, 2012),
Sales and Marketing	(Aller, 2010; Dynamics, 2008; Hasan & Ali, 2015; Rehme & Rennhak, 2011; Rouzies, Anderson, Kohli, Barton, & Zoltners, 2005),
Service and Growth	CSR (Natura Cosmetics, Sage Group PLC)
Distribution Network	CSR(Coca-cola, Bombardier, Nestle SA, Umicore)
Sustainability	CSR(Most sustainable Companies- Forbes)

Table 3.1: Indicators & References

Now we will discuss about some of the core indicators that are found to be common in the CSR reports of top 10 most sustainable companies. Table 3.2 presents the top 10 most sustainable companies 2014

Company Name	**Country**	**Sector**	**Score/100**
1 Westpac Banking	Australia	Financials	76.5
2 Biogen IDEC	USA	Health Care	75.3
3 Outotec	Finland	Industrials	74.2
4 Statoil ASA	Norway	Energy	74
5 Dassualt Systems	France	IT	74
6 Neste Oil	Finland	Energy	69.2
7 Novo Nordisk	Denmark	Health Care	68.8
8 Adidas AG	Germany	Consumer Discretionary	68
9 Umicore SA	Belgium	Materials	67.8
10Schneider Electric SA	France	Industrials	66.5

Table 2.2: Top 10 Sustainable companies

(The list is announced by Corporate Knights- a Toronto based Media Agency based on the environmental, social and governance performance indicators, including waste productivity, CEO-to-average-worker pay ratio, leadership diversity, and employee turnover. Corporate knights collected data from Bloomberg and through direct engagement with the companies)

The indicators presented in table 3.3 below are considered as very vital for the success of any business organization. These key indicators are highly focussed upon by the top 10 sustainable companies.

Indicators	References(Corporate Sustainability Report)
Kaizen or Continuous Improvement	Biogen Idec, Outotec, Statoil, , Neste Oil OYZ, Novo Nordisk, Adidas, Umicore,, (Dhingra, Kress, & Upreti, 2014; Martínez-Jurado & Moyano-Fuentes, 2014; Terziovski, ; Zain & Kassim, 2012)
Collaboration	Outotec, Biogen Idec, Stat oil, Neste oil OYZ, Adidas, Umicore, (Albino, Dangelico, & Pontrandolfo, 2012; Chakraborty, Bhattacharya, & Dobrzykowski, 2014; Liao & kuo, 2014; Trencher, Yarime, & Kharrazi, 2013)

Innovation	Biogen Idec, Natura Cosmetics Outotec, Statoil, , Neste Oil OYZ, , Adidas, Umicore, (Klewitz & Hansen, 2014; Leal-Rodríguez, Eldridge, Roldán, Leal-Millán, & Ortega-Gutiérrez, 2015; Sezen & Çankaya, 2013)
Leadership	Westpac Banking, Biogen Idec, Outotec, Statoil, SA, Neste Oil OYZ, Novo Nordisk, Adidas, Umicore, (Dubey, Gunasekaran, & Samar Ali, 2015a; Özer & Tınaztepe, 2014a)

Table 3.3: Core indicators & References

We discussed about all the indicators in great detail in section 3.2.1.1.

3.2 Sustainability Scorecard Dvelopment for Measuring Sustainability Performance of the Organizations

We have developed a sustainability scorecard that can be used by the business organizations to measure sustainability. We have already presented the indicators that are being focused upon by businesses to suggest effective improvements.

3.2.1 Justification of Sustainability Scorecard

Currently, sustainability balanced scorecard and other scorecards are being used in the organizations to measure sustainability but no scorecard provides complete overview of the internal indicators of the organizations as the indicators need to be customized. No doubt the balanced sustainability scorecard integrates sustainability using the four perspectives of the balanced scorecard, however it is important that the sustainability should be deep embedded in to the strategy rather than being an individual prospective. In the balanced scorecards, all the stakeholders are not included while in our model we have overcome this problem by addressing suppliers, customers, employee, and management. Moreover the indicators used in the balanced scorecard are too generic, which makes it a difficult task for the organizations to find out the performance indicator whereas in our model we have already find out the indicators that can be used by any organization for

sustainability assessment. All the indicators presented in the model can be divided under four wide categories: organization, process, core and learning. Sustainability has been integrated in all of the categories, which shows integration between sustainability and all of the indicators is required to achieve an optimum output from the model. The other sustainability scorecards i.e. product and energy sustainability being discussed earlier are focussed toward a single entity while our sustainability scorecard takes in-to consideration all the indicators that are required for suggesting improvements. The green scorecard for measurement is limited to supply chain processes only while our scorecard has overcome this limitation. Fig 3.3 shows our sustainability scorecard for assessing sustainability in business organizations.

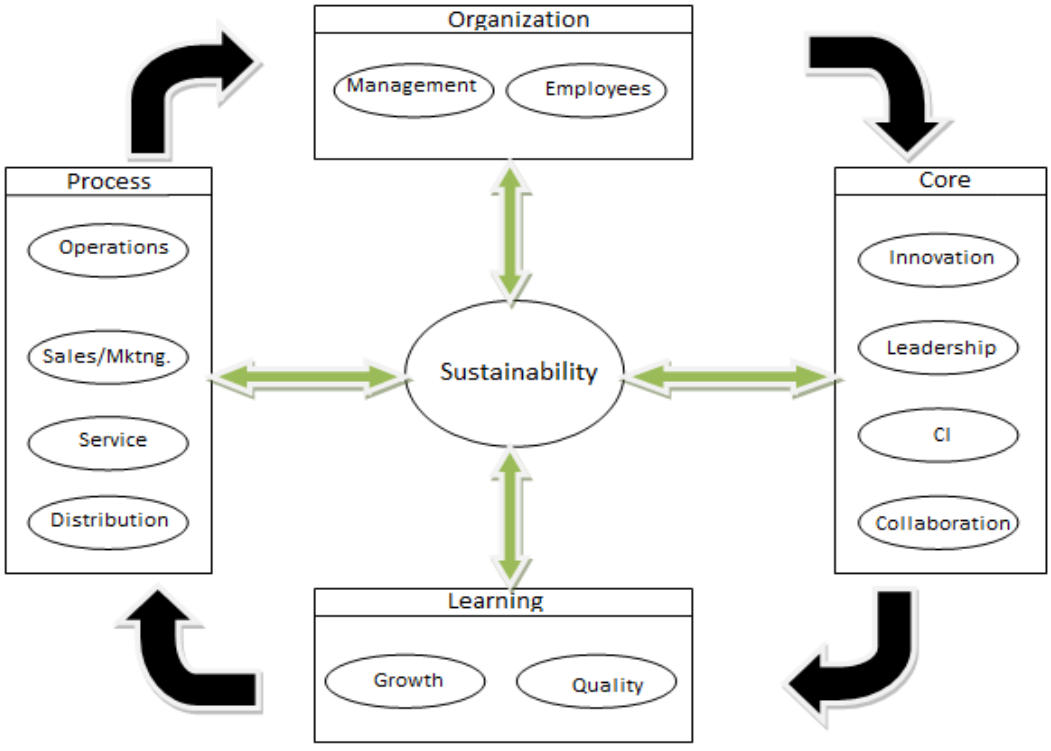


Fig 3.3: Sustainability Scorecard

3.2.1.1 Explanation of Indicators

3.2.1.1.1 Continuous Improvement

Continuous improvement is an ongoing or never-ending effort to improve products, services or processes. The customer's expectations are rising and the competition is increasing, the firms needs to continuously improve to remain in business (Zain & Kassim, 2012). Continuous improvement is the responsibility of every worker not just a selected few. The research strongly establishes a positive link between continuous improvement and the firm's competitiveness. "The adoption of continuous improvement and innovation management strategies is a critical factor for high performing SME's to achieve strategic goals and objectives"(Terziovski, 2010). Every organization wants to improve continuously in every aspect of the business and use different models to achieve the goal e.g. Outotec improves continuously its environmental performance by setting the targets and monitors the results by evaluating the environmental aspects of the research centres, manufacturing workshops, industrial plants etc. To drive continuous improvement in the environmental performance, Adidas set an environmental KPI assessment and E- rating mechanism to evaluate the supplier's environmental performance. It is used to identify suppliers that have potentially high environmental risk issues.

Continuous improvement starts with communicating expectations to everyone in the organization. The second step requires delivering information and training e.g. Japanese car maker Toyota is world pioneer in the continuous improvement and famous for the implementation of lean six sigma for improving continuously. The three key areas, which contribute to the efficiency and effectiveness of an organization are reducing the waste as the continuous improvement employs the principle of lean six sigma which focuses on

reducing variability and wastes. Secondly, it really matters the way job is being done and finally, the way of undertaking the processes. Plan-Do-Check-Act methodology shown in Fig 3.4 is used for continuously improving projects.

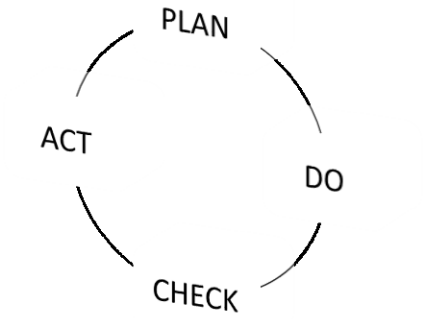


Fig 3.4: Continuous Improvement Process

The concepts of lean and environment complements each other (Martínez-Jurado & Moyano-Fuentes, 2014). The major goal of the lean is to reduce the wastes and for environment sustainability, reduction of wastes is one of the key issues for reducing emissions or any kind of non-value adding activity. The objective of lean is to solve the problem and making sure that it will not happen again which is true for the environmental approach as well and it requires high level involvement of people to drive significant benefits, the green manufacturing principles and strategies are often created by the companies who implement the lean approach. Lean adds to economic and social sustainability as it helps in managing the businesses responsibly. The lean initiatives should be implemented with the green initiatives for overall sustainability performance (Dhingra et al., 2014).

3.2.1.1.2 Innovation

Innovation is a new idea, device or process. “Innovation can be viewed as the application of better solutions that meet new requirements, in articulated needs or existing market needs and this is accomplished through products that are more effective, processes, services, technologies or ideas that are readily available to markets, governments and society”(8). In today’s challenging economic environment, innovation is a much anticipated tool to drive business growth. Innovation is one of the key factor for the firms to maintain competitive edge. The greater the ability of a firm to update their knowledge over their competitor’s, the more it would help the firm to improve its performance in the innovation race (Leal-Rodríguez et al., 2015). The research paper talks about the fact that innovative firms tends to me more flexible and can respond to the customer demands in a more versatile way. The most innovative companies takes advantage of the external environment, continuously update their business models according to the needs i.e. to increase customer retention and acquire more market share. Global competition, weak economy and more demanding customers have made growth more challenging than ever. The companies need to find innovative solutions while keeping the overall costs low to respond to the consumer requirements. The most successful companies adopt the following strategies:

a. S curve: Nothing grows forever. Even the best products or services have to go through the innovation to maintain their hold on the market. The diagram below depicts the innovation window that always exists between the original strategy and the new growth strategy, there is always a room to innovate and growth to maintain the competitive edge. Fig 3.5 shows the S curve.

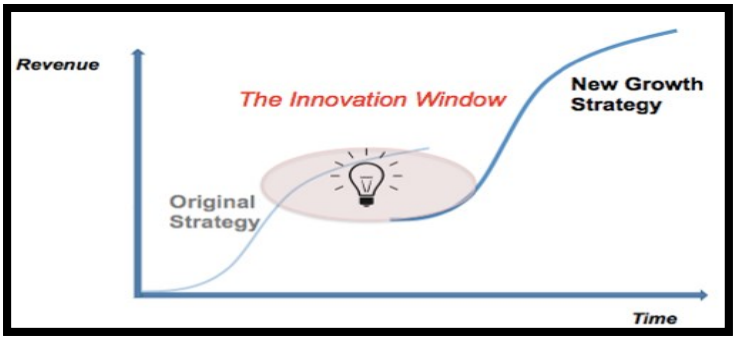


Fig 3.5: S curve (Source: 9)

Innovation is a continuous learning and never ending process and the strategies need to be adjusted according to the customers and their needs, competitors and the economic needs.

b. Understanding Customers: Most successful companies know about their customers and their needs and heavily rely on the feedback from their customers to innovate. Learning about the customers is very important to communicate with them and keeps them away from choosing the competitor.

c. Leading the Way: Innovation requires a level of risk taking. Some of the companies that are known for their excellence in products or services have created a culture of innovation.

Sustainability driven innovation practices helps the business organizations to successfully compete in the changing market trends and the environments (Klewitz & Hansen, 2014). Innovation practices like eco- innovation, cleaner production and supply have found their ways to firms. Innovation practices should be followed at every point whether it be process (eco-efficiency) or organization (environmental management systems). Eco-process innovations have a positive effect on the corporate sustainability performance of the organisations (Sezen & Çankaya, 2013).

Innovation contributes to the company's sustainable growth (CSR- Natura Cosmetics) and leads to resource and energy efficiency, minimize emissions and reduces the ecological footprint (CSR- Outotec). Companies are also innovating themselves technologically to promote sustainable culture. Sustainable technology advancement offers safety, reduce harmful waste products and strengthens the company's overall position (CSR- Statoil). The new technological developments can lead to the production of the broader range of renewable fuels (CSR- Neste oil). The technological innovations are not just limited to the sustainability, the companies are integrating the innovation with the customer service e.g. Westpac's digital innovation moved 40 % of the customers to mobile banking (reduced paper work). Adidas focusses on these 5 goals to achieve the overall balance; speed, creativity, innovation, sustainability and the cost savings whereas Neste Oil has embedded innovation in the core values of the organization.

3.2.1.1.3 Collaboration

Collaboration is a working practice where different individuals work together to achieve a common benefit. Two way communication is the key to highly successful collaborative relationships. Collaboration is the way of overcoming current challenges and have the potential to deliver the products that are sustainable and of the excellent quality on time. Collaborations can help firm achieve competitive position by reducing costs and firms can manage risk more efficiently by sharing (Chakraborty et al., 2014). Collaborations for environment are highly successful. Some of the studies that are conducted in this field are: (Trencher et al., 2013) demonstrates how the successful universities collaborations with industries, communities or government can contribute to the sustainability. The study presents examples of successful collaborations of universities with the private and

government sectors for sustainability e.g. Oberlin college collaborated with Oberlin city, local businesses, schools, colleges and organizations on a project called “Oberlin Project” to rejuvenate the town of Oberlin by transforming it into a prototype of a self-sufficient, post fossil fuel community and they focussed on green business, green buildings, renewable energy, energy efficiency etc. Another example of successful collaboration is Simon Frasers University’s collaboration with SFU faculty and administration, city of Burnaby, private enterprises and developers for development of mountain top area on campus grounds in to sustainable multi use community. Outotec has collaborated with the universities and students, communities to promote sustainable development.

(Albino et al., 2012) states that collaborations with the external parties strongly affects the environmental performance of the business organizations. The research study shows that the inter-organizational collaborations are beneficial for overall environmental performance and the environmental reputation of the company.

According to Statoil, collaborations with government, suppliers, universities, industries, civil societies have an important role to play to overcome current sustainability challenges as the demand of energy is likely to grow by 35 % by 2035 and the energy systems of tomorrow are still not in place and the partnerships are required to handle the demand and overcome the challenges. The organization strongly collaborates with the suppliers to limit emissions and air pollution, minimise invasive aquatic species and reduce the risks of accidental spills. The firm believes in supplier development and enhancing the capacity and capabilities of the suppliers e.g. Statoil has developed a Local Opportunity Centre in Coklin, Alberta, the LOC provides access to economic opportunities and promotes the increasing market transparency. “A strong collaboration along the supply chain can have

a significant Impact" (CSR- Adidas). Adidas in collaboration with other brand members in ZDHC group, have developed an industry- wide environmental audit protocol. Many big firms are known for their collaborative relationships with their suppliers to reduce costs and promote sustainability like Hewlett-Packard, Procter & Gamble, and IBM. Collaborations with the suppliers have always resulted in a good output that leads to supply chain innovation (Liao & Kuo, 2014). It is no longer just a strategy but a key to long-term business success. There are many examples of successful collaboration, how the collaboration leads to profitability and competitiveness of the business, one such example is of Coca cola and Heinz to develop more sustainable containers. In 2009, the coca cola company created the plant bottle, a plastic PET bottle partially manufactured (30%) with plant-derived materials and by products of sugar production in Brazil. The remaining 70% of bottle is made with materials that are derived from the fossil fuels, such as petroleum. Coca-Cola Company is now striving to manufacture a bottle made of 100 % plant-derived materials and plant residues. The bottle is 100 % recyclable and cheaper than the traditional ones.

