Sustainable Development in Higher Education

Incorporation, assessment and reporting of sustainable development in higher education institutions

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Abstract

The effects of modern economic systems have put extensive pressure on the environment and society, both for this and future generations. Sustainable Development (SD) may offer the solution of pursuing development while ensuring the preservation of economic, environmental and social aspects for present and future generations.

Throughout the centuries, universities and their faculty members have served as educators of the majority of entrepreneurs and decision-makers, hence the current need to incorporate SD into the higher education system.

There have been several efforts, such as declarations and charters, by universities, to address the problematic issues associated with implementing SD. Of these, two stand out above the others, the Decade of Education for Sustainable Development and the Earth Charter. The first highlights that education is vital to solve most of the current economic, environmental and social aspects; while the Earth Charter states the principles upon which to build a just, sustainable and peaceful global society.

Higher educational institutions should be places where new ideas are created and tried; they should serve as teaching and learning grounds for different disciplines, but bearing in mind that this process must increasingly be built upon the principles of sustainability.

The incorporation of SD is welcomed by some but rejected by other universities; and even within the universities, some individuals welcome it while others reject it. It is thus important for university leaders to understand the factors and reasons that create this resistance and to create strategies to overcome the barriers to change and to accomplish the institutionalisation of SD.

The incorporation must be performed in all five dimensions of the university system: Education, Research, Operations, Community outreach, and Assessment and reporting.

One of the principles of SD is the participation of stakeholders. Assessment, transparency and reporting play key roles in helping to ensure involvement and commitment of key stakeholders. Many tools have been developed for SD, most of them for corporations; some examples of these are the ISO standards, the Global Reporting Initiative, etc. Universities have two choices to fulfil their assessment and reporting obligations: 1. to create new tools, 2. to modify the existing corporate tools. This thesis presents one example of each.

For this thesis, two universities, Lund University (Sweden) and Monterrey Tec (Mexico), were chosen to gain insight into the process and progress of implementation of SD within them.

The findings from these two case studies are presented along with recommendations for how other universities may speed up their involvement in similar activities.

Keywords: sustainable development, universities, innovation, barriers of change, assessment and reporting in higher education, SD in Lund University, SD in Monterrey Tec

Executive Summary

This thesis author analysed the need for and the process of incorporation of Sustainable Development (SD) into higher educational systems. Many conceptual and procedural tools are now available to help faculty members on their journey of incorporating SD into their courses and programs. However, at the same time there are attitudinal, procedural and financial difficulties or barriers that are often present that slow down or block the implementation process.

Because SD is a complex and at the same time vague concept that encompasses economic, environmental and social aspects within an intergenerational perspective, it is believed to be difficult or impossible to implement within organisations.

However because of the growing severity of many environmental crises and the continuing increases in economic and social injustices, it is urgent that university faculty members become engaged in more effectively teaching these concepts to present and future entrepreneurs and decision-makers of societies.

Since most of the current educational systems are narrowly focussed and over specialised, they do not adequately address the multidisciplinary and transdisciplinary nature of SD. Therefore, it is essential and urgent that SD be incorporated within the university system in multidisciplinary and transdisciplinary contexts, so as to ensure that present and future generations of 'students' will be provided holistic insights and values to help them help their societies make the transition from unsustainable to sustainable societies.

Different universities have joined forces and created declarations and charters, for example the Talloires, Swansea and Halifax Declarations, and The Copernicus Charter. In addition to these fine statements, UNESCO has designated 2005-2015 as the Decade of Education for Sustainable Development.

Additionally the Earth Charter developed by people throughout the world who are concerned about how we must implement SD, presents a clear set of principles pertaining to the inalienable rights of justice, sustainability and peace.

These guidance documents form an excellent framework for catalysing and supporting SD implementation throughout educational systems, worldwide.

SD should be incorporated within the following dimensions of higher educational systems: **1.** Education (which involves the curricula and related educational aspects), **2.** Research, **3.** Operations (which refers to all the physical aspects within the campus), **4.** Community outreach, and **5.** Assessment and reporting. These five aspects also have to be supported by the institution's mission and planning.

The incorporation of SD into the universities can be explained by theories such as innovation and change theories, which refer to the processes of adopting and institutionalising new concepts or ideas, and how these could be effectively facilitated.

As with any new idea, different responses to SD arise; some of the individuals will accept the idea in a short time (innovators) while others will be the last to adopt it (laggards). The implementation process will often need to address three different barriers to change, **1.** Resistance based upon lack of information, **2.** Resistance based upon psychological and emotional reaction towards change, and **3.** Resistance to change due to disciplinary standards.