3.2.1.1.4 Leadership

Leadership is a process of social influence and motivating the team members to achieve the common goal. An effective leader is a person who has a vison and can inspire people and align them to his vision. A leader can coach and build a team so as to achieve the target. Leadership and business success are very closely related (CSR- Adidas). Adidas embeds leadership mindsets and the way of working in the daily life. The way of working, leadership and talented people enables business success (CSR- Neste Oil). Businesses survive on effective leadership and strategies for development. A good leader can help to

improve the productivity of the employees, improve ability to work under pressure and believes in the diversity of the workforce. A leader can contribute to the success of the team and the organization (Araujo & Lopes, 2015). Leadership is the base and the driver of Total Quality Management philosophy (Dubey et al., 2015). “Good leadership is one of the driving forces for success of the SME’s in the future” (Özer & Tınaztepe, 2014). The research study shows that transformational leadership has a stronger impact on the firm performance while the leadership styles (transactional and transformational) and innovativeness can have the impact on the business performance (Yıldız et al., 2014). A leader has an influence on the business organization’s policies and organization’s reputation. According to Outotec some of the dimensions to measure the organization’s reputation are; corporate culture and leadership, financial excellence, public image, product and services, social responsibility and operational dynamics.

In the sustainability scorecard, continuous improvement, collaboration, leadership and innovation together form the core and the backbone of success of any business venture in addition to other strategic measures that we will discuss later in this chapter. After the careful analysis of the corporate reports of the ten most sustainable companies, we can conclude that the four core properties that are must in an organization for its success are continuous improvement, leadership, innovation and collaboration. Fig 3.6 shows the business success diagram.

Fig 3.6: Business Success Diagram

3.2.1.1.5 Management

"Management by objectives is a process of defining objectives within an organization so as to achieve the objectives set by management" (10). The personal goals set for planning by the employees should align with the organization goals. If goals are properly set and managed, the organizations can save resources. (Friebel & Schweiger, 2012) establishes a connection between management quality and firm performance. Management is responsible for the strategy and long term objectives and provides leadership with regards to the interest of stakeholders. (CSR- Sage Group). Table 3.4 shows the indicators to measure management by objectives.

Management by Objectives	1. Goal Setting
	2. Improvement Planning
	3. Rate of Improvement

Table 3.4: Indicators for Management

As discussed above, goal setting is the first and very important metric for the management by objective approach. To achieve a target, the goal should be very clear and concise with a focus. Once a realistic goal has been set, the second metric for business performance measurement is to plan the improvement. Improvement planning involves documenting the steps and analyzing processes. Once the improvement has been planned and implemented the final step is to analyze the rate of improvement.

3.2.1.1.6 Employees

Employees are the core and the integral part of any successful organization. Often new ideas and innovations are generated by the employees that lead to the company's growth. The main objective of every organization is to bring out the best from every single employee. Surveys have revealed that people like their jobs when they accomplish something in them. A company's long term success is dependent upon dedicated employees (CSR- Cenovus). Given the right circumstances, every employee has a potential to become an inventor. Meaningful innovations derives from the thoughts and the insights of the employees (CSR- Johnson & Johnson). Many times, innovation is born out of the employees, who are well versed in their jobs. A clear strategic direction, sustainable growth is achieved with the commitment of the employees (Centrica PLC). The company should make sure that the employees have the training and the tools to be successful (Stumpo, 2001).The employees have always been an important part of the business. (CSR- Monsanto). A research study by (Dhar, 2015) analyzes the impact of training provided to the employees on their service levels and it has been showed that the support of training has a positive relationship with the employee's commitment level.

Westpac Banking believes in the training of the employees, equal opportunities and diversities in the workforce.

The stronger the connections and integration of teamwork, training and employee involvement, the stronger will be the environment, economic and social sustainability performance (Longoni et al., 2014). Table 3.5 shows the indicators to measure employee's criteria.

Employees	Employee Perception and Recognition
	Employee Innovative Recommendations
	Investment per Employee
	Number of Patents/ Publications per Employee

Table 3.5: Indicators for Employees

3.2.1.1.7 Operations

The value to a business is delivered when the operations transform the resources in to goods or services to generate revenues. The operations are widely divided in to three broad categories namely: streamlined manufacturing, supplier relationship management and waste management which is shown in Fig 3.7.

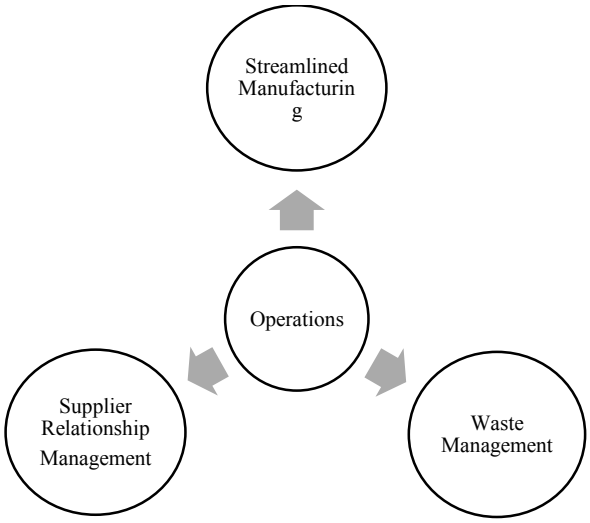


Fig 3.7: Operations

Streamline stands for optimizing the business process by reducing wastes and eliminating movement and unnecessary processes. (Fullerton et al., 2014) talks about adoption of lean manufacturing as a holistic approach and studied its impact on the firm performance. The manufacturing strategy and the competitive strategy of a firm is linked to the firm performance. The company's manufacturing strategy should be designed to complement the competitive strategy to achieve the desired performance (Amoako-Gyampah & Acquaah, 2008). Every company has different goals, streamlining the manufacturing process can depend upon the nature and intensity of the goal. The basic steps to streamlining the manufacturing process can include analyzing the manufacturing process by developing flow charts to simplify the process and tracing the movement of various parts in the plant. The next step is understanding the glitches, bottlenecks and eliminating all the non-value added activities.

Supplier Relationship Management (SRM): The supplier relationship management helps the organization to maximize the relationships with the supplier and minimize the overhead costs. Businesses have become very competitive and challenging, so a strong and strategic relationship with supplier is required for strong corporate performance (Liao & kuo, 2014). The paper indicates the positive influence of supplier management on the corporate performance and also explains about the much needed commitment between supplier and the organization. (Prajogo et al., 2012) talks about the critical importance of supplier management and the operational performance of an organization. Business organizations are more and more relying on their suppliers for effective performance. The paper explains the importance of selecting resources strategically to achieve goals of higher performance. The SRM has two aspects: clear commitment and interactions. The

supplier selection depends upon many factors like risk, profitability, performance, supplier sustainability, long term fit in the organization e.g. Johnson & Johnson has set up a sustainability toolkit for suppliers to improve the sustainability processes that includes use of renewable resources, packaging efficiency, made from recycled material or that can be recycled, transport efficiency etc. Johnson & Johnson hosts annual supplier sustainability awards to share a serious commitment to sustainability (CSR- Johnson & Johnson) whereas Cisco Systems have its partnership divided with three types of suppliers namely manufacturing partners, component suppliers and logistics service providers (CSR- Cisco Systems). Cisco measures sustainability performance of the suppliers through business scorecards and audits. Westpac Banking believes in the commitment to engage with the suppliers who demonstrate strong commitment about their social, ethical and environmental responsibilities (CSR- Westpac Banking). Westpac Banking has set a strict supplier code of conduct that includes 22 sustainability requirements that addresses the issues related to social, ethical and environmental business practices that are considered essential for good corporate citizenship. Table 3.6 shows the indicators to measure SRM.

Supplier Relationship Management	Material Acceptance Rate
	Total Spend/Sales
	Defect Rate
	Supplier Involvement

Table 3.6: Indicators for Supplier Management

Waste Management is the act of preventing on the first step or treating the solid industrial wastes. Not managing the industrial wastes carefully is a bigger waste in itself that can lead to health and environment effects. Human's increasing impact over the environment have always raised concerns, increasing environmental awareness have led the consumers

to choose a product wisely. Some of the waste management solutions include recycling, energy recovery, incineration etc. According to the corporate social responsibility report of Adidas, the company has set targets for the planet that includes 20% relative reduction in energy consumption, 20% water savings/employee, 25% waste reduction/employee and 50% paper reduction. The business organizations must always seek to maximise performance while minimising the wastes. According to business unit leader of Adidas Craig Vanderoef "We are constantly striving to make our products better, not just by increasing performance, but by continuing to develop how, products are made" .The best solution to the waste is the process optimization and avoiding it or eliminating the waste in the plant itself. Biogen Idec is the world's first healthcare company to achieve a target of zero wastes to landfill well before the target's stipulated time (CSR- Biogen Idec).

3.2.1.1.8 Quality

Quality is the ability of a product or a service to meet or exceed customer requirements or expectations, quality is customer dependent. Good quality product or service can have numerous advantages like company reputation, increase in customer satisfaction etc. High quality products maintain an environment for the innovation to thrive (CSR- Johnson & Johnson). Producing high quality products are very critical to achieve market success with. There should always be a balance between quality management and environment management as, there is a direct relationship between quality management and firm performance. Studies (Pereira-Moliner et al., 2012) show environment management can play the mediating role between the two. Environment management and quality in business practices have been identified as two of the key business drivers to achieve

market success and the financial performance (Llach et al., 2013). Table 3.7 shows the indicators to measure the quality criteria.

Quality	1.	Process Defect Rate(Sigma)
	2.	Customer Defects/ Total defects
	3.	Service Call Rate

Table 3.7: Indicators for Quality

3.2.1.1.9 Sales and Marketing

Sales is the exchange of the commodities for money. In any business organization, sales is the department that generates revenue. If a proper sales mechanism is not in place, the cutting edge technologies are useless whereas marketing is the action of promoting the products. Marketing process includes the analysis of market, distribution channel, competitive products and services, market share analysis etc. while the sales process is usually one to one. Selling is the end result of marketing. The typical goal of marketing is to generate the interest of a consumer to find out the potential needs. (Rouzies et al., 2005) explains the value of integration of sales and marketing to create more value to the firm which can-not be created alone either by sales or marketing, they work together the best when they are supportive of each other. In the research paper techniques have been discussed to improve the integration of sales and marketing. There is a need to evaluate the interaction between sales and marketing (Rehme & Rennhak, 2011) and it is not only because of revenue generation but to respond to the ever changing business requirements. The implementation of a strategic marketing technique may lead to satisfied customers which in turn can generate business. Marketing and sales are the integral parts of a value chain. (Dynamics, 2008) describes sales and marketing as a power couple. (Aller, 2010) explains the strategies for B2B sales.

Marketing helps in boosting the brand image. (Hasan & Ali, 2015) explains the impact of green marketing on the firm's performance. The factors that were concluded for the green image of the companies are green innovation and green promotion that together act as a green marketing strategy.

It is through marketing that big companies like Apple are making their concepts in the public more popular even before the launch of the product, the companies take advantage of their marketing strategies to sell and make their product worldwide popular and ultimately a sensation. The companies launch their concept on public sharing websites or any other marketing media now a days Face book, YouTube etc. and take the feedbacks from the prospective buyers to know about the weakness if any, to alter the concept and re-launch it to public so in a way the firms already get an idea about their product value even before the launching of actual product. Marketing through proper channels leads to sales. Table 3.8 shows the indicators for sales and marketing criteria.

Sales & Marketing	Number of Inquiries
	Profit Margin/Sales
	New Business/ Total Sales
	Profit Margin/ Sales

Table 3.8: Indicators for Sales and Marketing

3.2.1.1.10 Service & Growth

Customer service in addition with the superior products or service is critical to the business growth. The purpose of superior customer service must be, not only to understand customer concerns but also to anticipate customer requirements. Customer service can provide the insight into customer's unspoken requirements. Customers are the core and a very significant part of any business. Customer service decreases negative word of mouth, increases customer's life time value etc. Neste Oil identifies that customers growing

demand for the high quality products is one of the major forces of development of the value creation programs. To maintain high level of customer service, Natura Cosmetics decreased the time to replace the product to half. (CSR- Natura Cosmetics). Sage Group PLC is using the Subscription model to increase the interaction with the customers and to elongate the relationship lifetime. Sage Group tracks customer satisfaction by using the Net Promoter Score (NPS) metric which measures the customer's willingness to promote the Sage's product or services. Table 3.9 shows the indicators for service and growth criteria.

Service & Growth	Customer Satisfaction
	Customer Retention
	Repeat Business/ Total Sales
	New Product or Services

Table 3.9: Indicators for Service & Growth

3.2.1.1.11 Distribution Network

Distribution is the process of moving a product from the supplier stage to the customer. It drives the overall profitability as it is related to both the supply chain as well as the customer experience (Chopra, 2013). The important criteria that need to be taken in to consideration are the customer's needs that need to be met and the costs of meeting the customer's needs.

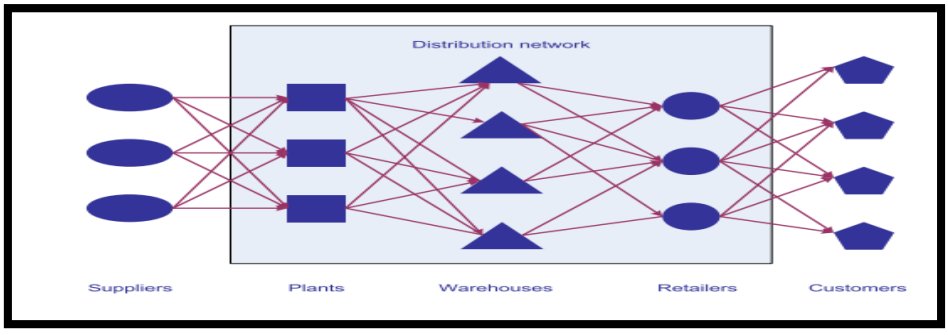


Fig 3.8: Distribution Network Diagram (Source: 11)

Designing an effective distribution network (Fig 3.8) is very important to be on the competitiveness forefront. Distribution network can be designed taking into account the key drivers that include customer location, eco-fuel, transportation costs, vehicle types, factory and supplier location, service level requirements etc. Effective distribution network is an integral component of companies like Coca-Cola, Bombardier, Schneider Electric, Nestle, Umicore etc. with a presence and reach to the customers all over the world. Increasing competition has led companies to design effective distribution network e.g. Coca Cola uses Manual Distribution Center model (MDC), Nestle transports more than 135,000 tonnes of products to customers from 1600 warehouses, while cutting the CO_2 emissions. The company is continuously finding ways to make better use of spaces in vehicle, avoiding unnecessary miles and using more efficient modes of transport, expanding driving training etc. Table 3.10 shows the indicators for distribution network criteria.

Distribution Network	1. Costs(Inventory, Transportation, Handling , Information)
	2. Customer Experience
	3. Order Visibility
	4. Product Variety Available
	5. Response Time
	6. Return ability

Table 3.10: Indicators for Distribution Network

3.2.1.1.12 Sustainability in Business

Business sustainability is often defined as managing the triple bottom line – a process by which companies manage their economic, social and environmental risks, obligations and opportunities"(12). Fig 3.9 shows the sustainability diagram

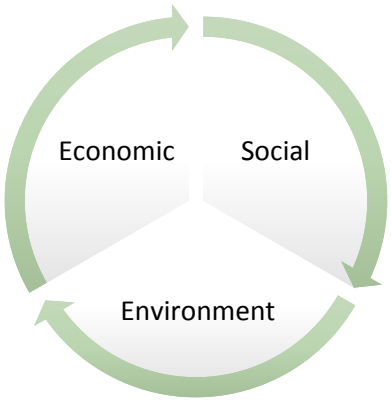


Fig 3.9: Sustainability Diagram (Source: 13)

Companies approach to sustainability:

A) Socio- environmental criteria enables the effective analysis of triple bottom line dimensions in the selection and the development of business partners (CSR-Natura Cosmetics)

B) The 'Monsanto' group has set a sustainability strategic council to establish the organization as a recognized sustainability leader and to ensure all the sustainability goals are well informed and efficiently executed.

C) The environmental considerations are integrated in the business to minimize risk and improve the efficiencies (CSR- Cenovus). Cenovus adds sustainability to its strategy to continuously improve the environmental performance that helps reduce the project costs.

D) Westpac Banking is committed to the sustainable business practices. According to Westpac Banking "Over the past 18 months we have been working internally and externally to assess what we think might evolve over the next 30 years" and the following three issues are being identified by Westpac Banking:

1. Responding to the big shifts of demographic and cultural change.
2. To create economic solutions to environmental changes.

3. Helping customers achieve sustainable financial futures in a changed landscape.

Corporate Sustainability Reports of 100 most sustainable companies: In this section we have studied the corporate sustainability reports (2013) of 100 most sustainable companies. We have shortlisted the top 5 companies in each category out of the 100 most sustainable companies (which is presented in the table 3.11) to find out the sustainability indicators they are reporting. The first column of the table shows the ranking of the company, the second column shows the name of the company, finally the last column shows the category of the company. All of the companies mentioned in the table below are using GRI's G3 reporting guidelines to report their performance.

Ranking (- Forbes)	**Name of the Company**	**Category**
1	Westpac Banking	Financials
17	Keppel Land Limited	
19	Australian and New Zealand Banking Group	
30	Shinhan Financial Group Co. Ltd	
31	Hang Seng Bank Ltd.	
2	Biogen IDEC	HealthCare
7	Novo Nordisk	
18	UCB SA	
21	Life Technologies Corporation	
57	Johnson & Johnson	
3	Outotec	Industrial
10	Schneider Electric	
14	Aeroports de Paris	
24	Bombardier	
27	Siemens AG	
4	Statoil	Energy
6	Neste Oil OYZ	
51	Royal Dutch Shell PLC	
52	Cenovus Energy	
53	Suncor Energy INC	

5 **11** **15** **16** **34**	Dassault Systems SA Cisco Systems ASML Holding NV The Sage group PLC Samsung Electronics CO Ltd	IT
8 **13** **22** **35** **60**	Adidas BayerischeMotorenWerke AG Tim Hortons Wolters Kluwer NV Daimler AG	Consumer Discretionary
9 **12** **20** **28** **27**	Umicore BASF SE Sigma Aldrich Corporation Croda International PLC Monsanto Company	Materials
23 **43** **45** **86** **92**	NaturaCosmeticos SA Coca Cola Enterprises Inc. L'Oreal SA Nestle SA Wesfarmers Ltd.	Consumer Staples
26 **47** **62**	Centrica PLC Duke Energy Corporation Acciona SA	Utilities
29 **40** **70** **73**	Star Hub Ltd Vivendi SA Telus Corporation BCE INC	Telecommunication Services

Table 3.11: 100 Most Sustainable Companies (top 5 shortlisted)

The sustainability breakdown structure (Fig 3.10)-gives the overview of the sustainability reporting (GRI). The first column shows the names of the industries that are in the list of 100 most sustainable companies. The GRI indicators are divided into three categories namely: environment, social and economic. The Environmental indicators are reported against sub-categories (Materials, Energy, Water, Biodiversity, Emissions & Affluents & wastes, Products and Services, Compliance, Transport and Overall). The Social indicators are divided in to 4 sub categories namely Labor Practices, Human Rights, Society and Product Responsibility. Each sub category is further sub divided in to indicators which is

presented in Fig 3.10. Finally the Economic have 3 sub- categories and lastly the ANP is the method that we will use to evaluate the sustainability Indicators. We can find out the number of indicators in each category in the Table 3.12

Category	**Subcategory**	**Number of Indicators**
Environment	Materials to Overall	30
Social	Labor Practices	14
	Human Rights	9
	Society	7
	Product Responsibility	9
Economic	Economic Performance Market Presence Indirect Economic Impacts	9

Table 3.12: GRI Indicators

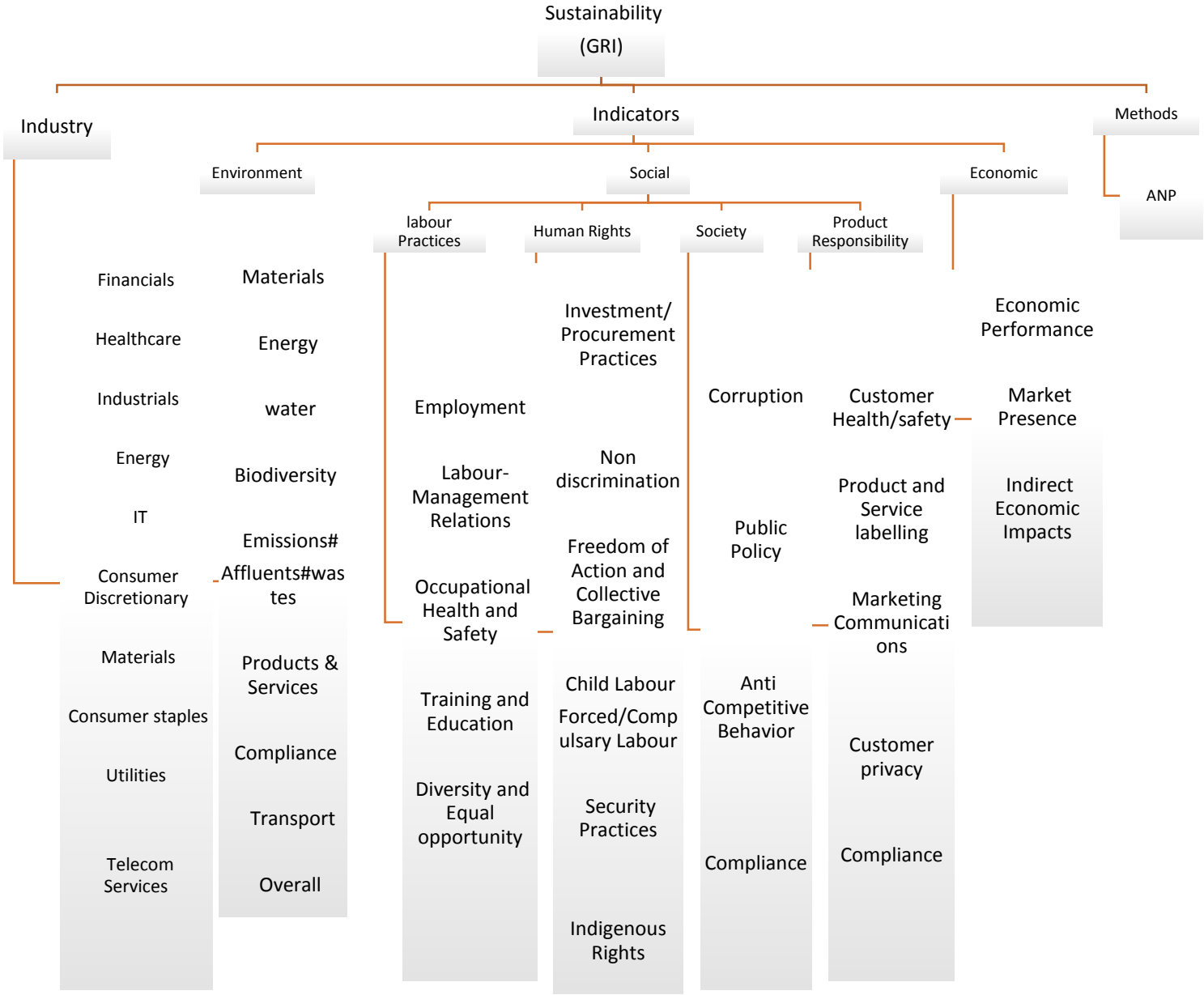

Sustainability
(GRI)
Industry
Indicators
Methods
ANP
Environment
Social
Economic
labour Practices
Human Rights
Society
Product Responsibility
Financials
Healthcare
Industrials
Energy
IT
Consumer Discretionary
Materials
Consumer staples
Utilities
Telecom Services
Materials
Energy
water
Biodiversity
Emissions#
Affluents#wastes
Products & Services
Compliance
Transport
Overall
Employment
Labour-Management Relations
Occupational Health and Safety
Training and Education
Diversity and Equal opportunity
Investment/ Procurement Practices
Non discrimination
Freedom of Action and Collective Bargaining
Child Labour
Forced/Compulsary Labour
Security Practices
Indigenous Rights
Corruption
Public Policy
Anti Competitive Behavior
Compliance
Customer Health/safety
Product and Service labelling
Marketing Communications
Customer privacy
Compliance
Economic Performance
Market Presence
Indirect Economic Impacts

Fig 3.10: Sustainability GRI breakdown structure

After studying about the 100 most sustainable companies and the GRI indicators we will study about each category and present a summary of our findings.

Financials: Under the Financial Category we have 5 companies (Westpac Banking, Keppel Land Limited, Australia and New Zealand Banking Group, Shinhan Financial Group Co. Ltd and Hang Seng Bank Ltd). The First column of the table below shows the GRI indicators (For Code and number of all the indicators please refer appendix). The 'Y' (yes) and 'N' (no) shows whether the company is reporting that indicator or not e.g. For EN1 every company is reporting the indicator so it is all 'Y' and same applies for EN2. We have taken best of 3 "yes" responses e.g. EN5, Hang Seng bank is not reporting while the other 4 companies are reporting that makes four "yes's" so it would be included in the summary table if there are less than 3 "yes's" that indicator is not included e.g. EN 11 there is one "yes" (only Westpac Banking is reporting it) so we have not included that in the summary table 15. Similarly all the indicators have been analyzed. Table 3.13 shows the GRI index for Financials.

	1	17	19	30	31
	Financials	**Financials**	**Financials**	**Financials**	**Financials**
GRI Indicators	Westpac Banking	Keppel Land Limited	Aus & NZ Banking group Limited	Shinhan Financial Group Co. Ltd	Hang Seng Bank Ltd
EN					
EN1	Y	Y	Y	Y	Y
EN2	Y	Y	Y	Y	Y
EN3	Y	Y	Y	Y	Y
EN4	Y	Y	Y	Y	Y
EN5	Y	Y	Y	Y	N
EN6	Y	Y	Y	Y	N
EN7	Y	Y	Y	Y	N
EN8	Y	Y	Y	Y	Y
EN9	N	Y	Y	Y	N

EN10	N	Y	N	Y	N
EN11	Y	N	N	N	NA
EN12	Y	N	N	N	NA
EN13	N	N	N	N	N
EN14	Y	N	N	N	N
EN15	N	N	N	N	N
EN16	Y	Y	Y	Y	Y
EN17	Y	Y	Y	Y	Y
EN18	Y	Y	Y	Y	N
EN19	Y	Y	N	Y	NA
EN20	N	Y	N	Y	NA
EN21	N	Y	N	Y	Y
EN22	Y	Y	P	Y	Y
EN23	Y	Y	N	N	NA
EN24	N	Y	N	N	N
EN25	N	Y	N	N	N
EN26	Y	Y	Y	Y	Y
EN27	N	Y	N	Y	NA
EN28	Y	Y	Y	N	None
EN29	Y	N	N	Y	N
EN30	N	N	Y	Y	N
LA					
LA1	P	Y	Y	N	Y
LA2	P	Y	Y	Y	Y
LA3	Y	Y	P	Y	N
LA4	Y	Y	P	N	None
LA5	Y	Y	Y	N	Y
LA6	Y	Y	P	Y	Y
LA7	Y	Y	Y	Y	Y
LA8	Y	Y	Y	N	Y
LA9	Y	N	Y	None	Y
LA10	P	Y	Y	Y	Y
LA11	Y	Y	Y	Y	Y
LA12	Y	Y	Y	Y	Y
LA13	Y	N	Y	Y	Y
LA14	Y	N	P	Y	Y
HR					
HR1	P	N	Y	N	Y
HR2	Y	N	Y	N	None
HR3	Y	N	Y	N	Y
HR4	Y	Y	Y	N	Y
HR5	Y	Y	Y	N	Y
HR6	Y	N	Y	N	Y
HR7	Y	N	Y	N	Y
HR8	Y	N	Y	N	Y

HR9	Y	N	Y	N	None
SO					
SO1	Y	Y	Y	Y	Y
SO2	Y	Y	Y	Y	Y
SO3	Y	Y	Y	Y	Y
SO4	Y	Y	Y	Y	N I
SO5	Y	N	Y	N	Y
SO6	Y	N	Y	N	None
SO7	Y	N	Y	Y	None
SO8	Y	Y	Y	Y	None
PR					
PR1	N	Y	N	N	Y
PR2	N	Y	N	N	None
PR3	Y	N	Y	N	Y
PR4	Y	N	Y	N	None
PR5	Y	N	Y	N	Y
PR6	Y	Y	Y	N	Y
PR7	Y	Y	Y	N	None
PR8	Y	N	Y	Y	None
PR9	Y	Y	Y	Y	None
EC					
EC1	Y	Y	Y	N	Y
EC2	Y	Y	Y	N	Y
EC3	Y	Y	Y	N	Y
EC4	Y	Y	Y	N	N
EC5	Y	Y	Y	N	Y
EC6	P	N	Y	N	Y
EC7	Y	Y	Y	N	Y
EC8	Y	N	Y	Y	Y
EC9	Y	N	Y	Y	N

Table 3.13: GRI Index for Financials

(N- No, None, NI- No Information, NA- Not Applicable are considered No while Y- yes and P- partially reporting are considered yes). For the code, the full list of the indicators, the GRI indicators of the rest of the categories please refer appendix please check the appendix.

Summary: The summary Table 3.14 shows the list of the environmental, social and the economic indicators that each category of the company is reporting. The table below can be used as a benchmarking tool by the new companies that are looking to make in to the

list of 100 most sustainable companies e.g. a company in the Healthcare sector can measure or report the organization's performance against the indicators in the Healthcare category.

	Environmental	**Social**	**Economic**
Financials	EN(1,2,3,4,5,6,7,8,9,16,17,18,19,21,22,25,26,28)	LA(1,2,3,4,5,6,7,8,9,10,11,12,13,14) HR(1,3,4,5,6,7,8) SO(1,2,3,4,5,7,8) PR(3,5,6,7,8,9)	EC(1,2,3,4,5,6,7,8,9)
HealthCare	EN(1,3,4,5,6,7,8,9,16,17,18,22,23,24,26,28,29)	LA(1,2,3,4,6,7,8,10,11,12,13) HR(2,3,5) SO(1,2,3,5,6) PR(1,3,5,6,7)	EC(1,2,3,8,9)
Industrials	EN(3,4,5,6,7,8,16,17,18,19,20,22,23,26,28)	LA(1,2,4,7,8,10,11,12,13) HR(1,2,3,5,6,7) SO(1,2,3,4,5,6,7,8) PR(1,2,3,4,5,9)	EC(1,2,3,6,7,8,9)
Energy	EN(1,3,4,5,6,8,9,11,12,13,14,16,17,18,19,20,21,22,23,25,26,28,29)	LA(1,2,4,7,8,11,12,13,14) HR(1,2,5,6,7,8,9) SO(1,2,3,4,5,6,7,8) PR(1,3,9)	EC(1,2,3,4,6,7,8,9)
IT	EN(1,2,3,4,5,7,8,11,16,17,18,19,20,22,26,28,29,30)	LA(1,2,6,7,8,10,11,13) HR(4,5,6,7) SO(1,2,3,4,5,7,8) PR(1,2,5,6,7,9)	EC(1,9)
Consumer Discretionary	EN(1,2,3,4,5,6,7,8,9,10,12,16,17,18,19,20,21,22,25,26,28,29)	LA(1,2,3,4,5,6,7,8,9,10,11,12,13,14) HR(1,2,3,4,5,6,7,9) SO(1,2,3,4,5,6,7,8) PR(1,2,3,4,5,6,7,8,9)	EC(1,2,3,4,5,6,7,8)
Materials	EN(1,3,4,5,6,7,8,9,11,12,16,17,18,20,21,22,23,26,28)	LA(1,2,4,6,7,8,9,10,11,12,13) HR(2,3,4,5,6,7,8) SO(1,2,3,4,5,6) PR(1,3,6)	EC(1,2,3,4,6,8)
Consumer Staples	EN(1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20,21,22,23,25,26,27,28,29,30)	LA(1,2,4,5,7,8,10,11,13,14) HR(1,2,3,4,5,6,7,8,9) SO(1,2,3,4,5,6,7,8) PR(1,2,3,4,6,7,9)	EC(1,2,3,4,6,7,8,9)
Utilities	EN(1,2,3,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25,26,27,28,29)	LA(1,2,3,5,6,7,8,9,10,11,12,13,14 HR(1,2,6,8,9) SO(1,2,3,4,5,6,7,8) PR(1,2)	EC(9)

Telecommunication Services	EN(1,3,4,5,7,8,16,17,18,19,22,26,28,30	LA(1,2,3,4,6,7,8,10,11,12,13,14) HR(2,6,7) SO(1,2,3,8) PR(5,8)	EC(1,4,7,8,9)

Table 3.14: Summary of indicators

After analysis of the Table 3.14 we can conclude, there are some indicators that are commonly reported, we will discuss about the indicators category wise. In the environment category the top 5 indicators that organizations are commonly reporting are EN (1, 2, 3, 8 and 9). In the labour and descent work category indicators LA (1, 2, 7, 8, 11 and 13) have been repeated maximum times which indicates these indicators are reported commonly by the organizations. In the human rights category, HR (2, 5, 6, and 7) indicators are being reported by majority of organizations. In the society and product responsibility categories, indicators SO (1, 2, 3, 4 and 5) and PR (1, 3, 5, 6 and 9) are commonly reported. In the economic category indicators EC (1, 2, 3, 8 and 9) are being reported. All the indicators that are being reported commonly are used in our sustainability balanced scorecard e.g. EN 2 indicator is percentage of material recycled, the indicator can be incorporated under waste management category. We have also included the indicator in the supply chain diagram in section 3.1.