Different strategies are presented to help educators and administrators overcome these barriers.

As the implementation progresses, it should be assessed and reported. This author reviews and evaluates some of the many tools that are available to assist universities in this process.

The efforts of two universities were analysed, Lund University and Monterrey Tec. The results from this analysis were: **1.** SD is penetrating the university system, sometimes slower than expected, but is gradually becoming an important focus; **2.** There are still many barriers to overcome so that SD can be effectively institutionalised in these universities; **3.** SD is still considered by many to only pertain to environmental aspects; **4.** SD is viewed as an abstract concept; and **5.** Even with all the difficulties, the efforts taken in these universities seems promising for the incorporation within and outside of their educational systems.

There are many universities that have started the process of incorporating SD, but world-wide there are many more that have not yet initiated work on SD in their systems. This author hopes that this thesis provides an overview and motivates the leaders and members of universities to make progress on the SD journey.

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1. Introduction

During my entire life I have been a witness of the indiscriminate urban growth; when I was a child, my family and I used to travel to Mexico City, currently one of the biggest, most polluted cities in the world and with one of the highest crime rates. I suffered the consequences of a city designed by the Aztecs, destroyed and rebuilt by the Spaniards and populated and polluted by the Mexicans. The city lies in a valley over two thousand meters above sea level. Currently, it has approximately 25 million people living in it with millions of cars, trucks, busses and industries; the city has fallen into the hands of the capitalistic asphalt monster. All that previously was natural has been invaded by people and their respective buildings, roadways and pollution.

This has, is and will happen all over the world, and not only with capitalism, socialism/communism proved to be equally destroying. At this moment, the numbers of humans on the planet is the highest of all *Homo sapiens* history and keeps increasing; we are not only many but we are removing forests to create arable land and polluting them with our chemicals, we use our sources of energy very inefficiently, we pollute our rivers and destroy our sky. We seem to believe that by consuming more we will be happier.

I have also been a witness of Mexican communities so distant and forgotten that they do not have basic services, like running water, electricity, telephone, and still cook with fuel wood that they have to collect themselves. Our rural zones have suffered emigration towards the cities, these unprepared workers arrive in the cities with what they have on their hands and end up living in 2m by 2m houses in districts without services, risking their lives while waiting for the next rain to perhaps wipe out their few belongings. According to the UNDP's Human Development Indicators (UNDP, 2003a), 24.3% of the Mexicans live with less than $2 USD/day and 8% with less than $1 USD. What can one think about the quality of life and equity in a country like this?

I came across the concept of sustainable development (SD) in 1999, in an attempt of almost 80 people from all over the world to create an organisation dedicated to that concept; I was part of this attempt which took place in Hungary under the name of Planet Club, an initiative from AIESEC, an international student-run foundation.

At that time I was misled and understood the concept as what some people have come to call environmental sustainability. However, after some years of aging, like a good wine, I now understand that the concept goes far beyond environmental sustainability; the concept of Sustainable Development (SD) is, in an analogy, an umbrella that should cover all the different disciplines and by the nature of it to integrate them in order to achieve, or at least try to achieve, a state of stability and dynamic equilibrium, where the anthropogenic generation of entropy is at its minimum, and not only that, but the quality of life and work are such that nobody has to suffer from hunger, poverty, racism and so many other sociologic problems of modern life. Sustainable Development (SD) is a change process which is designed to improve the quality of life of societies, while at the same time protecting and caring for the environment; this change process must be taught and transferred from one generation to another.

In the year 2000, I was one of the main pushers of Sustainable Development (SD) in Monterrey, Mexico, where I was part of the 1st Sustainable Development Conference in the ITESM (known also as Monterrey Tec) Campus Monterrey

During this conference many companies and my alma mater, ITESM, showed interest in the concept and its application. Regretfully, the moment was not right, my knowledge was not enough and I had to leave Monterrey, so all the bases that were created crumbled due to the weight of the daily routine.

At that time I looked for a Master's programme that would help me to fill all the gaps that I had of Sustainable Development (SD); with some luck I arrived to Lund where I met Don Huisingh, and somehow our interests converged into this thesis.

One could ask, why focus in Sustainable Development in Higher Education (SDHE), meaning by this mainly universities? Why not focus on companies or governments? One of the reasons for this is that I believe that universities are the places where the entrepreneurs and decision-makers for the social, political and economic sectors are created, formed and shaped. Also, based upon personal experience, the university life changed many of my mental patterns, and it was not only in reference to the formal courses, I was also fortunate to be in a university where the student life played a very important role and that the legislation of my country joined with the efforts of the university force the students to have contact with the community and motivates students to become actively involved in protection of the environment.