3.3 Applying Multi Criteria Decision Making Approach ANP for evaluating Sustainability Performance of Business Organizations

We have identified a total of 109 indicators (explained in numerical analysis chapter) of measuring business processes sustainability. As discussed in section 3.2.1 the sustainability scorecard has four dimensions namely; organization, process, learning and core. We will discuss about the dimensions and the indicators:

1. Organization: Organization dimension contains the indicators related to the organisational performance i.e. employees, management. We have provided some of the indicators for performance measurement in this category i.e. improvement planning, rate of improvement, employee perception and recognition, investment per employee etc. We can also incorporate indicators associated with social category in the organization dimension i.e. HR3 (total number of employee training on human right policies), HR4 (total number of incidents of discrimination), LA11 (skills management program for continued employability), HR9 (incidents of violation). We can incorporate all the indicators belonging to the inner management and employees under this dimension.

2. Process: Process dimension consists of the indicators that represent categories; operations, sales & marketing, service and distribution. We have find out the indicators under each category for performance measurement e.g. operations category is further divided in to three sub categories namely; manufacturing, supplier relationship management and waste management. We have provided the indicators to measure supplier relationship management some of the indicators are total spend/sales, defect rate of supplier. Other indicators that can be used in this category are EN2 (percentage of material recycled input material), EN3 (water consumption by supplier), EN18 (GHG reduction initiatives) etc.

3. Learning: Learning dimension of sustainability scorecard comprises of two main categories; growth and quality. Growth stands for the sustainable development of organization. Some of the indicators that represents growth are repeat business/ total sales, new products and services. The sustainability indicators like EC1 (economic value generated) and financial indicators can be included. Quality stands for defect free products

that are sustainable to use and environment friendly. The indicators used are process defect rate, customer satisfaction. Indicators like LA8 (risk of disease in job), PR2 (health and safety of products) etc. can be included in this category

4. Core: Core dimension contains the strategic indicators namely; continuous improvement, collaboration, innovation and leadership. All these indicators are important to maintain the firm's sustainable performance and keeping all the indicators together.

3.3.1 ANP

ANP is a multi-criteria decision making approach for evaluating alternatives against a pre-defined set of criteria by a committee of decision makers. ANP is the generalized form of the analytic hierarchy process, priorities are established the same way as that of AHP using pair wise comparisons but many problems cannot be structured hierarchically as there needs to be an interaction between the lower level elements and the higher-level elements in the hierarchy. Therefore, ANP is capable of taking inter-relationships of correlations among criteria into account. The fundamental weight of scale used for the pair wise comparison is:

1 :	Equal Importance
2 :	Moderate Importance
5 :	Strong Importance
7 :	Very Strong Importance
9 :	Extreme Importance
2,4,6,8 :	Intermediate values

The steps of ANP are (Yang et al., 2013; Yazgan & Ustun, 2011);

1. Constructing Network Model and Structuring Problem

The problem is started by constructing the network model through brain storming or other appropriate methods. Fig 3.11 gives the overview of ANP comparisons

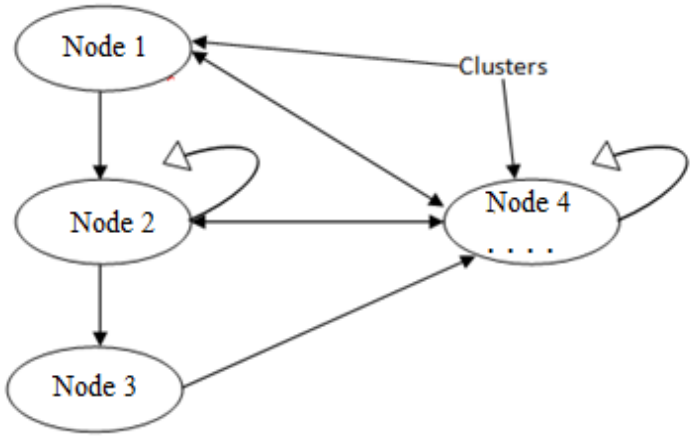


Fig 3.11: ANP network

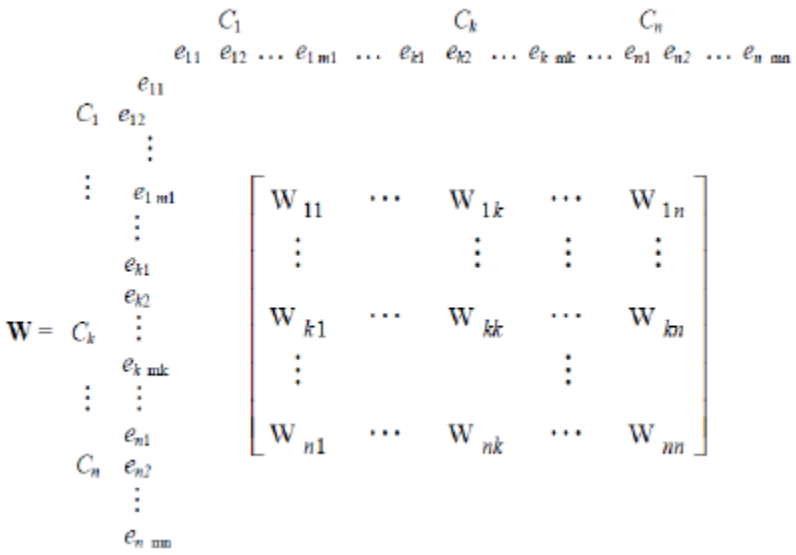
Similar to the comparisons as in AHP, the nodes in each cluster are compared with respect to the importance to the control criteria and the clusters themselves are compared, in Fig 3.11 the dots represents the nodes. The decision makers respond to the pair wise comparisons that can be evaluated in terms of upper or lower level network. The number of decision makers for the pairwise comparisons would depend upon the knowledge of the decision maker on the particular subject e.g. a company wants to know if recycling is a good option for them or not in this case, the operations manager can take the decision alone or he can take help from the junior staff. When multiple decision makers are involved in the decision making process it becomes necessary to aggregate individual judgements in to a single judgement that would represent the group.

2. Un-weighted super matrix formation

The un-weighted super matrix contains local priorities obtained through the pair wise comparisons. The pairwise comparisons with respect to criteria are done assuming the

scale of 1 to 9 and their relative importance is determined and is noted in the format shown.

The general form of super matrix is:



Where C_n is the nth cluster, $W_{11}\ldots W_{nn}$ shows the local priorities from the pairwise comparisons e.g. W_{11} shows the overall result of comparisons with respect to 1st criteria and so on and e_{nm} is the mth criterion in the nth cluster.

3. Weighted super matrix formation

The weighted super matrix is obtained by multiplying all the elements in the un-weighted super matrix by the cluster weights associated with that element. In the case where all clusters are equally important and no cluster comparisons are done, the un-weighted and the weighted super matrix are same. The process of obtaining the weighted super matrix is known as Normalization. Normalization transforms each column to sum exactly to unity and thus the matrix is stochastic. The super matrix below shows the un-weighted super matrix where W_w stands for un-weighted super matrix, $t^s_{11\ldots.}t^s_{nn}$ are the elements from the normalized matrix.

$$W_w = \begin{bmatrix} t_{11}^s \times W_{11} & t_{21}^s \times W_{12} & \cdots & \cdots & t_{n1}^s \times W_{1n} \\ t_{12}^s \times W_{21} & t_{22}^s \times W_{22} & \vdots & & \vdots \\ \vdots & \cdots & \cdots & \cdots & t_{ni}^s \times W_{in} \\ \vdots & & \vdots & & \vdots \\ t_{1n}^s \times W_{n1} & t_{2n}^s W_{n2} & \cdots & \cdots & t_{nn}^s \times W_{nn} \end{bmatrix}$$

4. Limit super matrix formation and selection of best alternative

The weighted super matrix is raised to power of 2k+1 to achieve the convergence of importance weights, where k is an arbitrary number, the new matrix formed is called limit super matrix. When column of the numbers is same means the limit super matrix has been reached, the multiplication process is stopped and final priorities are obtained. If the super matrix covers the whole network, the alternative with the largest priority is selected based on the synthesis result from the limit super matrix.

3.3.2 Sensitivity Analyses

Sensitivity Analyses is a what-if type of analyses that allows to select any combination of the independent variables to reflect their impact on output variables (or variables of interest). It can be nodes, super matrix entries or the individual judgements in case of ANP. The priorities of the alternatives are graphed. It is conducted by changing the criteria weights while keeping the weights of the other indicators constant. For our sustainability model, organizations can conduct the analyses by examining the indicators they wish to improve on. We have used super decisions software (Zhang, 2013) for conducting ANP and sensitivity analysis in our study.

3.4 Application of Sustainability Scorecard – ANP

There are many research papers that discuss the usefulness of the integration of ANP and scorecards (Bhattacharya et al., 2013). In the next chapter, we will show the practical applicability of our sustainability scorecard via ANP to evaluate the sustainability performance of three organizations namely company X, Y and Z. The ANP technique with the feedback mechanism can overcome the traditional problems like dependency relationships. ANP technique provides a systematic approach to measure interdependence and relative weights of the indicators in the sustainability scorecard. As the relative weights are being calculated in the ANP, the improvements can be suggested depending upon the weights. Thus, ANP is a "versatile multi- attribute technique" used for the implementation of the scorecards. Since interactions between the indicators is the underlying principle of our sustainability scorecard, ANP approach provides the flexibility for the indicators to interact with each other. The consistency test in the ANP can be used by the decision makers to make consistent judgements.

Chapter 4

Numerical Analysis

4.1 Super-decisions Software

For numerical analysis, we have used the super decisions software developed by Dr. Thomas Saaty. Super decisions is based on the Analytic Hierarchy Process (AHP) and the Analytic Network Process (ANP) techniques. The super- decisions software implements the Analytic Network Process for decision making with dependence and feedback. The ANP derives the global priorities of the indicators by pair-wise comparing them to all the indicators it interacts with, and then local priorities are calculated. A super matrix is formed for criteria prioritization by multiplying all the elements in the un-weighted super matrix by corresponding cluster weights. The weighted super matrix is raised to powers by multiplying it to several times itself called limit super matrix until the value of the columns become the same which shows that the limit matrix has been reached.

4.2 Overview

In this chapter, we will use Analytical Network Process to apply sustainability scorecard framework for evaluating performance of the three companies (X, Y and Z). Companies X, Y and Z are imaginative companies, we will rank and prioritize the companies based on pair wise comparisons with respect to the indicators and finally the rankings of the companies will be shown, the company with the highest rank will show the best adoption to the performance indicators while the company with the last rank will show the least.

The Table 4.1 shows the list of all the indicators that are used for the comparison with the categories and the sub categories. There are a total of 109 indicators that have been used out of which 31 indicators are presented below while rest of 78 indicators represents sustainability (environment, social and economic). The environment category have 30, social have 39 and economic have 9 indicators respectively.

Category/ Number of indicators	**Sub- Category**	**Indicator**	**Description**
Organization(7)	Management	M1	Goal Setting
		M2	Improvement Planning
		M3	Rate of Improvement
	Employees	EM1	Employee Perception and Recognition
		EM2	Employee Innovative Recommendations
		EM3	Investment per Employee
		EM4	Number of Patents/ Publications per Employee
Process(15)	Operations	O1	Material Acceptance Rate
		O2	Total Spend/Sales
		O3	Defect Rate(supplier)
		O4	Supplier Involvement
	Sales & marketing	SM1	Number of Inquiries
		SM2	Profit Margin/Sales
		SM3	New Business/ Total Sales
	Service	S1	Customer Satisfaction
		S2	Customer Retention
	Distribution	D1	Costs(Inventory, Transportation, Handling , Information)
		D2	Customer Experience
		D3	Order Visibility
		D4	Product Variety Available
		D5	Response Time
		D6	Return ability
Core(4)	Collaboration	C1	Collaboration activities for Firm performance
	Continuous Improvement	C2	Continuous Improvement activities for Firm performance

	Innovation	C3	Innovation activities for Firm performance
	leadership	C4	Leadership activities for Firm performance
Learning(5)	Growth	G1	Repeat Business/ Total Sales
		G2	New Product or Services
	Quality	Q1	Process Defect Rate(Sigma)
		Q2	Customer Defects/ Total defects
		Q3	Service Call Rate

Table 4.1: Indicators

Note: For the sustainability indicators of please check the appendix.

Indicators: The indicators presented above shows their significance in the particular domain only e.g. Indicator M1 (goal setting) may sound that it's solely intended for internal management goal setting only but in the sustainability scorecard we have integrated sustainability in the indicator to explain that the goals must be sustainable and should be set so as to achieve the balance with the rest of the indicators.

4.3 Figure Explanation

The Fig 4.2 shows the ANP model for evaluating the companies on the basis of the indicators discussed above. The arrow indicates the connection of a node in a cluster to the other node in the another cluster known as outer dependence while the self-loop indicates the comparison of a node to another node in the same cluster known as inner dependence e.g. in the Fig 4.1 we can see the node M1's connection with the another nodes that are highlighted in the red. The two way arrow indicates the connection from both sides in different clusters while an arrow in a single direction shows the connection from the parent node towards the children node. In the diagram below the M1 indicator is connected to the 16 other indicators in the different clusters in addition to the comp X, comp Y and the comp Z. All the three companies are connected to all the 109 indicators

and have been pair wise compared. In the comparison window (Fig. 4.1), red arrow pointing upwards shows that top node is preferred and the blue arrow shows that left node is preferred.

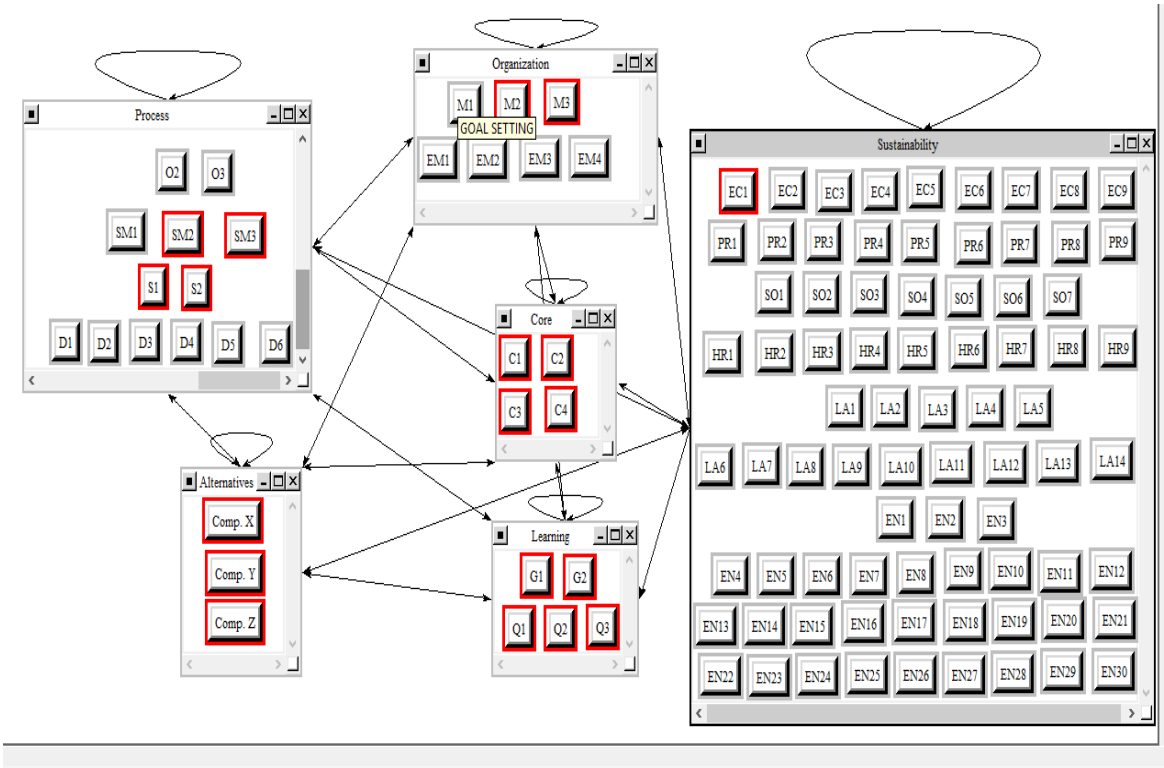


Fig 4.1: ANP Diagram

All the connections have been done in a similar fashion, the nodes in the alternatives clusters have been connected to the every indicator, so that the companies can be compared pair wise with each other but respect to all the indicators individually.

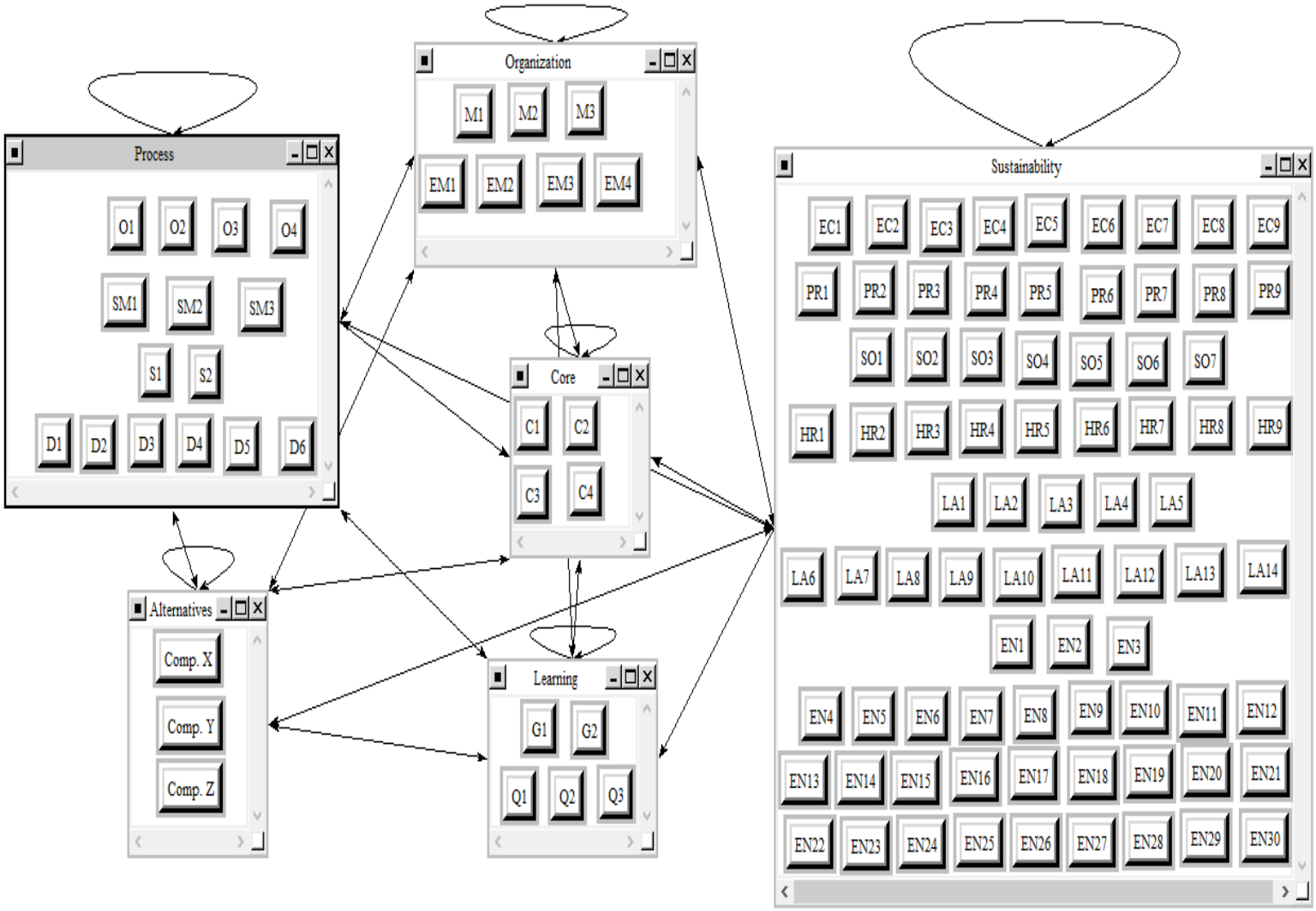


Fig 4.1: ANP Network Diagram

Justification of Connections: The connections have been made depending upon the factor that if an indicator can be influenced by or it influences the other indicator in any cluster e.g. the indicator M1 (Goal setting) is connected with other indicators like M2, M3 (organization cluster), all the core indicators C1- C4 (core cluster), O4, SM2, SM3, S1, S2 (process cluster), EC1 (sustainability cluster) and the alternatives (comp X, Y and Z). In this case, parent node is M1 while all the other nodes to which it is connected acts as children nodes and the comparisons have been done with respect to M1 node. As M1 indicator is the goal setting, it is believed that the setting of goal would have an impact on improvement planning and rate of improvement, secondly the goal setting is also very much related to all the core indicators (continuous improvement, collaboration, innovation and leadership). Goal setting, depending upon how realistic the goal is, can lead to the profit margin and increase in the total sales while also relating to the direct economic impact generated (EC1) and finally companies X, Y and Z are evaluated or ranked based on the M1 indicator. As M1 is connected to the nodes in every cluster so there will be 6 comparison windows as nodes would be compared with respect to M1. Fig 21 and fig 22 shows the two comparison windows for an example. The Table 4.2 shows the weight of the indicators when they are pair-wise compared with respect to M1. Similarly, all the node wise connections are established based upon the thinking and the companies are evaluated, while taking in to consideration all the indicators one by one. In the ANP, we can do pairwise comparisons between nodes and the clusters with respect to the nodes in the other cluster.

M2 (.431)	M3 (.568)	O4 (.217)	SM2 (.099)
SM3 (.284)	S1 (.210)	S2 (.188)	C1 (.233)
C2 (.185)	C3 (.221)	C4 (.358)	G1 (.227)
G2 (.169)	Q1 (.237)	Q2 (.161)	Q3 (.203)

Table 4.2: Indicator Weights

We can rank these indicators to find out their importance for the goal setting e.g. M3 shows the highest value which means rate of improvement. Similarly we can rank all the indicators to prioritize them when M1 is involved.

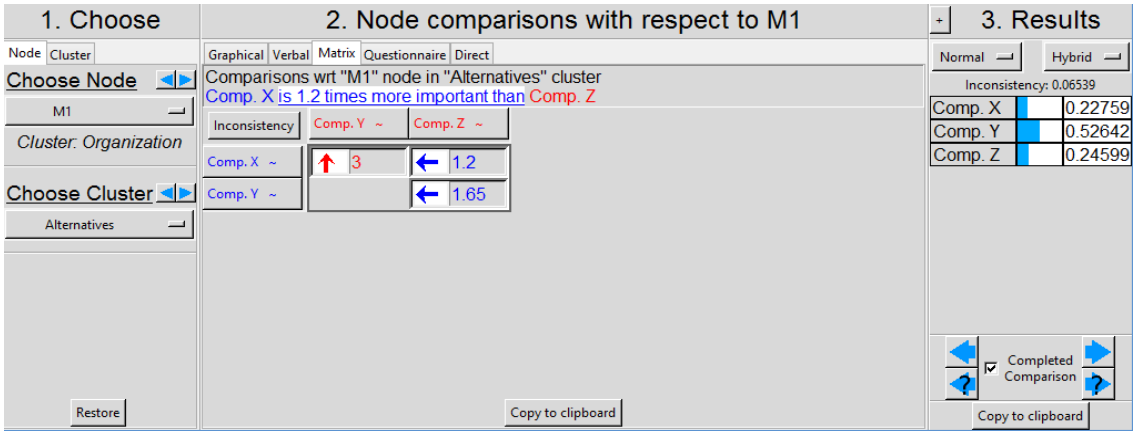


Fig 4.2: Comparison Window

In the Fig 4.3, we can see comparison with respect to parent node (M1) has been done for the companies (the values used are random and can be inter-changed with the real data). We can see w.r.t to M1 indicator company Y shows the highest possibility of adoption of the indicator because of the highest value (.52642) as compared to other two, but again as this indicator is being influenced by or influences the other indicators it is connected to, the final value would be revealed when all the comparisons would be done. We can also compare nodes in the other clusters with respect to M1. For an illustration, we can see in the Fig 4.4, nodes in the learning cluster are being compared to each other with respect to the indicator M1.

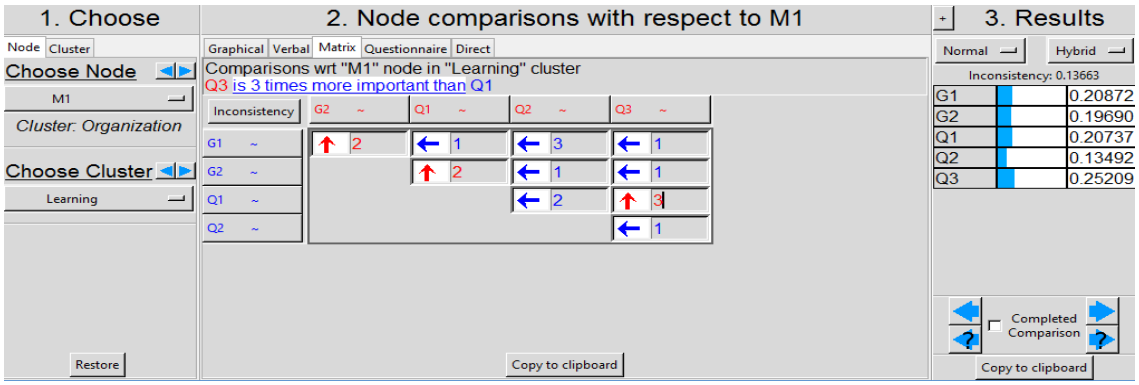


Fig 4.3: Comparison window 1

The values used in the above comparison are just for illustration purpose and are not used while evaluating the companies. The above decisions have been made independently and the consistency of the pairwise comparisons have been checked, through the option in the software which can be seen above in the window. The consistency should be less than 10 %. In the above example the consistency is 13.66 % which means the values of the pair wise comparisons needs to be changed to bring consistency less than 10%.

The data has been presented in the below tables after evaluating the companies X, Y and Z with respect to all the 109 indicators. The following tables below shows the numerical values after the pair wise comparison of the companies with respect to the indicators. The values in the table below are from un-weighted super matrix only, we have not mentioned values from weighted super- matrix because cluster weights were not determined as all the clusters are equally important.

4.4 Numerical Values

The weights have been generated by the pairwise comparisons and have been extracted from the un-weighted super matrix as shown in the section 3.3.1 (step 3)

1. Table 4.3 shows the values for the Core cluster

			Core		
		C1	C2	C3	C4
Alternatives	Comp. X	0.176	0.239	0.260	0.284
	Comp. Y	0.435	0.223	0.217	0.435
	Comp. Z	0.388	0.536	0.521	0.279

Table 4.3: Core Cluster Values

From the above table we can conclude that the company Y shows the maximum adoption of the indicator collaboration followed by the company X, while the comp Z scores the maximum value in adoption to the continuous improvement and the innovation indicators, finally for the leadership indicator company Y has the highest value.

2. Table 4.4 shows the values for the Learning cluster.

				Learning		
		G1	G2	Q1	Q2	Q3
Alternatives	Comp. X	0.254	0.258	0.249	0.322	0.277
	Comp. Y	0.305	0.198	0.177	0.322	0.138
	Comp. Z	0.440	0.542	0.572	0.354	0.583

Table 4.4: Learning Cluster Values

In the learning cluster company Z overall shows the highest value of adoption for all the indicators (G1, G2, Q1, Q2 and Q3).

3. Table 4.5 shows the values for the Organisation cluster.

					Organization			
		EM1	EM2	EM3	EM4	M1	M2	M3
Alternatives	Comp.X	0.257	0.308	0.254	0.442	0.227	0.323	0.360
	Comp.Y	0.444	0.419	0.211	0.280	0.526	0.322	0.171
	Comp. Z	0.297	0.271	0.533	0.277	0.245	0.353	0.468

Table 4.5: Organization Cluster Values

In the organization cluster company Y has the highest rating for (employee perception and recognition and employee innovation) while company Z has highest value of indicators (investment per employee, rate of improvement and improvement planning) while

company X shows the highest vale of adoption of the indicator (number of patents/ publication per employee).

4. Table 4.6 shows the values for the Process cluster.

				Process			
		D1	D2	D3	D4	D5	D6
Alternatives	Comp. X	0.332	0.254	0.382	0.360	0.258	0.343
	Comp. Y	0.3133	0.2114	0.497	0.171	0.198	0.245
	Comp. Z	0.353	0.533	0.119	0.468	0.542	0.411
		O1	O2	O3	O4	S1	S2
Alternatives	Comp. X	0.305	0.303	0.454	0.301	0.380	0.426
	Comp. Y	0.441	0.303	0.251	0.443	0.267	0.230
	Comp. Z	0.253	0.393	0.293	0.255	0.351	0.343
		SM1	SM2	SM3			
Alternatives	Comp. X	0.471	0.253	0.286			
	Comp. Y	0.239	0.441	0.331			
	Comp. Z	0.288	0.305	0.382			

Table 4.6: Process Cluster Values

The process cluster have a total of 15 indicators, the company Z shows the highest value for the indicators (costs-inventory, transportation, handling, and information, customer experience, product variety available, response time, return ability and new business/total sales). Company X shows the highest value of the indicators - supplier defect rate, customer satisfaction and retention and number of inquiries while the company Y shows the highest values for order visibility, supplier involvement and profit margin / sales.

5. Sustainability

a. Table 4.7 shows the values for Economic indicators.

			Economic			
		EC1	EC2	EC3	EC4	EC5
Alternatives	Comp. X	0.332	0.329	0.332	0.312	0.410

	Comp. Y	0.353	0.274	0.313	0.312	0.243
	Comp. Z	0.313	0.395	0.353	0.375	0.346
		EC6	EC7	EC8	EC9	
Alternatives	Comp. X	0.216	0.583	0.239	0.445	
	Comp. Y	0.090	0.138	0.184	0.342	
	Comp. Z	0.693	0.277	0.575	0.212	

Table 4.7: Economic Values

In the economic category the company X shows the highest adoption of EC5, EC7 and EC9, while company Y- EC1 whereas the company Z shows the highest value of the adoption of the indicators (EC2, EC3, EC4, EC6, EC8).

b. Table 4.8 shows the values for Environment indicators.