Universities are very important agents of change in modern societies, but they are only part of the whole system of education, in which it is imperative that Sustainable Development (SD) must play an increasing role.

1.1 Scope

This thesis is designed to explore the roles of higher educational institutions in the adoption and diffusion of Sustainable Development (SD). It has a particular focus on how to introduce and incorporate the concept into the university life, touching the different dimensions in the university system as well as presenting an analysis of the university policy and mission. Another point addressed by the author in this thesis is the array and interconnections among the diverse barriers and paradigms that impede the introduction of Sustainable Development (SD). This thesis also makes an analysis of the different tools that could be used to measure the performance of Sustainable Development (SD) in institutions of Higher Education.

1.2 Audience

This thesis is directed to all the people that work in universities and colleges and for all who work with people in these organisations. Its primary focus is upon students, professors and academic directors interested in sustainable development (SD), whether they have already started introducing and implementing the concept in their institution, or they are interested in doing so. . This thesis is designed to:

1. Demonstrate the importance and necessity of Sustainable Development (SD);
2. Summarise and learn from the efforts taken to include Sustainable Development (SD) within Higher Education;
3. Introduce Sustainable Development (SD) in universities as a new idea, and address the problems that could arise by its introduction/implementation;
4. Present the importance of Sustainable Development (SD) assessment and reporting, and the methods currently available to do it;
5. Present the results of interviews with faculty and academic leaders of two universities in different countries of the World which are on the journey of introducing Sustainable Development (SD) into their campus activities;

6. Present conclusions and recommendations for how all universities and colleges can make progress on SD for higher education.

1.3 Research goals

The author of this thesis has two main goals. The **first** is to understand the process of introduction and continuity of Sustainable Development (SD) in higher education in order to prepare guidelines for universities that have not yet started with the introduction of the concept of sustainable development but wish to do it in the future. The **second** goal is to understand the barriers that impede the adoption of sustainable development in the different dimensions of the university life in order to detect and overcome them in the process of adoption and diffusion of sustainable development for the university and throughout all societies.

1.4 The Research Questions for this thesis

The research questions used to guide this thesis research were:

- What is the meaning of the concept of Sustainable Development?
- What is the history of the evolution of the concept of Sustainable Development?
- Why is it important to integrate Sustainable Development in Higher Education?
- What has been done thus far to promote SD within Higher Education?
- Why has it taken so long for universities to start incorporating and applying the concept of SD?
- What are the social aspects (both internal and external) in universities that must be addressed to help ensure that the essential changes are made?
- How can the process of effecting change be improved and measured?
- What are the barriers of change and what are proven and effective ways of overcoming those obstacles to widespread implementation of Sustainable Development in Higher Education?
- How can university leaders, faculty and students more effectively work together to accelerate the process of implementation of SD within higher education?
- How can sustainable development in higher education be assessed and reported?

1.5 Limitations

There are several limitations in the process of writing this thesis; one of the most important ones was the difficulty of reaching some of the university leaders due to an overload in their work schedules. One example of this were the unsuccessful attempts to have an interview with the President of the entire ITESM system. The different school vacation periods in Sweden and Mexico caused additional difficulties.

The author wished to have been able to interview more individuals from both universities presented and also to have interviewed academic leaders from other universities, but time did not allow it.

1.6 Outcomes

The expected outcomes for this thesis are: **a.** developing a clear understanding of the concept of sustainable development (SD), one that can be used by academic leaders throughout the world, and **b.** presenting an option for the reporting of sustainable development (SD) in

universities, so that opinion leaders of universities can more effectively chart their courses towards sustainable development (SD) is more or less paved. As stated it is of great importance that some change barriers are detected and compared to the literature in order for future researchers and workers in the area to have a better understanding of the difficulties they may encounter while working on the subject.

1.7 Roadmap

This thesis is divided into 9 chapters, each of them a step towards a better understanding of the role of Sustainable Development (SD) in the universities, and as well the role of universities to help societies make progress towards Sustainable Development (SD).

Chapter 1 presents the introduction.

Chapter 2 presents the methodology used in the process of preparing this thesis.

Chapter 3 presents the concept of SD; to assist the reader to more fully understand the concepts and objectives of SD. The introduction to SD is provided because this concept has been quoted and used in many different occasions, but still there is a lack of clear understanding of the concept and of the broad panorama it encompasses.

Chapter 4 contains a review of different international efforts, declarations, conventions and associations that have been developed to help facilitate and catalyse the incorporation of SD into higher education. The chapter also presents the five university dimensions in which Sustainable Development (SD) should be incorporated: curricula, research, operations, community outreach, and assessment and reporting.

Chapter 5 presents an overview on the incorporation of the idea of SD into higher educational institutions, the problems that might arise, how to overcome them, the conflicts that could take place and the role of opinion leaders in preventing or solving such conflicts. These approaches are supported with innovation and change theories.

Chapter 6 presents a review and comparison of some of the tools that are, or could be, used to assess and report Sustainable Development (SD) in higher education institutions. The chapter presents two examples of these uses, Auditing Instrument for Sustainable Higher Education (AISHE), and the Global Reporting Initiative (GRI) Sustainability Guidelines, as well as two examples of universities using one of these tools: University of Florida and the Dartmouth College.

Chapter 7 presents information about two university case studies, ITESM Campus Monterrey, at Monterrey, Mexico, and Lund University, at Lund, Sweden, their efforts towards SD and how it is perceived in the institution.

Chapter 8 presents the observations and recommendations of the thesis.

Chapter 9 presents the conclusions.

Finally the Appendixes provide more detailed information in the topic that this thesis author considers important to include.

2. Methodology

This chapter presents the methodology used for the thesis.

First, a literature search was conducted on the topic of Sustainable Development (SD); this was made in order to set the basis of the current economic, environmental and social problems that the world is facing, and in order to obtain a more complete understanding of some of the proposals of Sustainable Development (SD) to these problems. The literature review was performed using both online and standard literature.

Second, a literature review was performed to understand **a.** the role of universities as change agents in society, **b.** the integration of Universities and Sustainable Development (SD), **c.** the efforts taken by different universities towards Sustainable Development (SD) (such as declarations, charters, etc.), **d.** the dimensions into which Sustainable Development (SD) should be included in the higher education institution, and **e.** to review examples of universities already working with/towards Sustainable Development (SD).

Third, a literature study was done on innovation theory, change theory, and change barriers, in order to create a theoretical structure to better understand the different processes and constraints that affect the incorporation of Sustainable Development into Higher Education

Fourth, a research and analysis of diverse assessment and reporting methods and tools for sustainability was performed. This included the different methods currently available explicitly for higher education and some designed for corporations but with a possibility to use in higher education.

Fifth, a series of face-to-face interviews was done in two universities, Monterrey Tec in Monterrey, Mexico (ITESM) and Lund University in Lund, Sweden, in order to obtain first person insight from academic leaders who are engaged in facilitating implementation of SD within these two institutions.

Sixth, the author created a work sheet in which the assessment of sustainability in a university is graded and then displayed in graphs that can easily be compared and understood.

Seventh, the integration of all the previous points was done in order to create guidelines and recommendations for universities that are willing to, or are in the process, of incorporating Sustainable Development into their systems.

3. Economic development and the birth of the concepts and approaches of Sustainable Development (SD)

One of this thesis' cornerstones is the concept of Sustainable Development (SD). Thus, it is essential to clarify what is meant by the term, where it has been used, how it has been used and what it means for academic leaders as they struggle to be responsible and catalytic agents of change to assist their societies make the transition to truly Sustainable Societies.

This chapter is designed to explain the social and environmental problems that have arisen from the different economic approaches and theories over the past 50 years, the period of highest economic growth, technological, population and environmental impact rates. The concept of Sustainable Development (SD) is comprised of two parts: sustainable and development.

Development is defined as:

> *"to go through a process of natural growth, differentiation, or evolution by successive changes from a less perfect to a more perfect or more highly organised state"* (Gove, 1993)

And Sustainable as:

> "*Capable of being sustained*" that means, "*to provide for the support or maintenance of*". (Gove, 1993)

These two terms put together indicate that Sustainable Development (SD) is the: support or maintenance of growth, differentiation or evolution to a more perfect or highly organised state. The first part of the chapter describes what has been understood for development over the past fifty years and the social, economic and environmental consequences that have resulted with the development policies in the different regions of the world. The second part presents the evolution and subsequent use of Sustainable Development (SD).

3.1 Development and its setbacks

The concept of **Development** was first formally defined by the U.S.A. President Truman in 1949 (Dresner, 2002). The inaugural speech of President Truman on the 20th of January 1949 stated:

> *"The old imperialism exploitation for foreign profit has no place in our plans. What we envisage is a program of development based on the concepts of democratic fair-dealing…*
> *All countries, including our own, will greatly benefit from a constructive program for the better use of the world's human and natural resources. Experience shows that our commerce with other countries expands as they progress industrially and economically…*
> *We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas."*

Truman's objective of development was to transform poor countries and create them into industrial societies with the help of scientific and technological advancements, or to better explain it, to transform them into a copy of the Western societies; this process was called the "development path".