		EN1	EN2	EN3	EN4	EN5	EN6
Alternatives	CompX	0.647	0.349	0.281	0.369	0.373	0.259
	CompY	0.202	0.150	0.066	0.454	0.177	0.196
	CompZ	0.150	0.499	0.652	0.175	0.448	0.5444
		EN7	EN8	EN9	EN10	EN11	EN12
Alternatives	CompX	0.367	0.253	0.258	0.290	0.239	0.241
	Comp. Y	0.114	0.206	0.258	0.090	0.199	0.201
	Comp. Z	0.517	0.540	0.483	0.618	0.560	0.556
		EN13	EN14	EN15	EN16	EN17	EN18
Alternatives	Comp. X	0.239	0.379	0.180	0.440	0.360	0.254
	Comp. Y	0.184	0.165	0.078	0.191	0.171	0.195
	Comp. Z	0.575	0.455	0.740	0.367	0.468	0.549
		EN19	EN20	EN21	EN22	EN23	EN24
Alternatives	Comp. X	0.347	0.352	0.377	0.303	0.379	0.373
	Comp. Y	0.165	0.352	0.247	0.303	0.165	0.177
	Comp. Z	0.486	0.294	0.374	0.393	0.455	0.448
		EN25	EN26	EN27	EN28	EN29	EN30
Alternatives	Comp. X	0.180	0.234	0.431	0.325	0.362	0.3945
	Comp. Y	0.078	0.190	0.226	0.154	0.151	0.484
	Comp. Z	0.740	0.574	0.342	0.520	0.486	0.120

Table 4.8: Environment Values

Under the environmental category company X shows the highest sensitivity to the indicators (EN1, EN16, EN20, EN21, EN27) while company Y (EN4, EN20, EN30) and the company Z (EN2, EN3, EN5, EN6, EN1, EN8, EN9, EN10, EN11, EN12, EN13, EN14, EN15, EN17, EN18, EN19, EN22, EN23, EN24, EN25, EN26, EN28, EN29).

c. Social

1. Table 4.9 shows the values for Human Rights indicators.

		HR1	HR2	HR3	HR4	HR5	HR6
Alternatives	Comp.X	0.345	0.299	0.259	0.241	0.264	0.472
	Comp.Y	0.164	0.272	0.196	0.199	0.126	0.143
	Comp. Z	0.490	0.428	0.544	0.559	0.609	0.384
		HR7	HR8	HR9			
Alternatives	Comp.X	0.360	0.375	0.242			
	Comp.Y	0.156	0.461	0.197			
	Comp. Z	0.483	0.162	0.560			

Table 4.9: Human Right Values

In the human rights category, company X shows the sensitivity to the indicators (HR6), company Y (HR8) and the company Z (HR1, HR2, HR3, HR4, HR5, HR7, and HR9).

2. Table 4.10 shows the values for Labour Practices and Descent Work indicators

		LA1	LA2	LA3	LA4	LA5	LA6	LA7
Alternatives	Comp. X	0.375	0.289	0.375	0.253	0.241	0.375	0.370
	Comp. Y	0.162	0.320	0.163	0.206	0.199	0.161	0.173
	Comp. Z	0.461	0.389	0.461	0.540	0.558	0.462	0.455
		LA8	LA9	LA10	LA11	LA12	LA13	LA14
Alternatives	Comp. X	0.360	0.334	0.240	0.242	0.257	0.260	0.350
	Comp. Y	0.112	0.253	0.195	0.197	0.194	0.183	0.151
	Comp. Z	0.526	0.411	0.563	0.560	0.547	0.555	0.497

Table 4.10: Labour Practices and Descent Work Values

Under the labour practices and descent work category the company Z shows the highest values to the sensitivity of adoption of the indicators followed by company X and company Y respectively.

3. Table 4.11 shows the values for Product Responsibility indicators.

		PR1	PR2	PR3	PR4	PR5
Alternatives	Comp. X	0.259	0.241	0.242	0.240	0.457
	Comp. Y	0.196	0.196	0.197	0.202	0.285
	Comp. Z	0.544384	0.561	0.560	0.556	0.257

		PR6	PR7	PR8	PR9
Alternatives	Comp. X	0.322	0.242	0.387	0.375
	Comp. Y	0.244	0.197	0.462	0.162
	Comp. Z	0.432	0.560	0.155	0.461

Table 4.11: Product Responsibility Values

Under this category comp. X (PR5), comp. Y (PR8) and comp. Z (PR1, PR2, PR3, PR4, PR6, PR7, PR9).

4. Table 4.12 shows the values for Society indicators.

		SO1	SO2	SO3	SO4	SO5	SO6	SO7
Alternatives	Comp.X	0.342	0.412	0.253	0.313	0.217	0.241	0.322
	Comp.Y	0.160	0.356	0.206	0.237	0.102	0.199	0.343
	Comp. Z	0.496	0.230	0.540	0.448	0.679	0.558	0.333

Table 4.12: Society values

Under the society sub- category, comp X (SO2), comp Y (SO7) and comp Z (SO1, SO3, SO4, SO5, and SO6).

Synthesis Results

The Fig 4.5 shows the overall synthesized result of the ANP model, the company Z shows the most sensitivity to the adoption of the indicators followed by company Y and the company X.

Here are the overall synthesized priorities for the alternatives. You synthesized from the network Super Decisions Main Window: final model.sdmod

Name	Graphic	Ideals	Normals	Raw
Comp. X		0.659403	0.276886	0.082135
Comp. Y		0.722093	0.303210	0.089944
Comp. Z		1.000000	0.419904	0.124560

Fig 4.5: Synthesis Results

The "Raw" column shows the priorities from limiting super matrix, the "Normals" column shows the normalized values for each component while the "Ideal" column shows the result by dividing the values in either columns by the largest value in the column.

4.5 Sensitivity Analyses

The sensitivity analyses in the super decisions software can be done under the computations tab. The sensitivity analyses of the three companies being pairwise compared is shown in Fig 4.6.

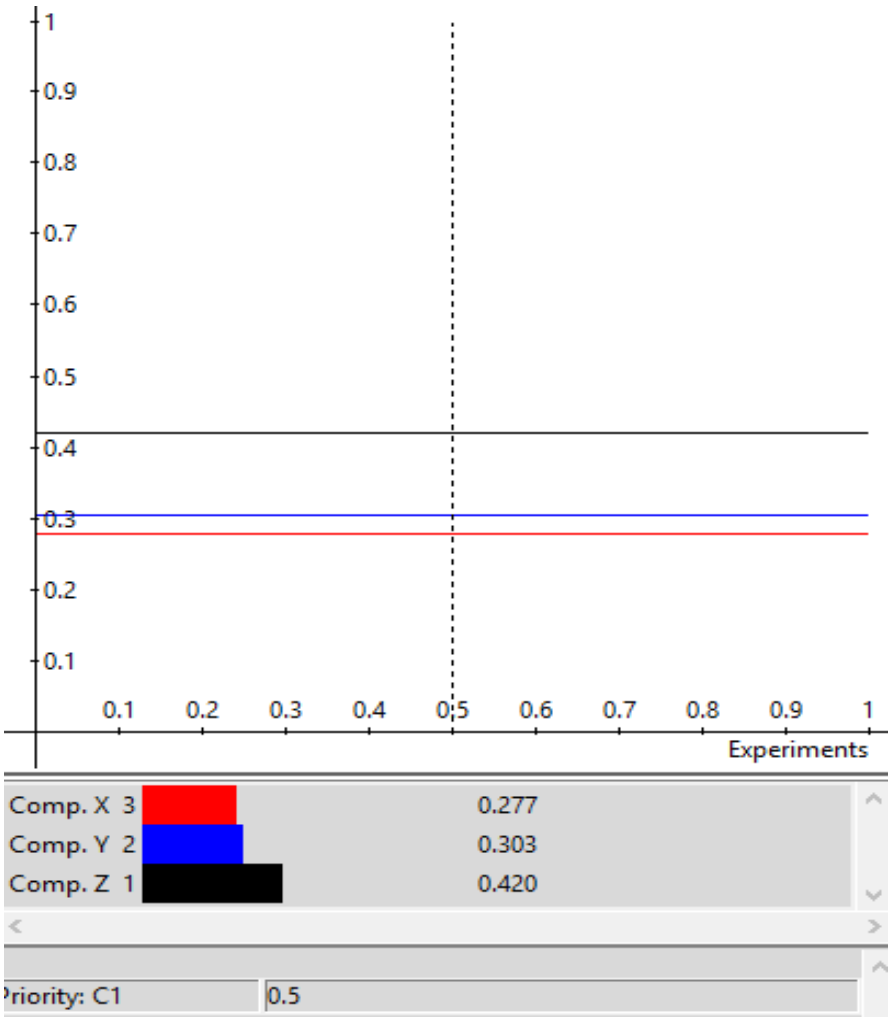


Fig 4.6: Sensitivity Analysis 1

From the Fig we can see that company Z has the highest value which is already being proved from the synthesis results from Fig 24.

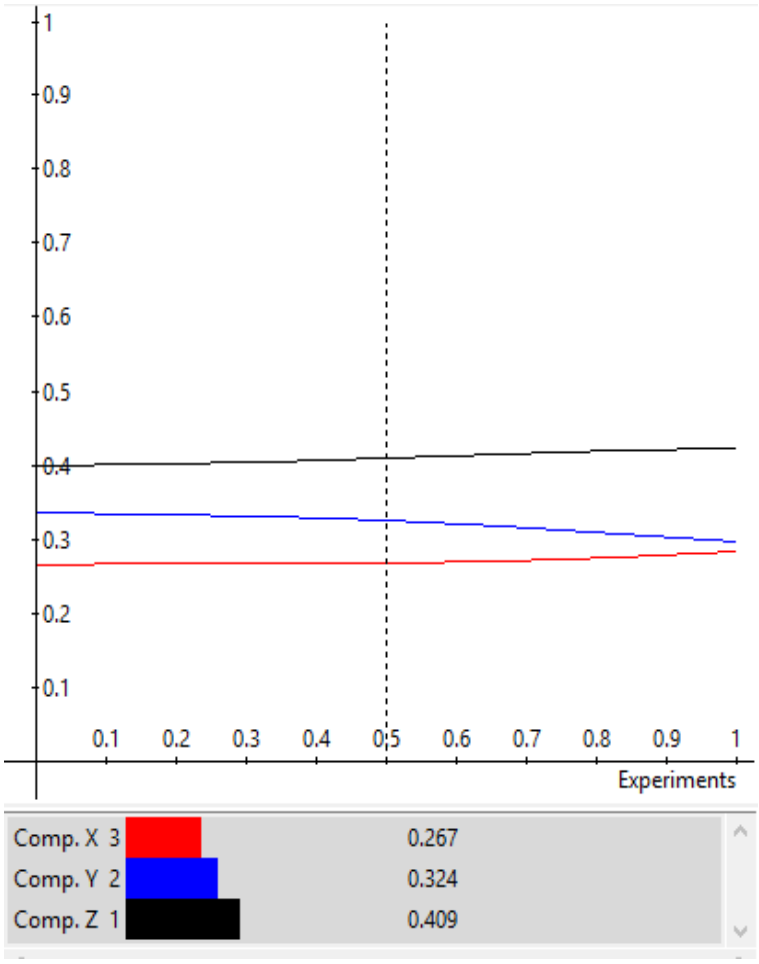


Fig 4.7: Sensitivity Analysis 2

The Fig 4.7 shows the result of altering the value of the indicator C1 by node wise comparison. From the sensitivity analyses, we can see the option 'Company Z' remains dominant even if the value of the indicator C1 changes because it is strongly supported by the other indicators. By changing the value of C1, the value of company Z shows the slight drop in the value from .420 to .409.

Chapter 5

Conclusions and Future works

5.1 Conclusions

In this research, we have examined the sustainability advantages, challenges and the different types of scorecards being used by the business organizations to measure sustainability. A hybrid approach integrating sustainability scorecard framework and ANP is proposed for measuring overall organizational sustainability and suggesting improvements. The proposed sustainability scorecard provides a strong framework for improvement as the indicators used are industry specific, strongly supported by the core values and integration with other indicators provides the flexibility to study the impact of one indicator over another. The ANP model helps to study the strength of the interactions and derive the priorities of indicators. All the stakeholders, decision makers are involved in the development of sustainability scorecard which provides an overall balance and completes the model for mathematical analysis. Secondly, sustainability has been extensively studied using data collected from 100 most sustainable companies. The key indicators under all the categories (environment, social and economic) have been analyzed for all set of companies' i.e. financial, health care, industrial, material etc. and reported under each category. The presented data can be used as a benchmarking tool.

In the numerical analysis chapter, we present the application of the sustainability scorecard with the help of multi criteria decision making technique called Analytic Network Process (ANP). Pair wise comparisons of the indicators for the three companies

(company X, Y and Z) are performed to analyze their performance against the other indicators. Sensitivity analyses has been presented.

Limitations

1. The indicators used for GRI reporting are G3, more detailed version of the indicators have been published by GRI i.e. G4 guidelines.
2. Non-availability of data for some companies i.e. in top 100 list can result in deviation and may lead to wrong indicator selection.
3. The values used for pair wise comparisons in the numerical analysis chapter to find out the set of indicators for companies are non- real so we can-not guarantee the overall outcome of the result.

5.2 Future Work

In future, we will advance our present work by applying the sustainability scorecard to different industries, as the model works on the set of indicators, different businesses relies on different indicators and strategies for the performance measurement. Testing the model against distinct set of indicators and real data can give an insight to the sustainability scorecard adaptation in various sectors.

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Appendix

Environment
EN1 Materials used by weight or volume
EN2 Percentage of materials recycled Input materials
EN3 Direct Energy Consumption by Primary Energy Source
EN3 Direct Energy Consumption by Primary Energy Source
EN4 Indirect Energy Consumption by Primary source
EN5 Energy saved due to conservation and efficiency improvements
EN6 Renewable /energy-efficient initiatives and result
EN7 Initiatives to reduce indirect energy consumption and reductions achieved
EN8 Total water withdrawal by source
EN9 Water sources significantly affected by withdrawal of water
EN10 percentage and total volume of water recycled and reused
EN11 Location and size of land owned, leased, managed in, protected areas of high biodiversity value outside protected areas
EN12 Description of significant impacts of activities, products and services on biodiversity in protected areas of high biodiversity value outside protected areas
EN13 Habitats protected or restored
EN14 Strategies, current actions, and future plans for managing impacts on biodiversity
EN15 Number of IUCN Red list species and natural conservation list species with habitats in areas affected by operations, by level of extinction risk
EN16 Total direct and indirect gas emissions by weight
EN17 Other relevant indirect GHG by weight
EN18 Initiatives to reduce GHG emissions and reductions achieved
EN19 Emissions of ozone depleting substances by weight
EN20 NO, SO and other significant air emissions by type and weight
EN21 Total water discharge by quality and destination
EN22 Total weight of waste by type and disposal method
EN23 Total number and volume of significant spills
EN24 Weight of (transported, imported, exported or treated) waste deemed hazardous and percentage of transported waste shipped internationally
EN25 Identity, size, protected status and biodiversity value of water bodies and related habitats significantly affected by the reporting organizations discharges of water and runoff
EN26 environmental impacts Mitigation Initiatives and impact
EN27 percentage of products sold and their packaging reclaimed
EN28 Fines for non-compliance with environmental laws and regulations
EN29 Impacts of transporting products and materials used for operations and transporting members of the workforce
EN30 Total Environmental protection expenditures and investments by type

Social
LA1 Total workforce by employment type, employment contract and region
LA2 Total number and Rates of new employee turnover by age group, gender and region
LA3 Benefits provided to full time employees that are not provided to temporary or part time employees by locations of operations
LA4 Percentage of employees covered by collective bargaining agreements
LA5 Minimum Notice period regarding operational changes, Including whether these are specified in collective agreements
LA6 Percentage of total workforce represented in Health and Safety Committees
LA7 Types of Injury and its Rate/Occupational Diseases/Lost Days/Absenteeism/Work related Fatalities by region and by gender
LA8 Workers with high risk of diseases related to their occupation
LA9 Health and safety topics covered in formal agreements with Trade unions
LA10 Average hours of training per year per employee by gender and employee category
LA11 Skills Management Programs and lifelong learning support that support continued employability
LA12 Percentage of employees receiving regular performance and career development reviews by gender and by employee category
LA13 Composition of Governance Bodies and breakdown of employees category according to gender, age group, minority group membership and other indicators of diversity
LA14 Ratio of basic salary men to women by employee category
HR1 Percentage of investment agreements or contracts that include Human right clauses
HR2 Percentage of significant suppliers and contractors that have undergone screening on human rights and actions taken
HR3 Total number of employee training on human rights policies relevant to operations
HR4 Total number of Incidents of Discrimination and Corrective Actions taken
HR5 Operations identified in which the right to exercise freedom of association and collective bargaining may be violated or at significant risk and measures taken to support these rights
HR6 Operations and suppliers identified as having significant risk for incidents of child labour and measures taken to contribute to the effective abolition of child labour
HR7 Operations and suppliers identified as having significant risk for incidents of forced or compulsory labour and measures to contribute to the elimination of all forms of forced or compulsory labour
HR8 Percentage of security personnel trained in the organizations Human rights policies or procedures that are relevant to operations
HR9 Total Number of Incidents of violations involving human rights of indigenous peoples and Actions taken
SO1 Nature, Scope and effectiveness of any programs and practices that access and manage the impact of operations on communities
SO2 Total number and percentage of operations Assessed for risks related to corruption and significant risks identified

SO3 Communication and training on Anti-corruption policies and procedures
SO4 Confirmed incidents of Corruption and Actions taken
SO5 Total value of financial and in-kind contribution to political parties and related institutions
SO6 Total number of legal actions for anti-competitive behavior, Anti-trust and monopoly practices and their outcomes
SO7 Monetary value of significant Fines and total number of non-monetary sanctions for non-compliance with laws and regulations
PR1 Percentage of significant product and service categories for which health and safety impacts are assessed for improvement
PR2 Total Number of incidents of noncompliance with regulations and voluntary codes concerning the health and safety impacts of products and services during their life cycle, by type of outcomes
PR3 Type of product and service information required by the organizations procedures for product and service information and labelling and percentage of significant product and service categories subject to such information requirements
PR4 Total number of noncompliance with regulations and voluntary codes concerning product and service information and labelling by type of outcomes
PR5 Result of surveys Measuring customer Satisfaction
PR6 Sale of banned or disputed products
PR7 Incidents of Non Compliance concerning Marketing Communications, Including Advertising, Promotion and sponsorship by type of outcomes
PR8 Complaints regarding breaches of customer privacy and loss of customer data
PR9 Monetary value of fines for Noncompliance with laws and regulations concerning use of products and services
EC1 Direct economic value generated and distributed
EC2 Financial implications and other risks and opportunities for the organization's activities due to climate change.
EC3 Coverage of the organization's defined benefit plan obligations
EC4 Significant financial assistance received from government
EC5 Range of ratios of standard entry-level wage compared to local minimum wage at significant locations of operation
EC6 Policy, practices, and proportion of spending on locally based suppliers at significant locations of operation
EC7 Procedures for local hiring and proportion of senior management hired from the local community at significant locations of operation
EC8 Development and impact of infrastructure investments and services provided primarily for public benefit through commercial, in-kind, or pro bono engagement
EC9 Understanding and describing significant indirect economic impacts, including the extent of impacts

Table 1: GRI Indicators

	2	7	18	21	57
	HealthC	**HealthC**	**HealthC**	**HealthC**	**HealthC**

GRI Indicators	Biogen IDEC	Novo Nordisk	UCB SA	Life Corp	Johnson & Johnson
EN					
EN1	Y	Y	N	N	Y
EN2	N	N	N	N	Y
EN3	Y	Y	Y	Y	Y
EN4	Y	N	Y	Y	Y
EN5	Y	Y	Y	Y	Y
EN6	Y	N	N	Y	Y
EN7	N	N	P	Y	Y
EN8	Y	Y	Y	Y	Y
EN9	Y	Y	N	Y	Y
EN10	Y	N	N	N	Y
EN11	N	Y	N	N	Y
EN12	N	Y	N	N	Y
EN13	N	N	N	N	Y
EN14	N	N	N	Y	N
EN15	N	N	N	N	N
EN16	Y	Y	Y	Y	Y
EN17	Y	N	N	Y	Y
EN18	Y	Y	N	Y	Y
EN19	N	N	N	Y	Y
EN20	N	Y	N	N	Y
EN21	N	Y	N	N	Y
EN22	Y	Y	Y	Y	Y
EN23	Y	Y	N	Y	Y
EN24	Y	Y	Y	N	N
EN25	Y	N	N	N	N
EN26	Y	Y	N	Y	Y
EN27	N	N	N	Y	Y
EN28	Y	Y	N	Y	Y
EN29	Y	Y	N	N	Y
EN30	N	N	N	N	N
LA					
LA1	Y	Y	Y	Y	Y
LA2	N	Y	Y	Y	Y
LA3	Y	N	N	Y	Y
LA4	N	Y	N	Y	Y
LA5	Y	N	N	Y	N
LA6	N	Y	N	Y	Y
LA7	Y	Y	Y	Y	Y
LA8	N	Y	N	Y	Y
LA9	N	Y	N	N	Y
LA10	Y	N	Y	Y	Y
LA11	Y	Y	Y	Y	Y

LA12	Y	N	Y	Y	Y
LA13	N	Y	Y	Y	Y
LA14	N	N	N	N	Y
HR					
HR1	N	N	N	Y	N
HR2	N	Y	N	Y	Y
HR3	N	N	Y	Y	Y
HR4	N	N	N	N	Y
HR5	Y	Y	N	N	Y
HR6	Y	N	N	N	Y
HR7	Y	N	N	N	Y
HR8	N	Y	N	Y	N
HR9	N	N	N	N	Y
SO					
SO1	Y	N	N	Y	Y
SO2	N	Y	N	Y	Y
SO3	Y	Y	Y	Y	Y
SO4	Y	N	N	N	Y
SO5	N	Y	Y	Y	Y
SO6	Y	Y	N	Y	Y
SO7	N	Y	N	N	Y
SO8	N	N	N	N	Y
PR					
PR1	Y	Y	N	Y	Y
PR2	N	N	N	N	Y
PR3	Y	Y	N	Y	Y
PR4	N	N	N	N	Y
PR5	Y	Y	N	Y	Y
PR6	N	Y	Y	Y	Y
PR7	Y	N	N	NI	Y
PR8	N	N	N	N	Y
PR9	N	N	N	Y	Y
EC					
EC1	Y	Y	Y	Y	Y
EC2	Y	Y	N	Y	Y
EC3	Y	Y	Y	Y	Y
EC4	N	Y	N	N	N
EC5	N	Y	N	N	N
EC6	N	N	N	Y	Y
EC7	N	N	N	Y	Y
EC8	Y	Y	N	Y	N
EC9	N	Y	N	Y	Y

Table 2: GRI Index for Healthcare

	3	10	14	24	27

	Industrial	Industrials	Industrials	Industrials	Industrials
GRI Indicators	Outotec	Schneider Electric	Aeroports de Paris	Bombardier	Siemens AG
EN					
EN1	P	P	N	N	N
EN2	N	P	N	N	P
EN3	Y	P	Y	Y	Y
EN4	Y	P	Y	Y	N
EN5	Y	Y	N	P	P
EN6	P	Y	Y	P	Y
EN7	P	Y	N	P	N
EN8	Y	Y	Y	Y	Y
EN9	N	N	N	P	N
EN10	N	N	N	N	N
EN11	N	N	N	N	P
EN12	N	P	N	N	P
EN13	N	N	N	N	N
EN14	N	P	N	N	N
EN15	N	N	N	N	N
EN16	Y	Y	Y	Y	Y
EN17	Y	Y	Y	N	Y
EN18	Y	Y	N	Y	P
EN19	N	P	N	Y	Y
EN20	P	P	Y	Y	Y
EN21	N	N	N	N	P
EN22	Y	P	Y	P	P
EN23	P	Y	N	Y	P
EN24	Y	N	Y	N	N
EN25	N	N	N	N	N
EN26	N	Y	N	Y	Y
EN27	N	N	N	N	P
EN28	Y	Y	N	Y	Y
EN29	N	P	Y	N	N
EN30	N	N	N	N	N
LA					
LA1	Y	Y	Y	Y	P
LA2	Y	Y	Y	Y	P
LA3	Y	Y	N	N	N
LA4	Y	Y	N	Y	N
LA5	P	Y	N	N	N
LA6	N	P	N	P	N
LA7	Y	P	Y	P	P

LA8	P	Y	N	P	Y
LA9	P	N	N	N	P
LA10	P	Y	Y	P	Y
LA11	Y	Y	N	Y	N
LA12	Y	Y	N	Y	N
LA13	Y	Y	Y	Y	Y
LA14	N	N	N	Y	N
HR					
HR1	N	P	Y	P	Y
HR2	P	P	ND	P	Y
HR3	Y	P	Y	N	N
HR4	Y	N	ND	N	P
HR5	N	Y	ND	P	P
HR6	Y	P	ND	P	Y
HR7	Y	P	ND	P	Y
HR8	N	N	ND	N	N
HR9	Y	N	ND	Y	N
SO					
SO1	Y	Y	Y	P	Y
SO2	Y	Y	Y	P	Y
SO3	P	Y	N	P	P
SO4	Y	P	N	N	Y
SO5	Y	P	N	P	Y
SO6	Y	Y	N	N	P
SO7	Y	Y	N	Y	Y
SO8	Y	Y	N	Y	Y
PR					
PR1	Y	Y	ND	Y	Y
PR2	P	P	ND	Y	N
PR3	P	Y	ND	P	Y
PR4	Y	P	ND	Y	N
PR5	Y	Y	ND	P	N
PR6	N	N	ND	Y	P
PR7	N	N	ND	Y	N
PR8	N	N	ND	Y	N
PR9	Y	Y	ND	Y	Y
EC					
EC1	Y	Y	Y	Y	Y
EC2	Y	Y	N	Y	Y
EC3	P	Y	N	Y	Y
EC4	Y	N	N	P	N
EC5	N	N	N	N	N
EC6	P	P	Y	P	P

EC7	Y	P	N	P	P
EC8	Y	P	Y	Y	Y
EC9	P	N	Y	Y	N

Table 3: GRI Index for Industrials

	4	6	51	52	53
	Energy	**Energy**	**Energy**	**Energy**	**Energy**
GRI Indicators	Statoil	Neste Oil OYZ	Royal Dutch Shell PLC	Cenovus Energy INC	Suncor Energy INC
EN					
EN1	P	P	P	N	Y
EN2	N	N	N	N	Y
EN3	Y	P	Y	Y	Y
EN4	P	P	Y	N	Y
EN5	Y	P	Y	Y	Y
EN6	P	P	Y	Y	Y
EN7	P	N	P	N	N
EN8	P	P	P	Y	Y
EN9	P	P	Y	N	Y
EN10	P	P	N	N	N
EN11	Y	Y	P	N	Y
EN12	Y	P	Y	N	Y
EN13	P	P	Y	Y	Y
EN14	Y	P	Y	Y	Y
EN15	P	N	N	N	N
EN16	P	Y	Y	Y	Y
EN17	N	Y	Y	N	Y
EN18	Y	Y	Y	Y	Y
EN19	N	Y	Y	N	Y
EN20	Y	Y	Y	Y	Y
EN21	P	Y	N	N	Y
EN22	Y	Y	P	Y	Y
EN23	Y	Y	Y	Y	Y
EN24	P	N	N	N	N
EN25	P	P	N	N	Y
EN26	N	Y	Y	Y	Y
EN27	N	N	N	N	Y
EN28	Y	Y	Y	N	Y
EN29	P	Y	Y	N	N
EN30	N	N	N	N	Y
LA					
LA1	Y	Y	P	Y	Y
LA2	Y	P	N	Y	Y

LA3	N	N	P	N	Y
LA4	P	Y	N	N	Y
LA5	N	Y	N	N	Y
LA6	P	N	N	N	Y
LA7	P	P	P	Y	Y
LA8	P	P	P	N	Y
LA9	Y	N	N	N	Y
LA10	P	N	N	N	Y
LA11	Y	Y	P	Y	Y
LA12	Y	Y	Y	Y	Y
LA13	Y	Y	P	Y	Y
LA14	P	P	N	N	Y
HR					
HR1	Y	N	P	N	Y
HR2	Y	Y	Y	N	Y
HR3	P	N	N	N	Y
HR4	N	Y	N	N	Y
HR5	Y	Y	P	N	Y
HR6	Y	Y	N	N	Y
HR7	Y	Y	N	N	Y
HR8	Y	N	Y	N	Y
HR9	Y	N	N	Y	Y
SO					
SO1	Y	N	Y	N	Y
SO2	Y	N	P	N	Y
SO3	Y	P	Y	N	Y
SO4	Y	N	P	N	Y
SO5	Y	Y	Y	Y	Y
SO6	Y	Y	Y	Y	Y
SO7	P	Y	P	N	Y
SO8	Y	Y	Y	Y	Y
PR					
PR1	N	P	Y	N	Y
PR2	N	Y	N	N	Y
PR3	N	P	Y	N	Y
PR4	N	Y	N	N	Y
PR5	N	P	N	N	Y
PR6	N	Y	N	N	Y
PR7	N	Y	N	N	Y
PR8	N	N	N	N	Y
PR9	N	Y	Y	N	Y
EC					
EC1	Y	Y	Y	Y	Y
EC2	Y	P	Y	N	Y

EC3	Y	Y	Y	Y	Y
EC4	P	Y	N	N	Y
EC5	N	P	N	N	Y
EC6	Y	N	Y	Y	Y
EC7	Y	P	Y	N	Y
EC8	P	N	Y	N	Y
EC9	Y	Y	Y	N	Y

Table 4: GRI Index for Energy

	5	11	15	16	34
	IT	**IT**	**IT**	**IT**	**IT**
GRI Indicators	Dassault System SA	Cisco Systems	ASML Holding NV	The Sage group PLC	Samsung Electronics Co Ltd
EN					
EN1	Y	Y	N	N	Y
EN2	Y	Y	N	N	Y
EN3	Y	Y	Y	Y	Y
EN4	Y	Y	N	N	Y
EN5	Y	Y	N	Y	Y
EN6	N	Y	N	N	Y
EN7	N	Y	N	Y	Y
EN8	Y	Y	Y	N	Y
EN9	N	Y	N	N	Y
EN10	N	Y	N	N	Y
EN11	Y	Y	N	N	Y
EN12	N	Y	N	N	Y
EN13	N	Y	N	N	Y
EN14	N	Y	N	N	Y
EN15	N	Y	N	N	Y
EN16	Y	Y	Y	Y	Y
EN17	N	Y	Y	N	Y
EN18	N	Y	N	Y	Y
EN19	Y	Y	N	P	Y
EN20	Y	Y	N	N	Y
EN21	N	Y	N	N	Y
EN22	Y	Y	Y	N	Y
EN23	N	Y	N	N	Y
EN24	N	Y	N	N	N
EN25	N	Y		N	Y
EN26	N	Y	Y	N	Y
EN27	N	Y	N	N	Y
EN28	N	Y	Y	N	Y

EN29	N	Y	Y	Y	Y
EN30	Y	Y	N	N	Y
LA					
LA1	Y	Y	Y	Y	Y
LA2	Y	N	Y	Y	Y
LA3	N	Y	N	ND	Y
LA4	Y	N	N	ND	Y
LA5	Y	Y	N	ND	N
LA6	Y	N	N	Y	Y
LA7	Y	Y	Y	Y	Y
LA8	Y	Y	N	ND	Y
LA9	Y	N	N	ND	Y
LA10	Y	Y	Y	ND	Y
LA11	Y	Y	N	Y	Y
LA12	N	Y	N	ND	Y
LA13	Y	Y	Y	Y	Y
LA14	Y	N	N	Y	N
HR					
HR1	N	Y	N	ND	P
HR2	N	Y	N	ND	Y
HR3	N	Y	N	ND	Y
HR4	Y	N	N	Y	N V
HR5	Y	Y	N	ND	Y
HR6	Y	Y	N	ND	Y
HR7	Y	Y	Y	ND	Y
HR8	N	Y	Y	ND	N
HR9	N	N	N	ND	N
SO					
SO1	Y	Y	N	ND	N
SO2	Y	Y	Y	ND	Y
SO3	Y	Y	Y	Y	Y
SO4	Y	Y	N	Y	Y
SO5	N	Y	N	Y	Y
SO6	N	Y	N	Y	N
SO7	Y	Y	N	ND	Y
SO8	Y	Y	Y	ND	Y
PR					
PR1	Y	N	N	Y	Y
PR2	Y	Y	Y	Y	N
PR3	N	N	N	ND	Y
PR4	Y	N	N	ND	Y
PR5	Y	Y	Y	Y	P
PR6	Y	Y	Y	ND	Y
PR7	Y	Y	Y	ND	P
PR8	N	N	N	Y	P

PR9	Y	Y	Y	ND	P
EC					
EC1	Y	Y	Y	ND	Y
EC2	Y	N	N	ND	Y
EC3	N	Y	N	ND	Y
EC4	N	N	N	ND	N
EC5	Y	Y	N	ND	N
EC6	N	N	N	ND	Y
EC7	N	N	N	ND	P
EC8	N	Y	N	ND	Y
EC9	N	Y	Y	ND	Y

Table 5: GRI Index for Energy

	8	13	22	35	60
	Consumer Discretionary	**Consumer Discretionary**	**Consumer Discretionary**	**Consumer Discretionary**	**Consumer Discretionary**
GRI Indicators	Adidas	Bayerische MotorenWerke AG	Tim Hortons Inc	Wolters Kluwer NV	Daimler AG
EN					
EN1	N	Y	N	Y	Y
EN2	N	Y	N	Y	Y
EN3	P	Y	Y	Y	Y
EN4	N	Y	Y	Y	Y
EN5	Y	Y	Y	Y	Y
EN6	P	Y	N	Y	Y
EN7	P	Y	Y	Y	Y
EN8	P	Y	Y	Y	Y
EN9	N	Y	Y	N	Y
EN10	P	Y	Y	N	Y
EN11	N	Y	N	NA	P
EN12	N	Y	N	Y	Y
EN13	N	Y	N	N	Y
EN14	N	Y	N	N	Y
EN15	N	N	N	N	P
EN16	P	Y	Y	Y	Y
EN17	N	Y	Y	Y	Y
EN18	Y	Y	P	Y	Y
EN19	Y	Y	N	Y	Y
EN20	N	Y	N	Y	Y
EN21	N	Y	N	Y	Y
EN22	P	Y	P	Y	Y
EN23	N	N	Y	N	Y
EN24	N	Y	N	N	Y

EN25	N	Y	Y	N	Y
EN26	P	Y	P	Y	Y
EN27	N	Y	N	N	Y
EN28	Y	Y	Y	N	Y
EN29	Y	Y	P	N	Y
EN30	N	Y	N	N	Y
LA					
LA1	Y	P	Y	Y	P
LA2	P	Y	Y	Y	Y
LA3	Y	Y	Y	N	Y
LA4	P	Y	N	N	Y
LA5	N	Y	Y	N	Y
LA6	N	Y	Y	N	Y
LA7	P	Y	P	N	P
LA8	P	Y	Y	N	Y
LA9	Y	Y	N	N	Y
LA10	P	Y	N	Y	Y
LA11	P	Y	Y	N	Y
LA12	N	Y	Y	N	Y
LA13	P	Y	Y	Y	Y
LA14	Y	Y	Y	N	Y
HR					
HR1	P	Y	N	Y	Y
HR2	Y	Y	Y	N	P
HR3	P	Y	Y	N	Y
HR4	Y	Y	N	Y	Y
HR5	Y	Y	Y	N	Y
HR6	Y	Y	Y	Y	Y
HR7	Y	Y	Y	Y	Y
HR8	N	Y	N	N	P
HR9	Y	N	Y	N	Y
SO					
SO1	N	Y	N	Y	Y
SO2	Y	Y	Y	N	Y
SO3	Y	Y	Y	Y	P
SO4	Y	Y	P	Y	Y
SO5	P	Y	P	N	Y
SO6	N	Y	P	N	Y
SO7	Y	Y	Y	N	Y
SO8	Y	Y	Y	N	Y
PR					
PR1	P	Y	Y	N	Y
PR2	Y	Y	Y	N	Y
PR3	P	Y	Y	Y	Y
PR4	Y	Y	Y	N	Y

PR5	N	Y	P	Y	Y
PR6	P	Y	P	Y	Y
PR7	Y	Y	Y	N	P
PR8	Y	Y	N	Y	Y
PR9	Y	Y	Y	N	Y
EC					
EC1	P	Y	P	Y	Y
EC2	P	Y	Y	Y	P
EC3	Y	Y	P	Y	Y
EC4	Y	Y	Y	NA	Y
EC5	P	Y	P	N	Y
EC6	P	Y	Y	Y	Y
EC7	P	Y	Y	N	Y
EC8	P	Y	N	N	Y
EC9	N	Y	N	N	Y

Table 6: GRI Index for Consumer Discretionary

	9	12	20	28	37
	Materials	**Materials**	**Materials**	**Materials**	**Materials**
GRI Indicators	Umicore	BASF SE	Sigma-Aldrich Corporation	Croda International PLC	Monsanto Company
EN					
EN1	N	P	N	Y	Y
EN2	Y	Y	N	N	N
EN3	Y	Y	Y	Y	Y
EN4	Y	Y	Y	Y	Y
EN5	Y	Y	Y	N	Y
EN6	Y	Y	Y	N	Y
EN7	Y	Y	Y	N	Y
EN8	Y	P	P	Y	Y
EN9	N	Y	Y	Y	Y
EN10	N	Y	N	N	Y
EN11	Y	Y	Y	Y	Y
EN12	N	Y	N	Y	Y
EN13	N	Y	N	N	Y
EN14	N	Y	N	N	Y
EN15	N	N	N	Y	N
EN16	Y	Y	Y	Y	Y
EN17	Y	Y	N	N	Y
EN18	Y	Y	Y	N	Y
EN19	N	Y	N	N	N
EN20	Y	Y	Y	Y	Y
EN21	Y	Y	N	Y	Y
EN22	Y	P	Y	Y	Y

EN23	N	Y	Y	Y	Y
EN24	N	P	Y	N	N
EN25	N	P	N	N	N
EN26	Y	Y	Y	Y	Y
EN27	N	N	N	N	Y
EN28	N	Y	Y	Y	Y
EN29	N	Y	Y	N	N
EN30	N	Y	N	N	N
LA					
LA1	Y	Y	Y	Y	Y
LA2	Y	P	Y	Y	Y
LA3	N	Y	Y	N	N
LA4	Y	Y	N	N	Y
LA5	N	Y	Y	N	N
LA6	N	Y	Y	Y	Y
LA7	Y	P	N	Y	Y
LA8	N	Y	Y	N	Y
LA9	Y	Y	Y	N	N
LA10	Y	P	N	Y	Y
LA11	N	Y	N	Y	Y
LA12	Y	Y	N	N	Y
LA13	Y	P	Y	N	Y
LA14	N	Y	N	N	N
HR					
HR1	N	P	N	N	Y
HR2	Y	Y	Y	N	Y
HR3	Y	Y	Y	N	Y
HR4	N	Y	Y	N	Y
HR5	Y	Y	N	Y	Y
HR6	Y	Y	Y	Y	Y
HR7	Y	Y	Y	Y	Y
HR8	N	Y	Y	N	Y
HR9	N	N	Y	N	Y
SO					
SO1	Y	Y	Y	Y	Y
SO2	Y	P	Y	Y	Y
SO3	Y	Y	Y	Y	Y
SO4	N	P	Y	N	Y
SO5	Y	Y	Y	N	Y
SO6	Y	Y	Y	Y	Y
SO7	N	N	Y	Y	N
SO8	N	N	Y	N	N
PR					
PR1	Y	Y	Y	Y	Y
PR2	N	N	Y	Y	N

PR3	Y	Y	Y	Y	Y
PR4	N	N	Y	Y	N
PR5	N	Y	Y	N	N
PR6	N	Y	Y	Y	Y
PR7	N	N	Y	Y	N
PR8	N	N	Y	Y	N
PR9	N	N	Y	Y	N
EC					
EC1	Y	Y	Y	Y	Y
EC2	Y	Y	Y	Y	Y
EC3	Y	Y	Y	Y	Y
EC4	Y	P	Y	Y	N
EC5	N	N	N	N	N
EC6	N	P	Y	N	Y
EC7	N	N	N	N	N
EC8	Y	Y	N	N	Y
EC9	N	Y	N	N	Y

Table 7: GRI Index for Materials

	23	43	45	86	92
	Consumer Staples	**Consumer Staples**	**Consumer Staples**	**Consumer Staples**	**Consumer Staples**
GRI Indicators	Natura Cosmeticos SA	Coca Cola Enterprises Inc	L'Oreal SA	Nestle SA	Wesfarmers Ltd
EN					
EN1	Y	N	Y	Y	N
EN2	Y	N	Y	Y	N
EN3	Y	P	Y	Y	P
EN4	Y	P	Y	Y	Y
EN5	Y	P	Y	Y	Y
EN6	Y	P	Y	Y	Y
EN7	Y	P	Y	Y	Y
EN8	Y	Y	Y	Y	Y
EN9	Y	N	Y	P	Y
EN10	Y	Y	Y	Y	Y
EN11	Y	N	Y	Y	N
EN12	Y	N	Y	Y	N
EN13	Y	N	Y	Y	Y
EN14	Y	N	Y	Y	N
EN15	Y	N	Y	N	N
EN16	Y	P	Y	Y	Y
EN17	Y	Y	Y	Y	Y
EN18	Y	P	Y	Y	Y
EN19	Y	N	Y	Y	N

EN20	Y	N	Y	Y	Y
EN21	Y	P	Y	Y	N
EN22	Y	N	Y	Y	Y
EN23	Y	N	Y	Y	N
EN24	Y	N	Y	N	N
EN25	Y	N	Y	P	N
EN26	Y	P	Y	Y	Y
EN27	Y	Y	Y	Y	P
EN28	Y	N	Y	Y	Y
EN29	Y	N	Y	Y	N
EN30	Y	N	Y	Y	N
LA					
LA1	Y	N	Y	Y	P
LA2	Y	P	Y	Y	N
LA3	Y	N	Y	N	N
LA4	Y	Y	Y	Y	Y
LA5	Y	N	Y	Y	N
LA6	Y	N	Y	N	N
LA7	Y	P	Y	P	P
LA8	Y	Y	Y	Y	N
LA9	Y	N	Y	N	N
LA10	Y	N	Y	P	P
LA11	Y	N	Y	P	N
LA12	Y	N	Y	N	N
LA13	Y	P	Y	P	P
LA14	Y	N	Y	Y	N
HR					
HR1	Y	N	Y	Y	N
HR2	Y	Y	Y	Y	Y
HR3	Y	N	Y	Y	N
HR4	Y	Y	Y	Y	N
HR5	Y	Y	Y	Y	N
HR6	Y	Y	Y	Y	Y
HR7	Y	Y	Y	Y	Y
HR8	Y	N	Y	Y	N
HR9	Y	N	Y	Y	N
SO					
SO1	Y	N	N	Y	P
SO2	Y	Y	Y	Y	Y
SO3	Y	Y	Y	Y	Y
SO4	Y	N	Y	Y	Y
SO5	Y	Y	Y	P	Y
SO6	Y	Y	Y	Y	N
SO7	Y	N	Y	P	N
SO8	Y	N	Y	Y	N

PR					
PR1	Y	N	Y	Y	Y
PR2	Y	N	Y	Y	N
PR3	Y	P	Y	Y	P
PR4	Y	N	Y	Y	N
PR5	Y	N	N	N	P
PR6	Y	Y	Y	Y	Y
PR7	Y	N	Y	Y	N
PR8	Y	N	Y	N	N
PR9	Y	N	Y	Y	N
EC					
EC1	Y	Y	Y	Y	Y
EC2	Y	Y	Y	Y	Y
EC3	Y	N	Y	Y	Y
EC4	N	N	Y	Y	Y
EC5	Y	N	Y	N	N
EC6	Y	N	Y	P	N
EC7	Y	N	Y	Y	N
EC8	Y	Y	Y	Y	Y
EC9	Y	Y	Y	Y	N

Table 8: GRI Index for Consumer Staples

	26	47	62
	Utilities	**Utilities**	**Utilities**
GRI Indicators	Centrica PLC	Duke Energy Corporation	Acciona SA
EN			
EN1	N	Y	Y
EN2	N	Y	Y
EN3	N	Y	Y
EN4	N	N	Y
EN5	N	Y	Y
EN6	N	Y	Y
EN7	N	Y	Y
EN8	N	Y	Y
EN9	N	Y	Y
EN10	N	Y	Y
EN11	N	Y	Y
EN12	N	Y	Y
EN13	N	Y	Y
EN14	N	Y	Y
EN15	N	Y	Y
EN16	Y	Y	Y

EN17	Y	N	Y
EN18	Y	Y	Y
EN19	Y	N	N
EN20	N	Y	Y
EN21	N	Y	Y
EN22	N	Y	Y
EN23	N	Y	Y
EN24	N	Y	Y
EN25	N	Y	Y
EN26	N	Y	Y
EN27	N	Y	Y
EN28	N	Y	Y
EN29	N	Y	Y
EN30	N	N	Y
LA			
LA1	Y	Y	Y
LA2	Y	Y	Y
LA3	ND	Y	Y
LA4	ND	Y	N
LA5	ND	Y	Y
LA6	Y	N	Y
LA7	Y	Y	Y
LA8	Y	Y	Y
LA9	ND	Y	Y
LA10	ND	Y	Y
LA11	Y	Y	Y
LA12	ND	Y	Y
LA13	ND	Y	Y
LA14	Y	Y	Y
HR			
HR1	ND	Y	Y
HR2	ND	Y	Y
HR3	ND	Y	N
HR4	ND	N	Y
HR5	ND	Y	N
HR6	ND	Y	Y
HR7	ND	Y	N
HR8	ND	Y	Y
HR9	ND	Y	Y
SO			
SO1	ND	Y	Y
SO2	ND	Y	Y
SO3	ND	Y	Y
SO4	ND	Y	Y

SO5	ND	Y	Y
SO6	ND	Y	Y
SO7	ND	Y	Y
SO8	ND	Y	Y
PR			
PR1	ND	Y	Y
PR2	ND	NONE	Y
PR3	ND	Y	N
PR4	ND	NONE	N
PR5	ND	Y	N
PR6	ND	Y	N
PR7	ND	NONE	N
PR8	ND	Y	N
PR9	ND	Y	N
EC			
EC1	ND	Y	N
EC2	ND	Y	N
EC3	ND	Y	N
EC4	ND	N	N
EC5	ND	Y	N
EC6	ND	N	N
EC7	ND	Y	N
EC8	ND	Y	N
EC9	ND	Y	Y

Table 9: GRI Index for Utilities

	29	40	70	73
	Telecom Services	**Telecom Services**	**Telecom Services**	**Telecom Services**
GRI Indicators	Star Hub Ltd	Vivendi SA	Telus Corporation	BCE Inc
EN				
EN1	N	Y	Y	N
EN2	N	N	Y	N
EN3	Y	Y	Y	Y
EN4	N	Y	Y	N
EN5	N	Y	Y	N
EN6	N	N	N	N
EN7	Y	Y	Y	N
EN8	Y	N	Y	Y
EN9	N	Y	N	N
EN10	N	N	Y	N
EN11	N	N	N	N

EN12	N	N	N	N
EN13	N	N	N	Y
EN14	N	N	N	N
EN15	N	N	N	N
EN16	Y	Y	Y	Y
EN17	Y	Y	Y	Y
EN18	Y	N	Y	N
EN19	Y	N	Y	N
EN20	N	N	Y	N
EN21	N	N	N	N
EN22	Y	Y	Y	Y
EN23	N	N	Y	N
EN24	N	N	N	N
EN25	N	N	N	N
EN26	Y	Y	Y	N
EN27	N	N	N	N
EN28	Y	N	Y	Y
EN29	N	Y	N	N
EN30	N	Y	Y	N
LA				
LA1	Y	Y	Y	N
LA2	Y	Y	Y	N
LA3	Y	Y	Y	N
LA4	N	Y	Y	N
LA5	N	N	Y	N
LA6	N	Y	Y	N
LA7	N	Y	Y	Y
LA8	N	Y	Y	N
LA9	N	Y	N	N
LA10	Y	Y	Y	N
LA11	Y	Y	Y	N
LA12	Y	N	Y	N
LA13	Y	Y	Y	Y
LA14	Y	N	Y	N
HR				
HR1	N	N	Y	N
HR2	N	Y	Y	N
HR3	N	N	Y	N
HR4	N	N	Y	N
HR5	N	N	Y	N
HR6	N	Y	Y	N
HR7	N	Y	Y	N
HR8	N	N	N	N
HR9	N	N	Y	N

SO				
SO1	Y	Y	Y	N
SO2	N	Y	Y	N
SO3	N	N	Y	Y
SO4	N	N	Y	N
SO5	N	N	Y	N
SO6	N	N	Y	N
SO7	N	N	Y	N
SO8	Y	N	Y	N
PR				
PR1	N	N	N	N
PR2	N	N	N	N
PR3	N	N	N	N
PR4	N	N	Y	N
PR5	Y	Y	Y	Y
PR6	N	N	Y	N
PR7	N	N	N	N
PR8	Y	Y	Y	Y
PR9	N	N	Y	N
EC				
EC1	Y	Y	Y	Y
EC2	N	N	Y	N
EC3	N	N	Y	N
EC4	Y	N	Y	N
EC5	N	N	Y	N
EC6	N	N	Y	N
EC7	N	Y	Y	N
EC8	Y	Y	Y	N
EC9	Y	Y	N	Y

Table 10: GRI Index for Telecommunication Services