In the 1950s the development focused on economic growth, not on the redistribution of wealth; in industrialisation, not on equality. As Dresner puts it *"The idea was to increase national self-sufficiency by creating an industrial sector so that less had to be imported, and instead goods could be exported... The industries created would kick start a wider process of industrialisation that would 'take off' and become self-sustaining."* (Dresner, 2002) These industries were usually created with the help of foreign aid. The setback of this was that it was designed to generate wealth that would be invested in productive activities rather to assist the poor. Therefore, economic growth was seen as the only factor for development that was measured as GNP.

GNP is not an adequate measure of economic health. According to Hansson (2003b) GNP only measures market activities, GNP does not differentiate between production and repairs, neither of weapons and education. It also does not consider income distribution; if fact GNP only addresses the gross production without the cost side. Hansson (2003a) told this thesis author in an interview that GNP/GDP were not developed as tools to measure well-being, but as indicators for economic activities in the market.

Costanza provides an example of the shortcomings of the concept GNP: *"For example, a standing forest provides real economic services for people: by conserving soil, cleaning air and water, providing habitat for wildlife, and supporting recreational activities. But as GNP is currently figured, only the value of harvested timber is calculated in the total. On the other hand, the billions of dollars that Exxon spent on the Valdez cleanup – and the billions spent by Exxon and others on the more than 100 other oil spills in the last 16 months – all actually improved our apparent economic performance"* (Costanza, 1991) Another example can be found in Appendix 1.

As it can be seen GNP sums up financial transactions in the entire production chain without making a difference between costs and benefits, thus it is not an adequate measure of economic or ecological health

In the 1960s the concept of development changed from GNP growth and industrialisation to changing societies socially and culturally. The problem was the imposition of Western ideas on the world to continue this development. Development was supposed to be adapted to the different local situations of each country. It was then that the concept of Development started to fall apart; it was not giving the benefits expected and was often leading to more impoverishment, creating bigger gaps between the rich and the poor. Dresner remarks that *"Only in countries that took deliberate steps to promote equality through land reform and investment in mass education and health care was the condition of the poor improving."* (Dresner, 2002)

Dresner wrote that *"The emphasis on economic growth had overlooked other aspects of social progress. The problem was initially seen as simply lack of jobs, but it was realised by the 1970s that the poor were held back by lack of education, bad health and nutrition, and policies that favoured the elite."* (Dresner, 2002) The gaps between the rich and the poor became extreme. It was then that the use of GNP as a measure of development was discontinued (but it continues to be used as a measure of economic health), as there were no clear alternatives thus, it was decided that development should focus on the integration of economic and social components.

In the middle of the 1970s, the United Nations took a new approach, namely the 'Basic Needs' approach based upon social inclusion, promotion of equity and fulfilment of human potential. This approach was also taken by the World Bank; Dresner remarks that *"However, the practice tended to concentrate on top-down state provision of basic public services, rather than the non-material aspects to empower the poor themselves."* (Dresner, 2002)

In the 1980s the poor countries (especially in Africa and Latin America) fell deeper into poverty mainly due to depression in the USA; this reduced the amount of foreign aid to developing countries as well as decreased the developing countries' ability to repay their creditor debts, this due also to the global impacts of the global depressions. This setback was partially filled in by the raising numbers of NGOs dedicated to help the poor countries of the world. It is important to emphasise that foreign aid did not disappear totally, just that the depression of the 1980s reduced the help provided from developed countries to underdeveloped countries.

In the 1990s, the redevelopment/sustainable development approach theory was born, stressing that development should promote sustained economic growth but be equitable, participatory, environmentally sustainable and self reliant.

In 1998, Amartya Sen introduced the "human development" model. This model *"judges a society's standard of living not just according to the average level of income, but according to people's capabilities to lead the lives they value"* (Dresner, 2002). This model was selected as the basis for the creation of the UNDP's Human Development Index (HDI). The HDI is measured by making an average of the opportunity for long and healthy life (life expectancy), the educational attainment (adult literacy and school enrolment), and the standard of living (GDP).

Herman Daly (2002) makes a clear distinction between growth and development. Economic growth, which Daly defines as an increase in quantity, will never be sustainable on a finite planet, while economic development, an improvement in the quality of life without necessarily increasing the resources consumed, may be sustainable. Daly also compares two of the answers given to sustainability:

> *"First, utility should be sustained; that is, the utility of future generations is to be non-declining. The future should be at least as well off as the present in terms of its utility or happiness as experienced by itself. Utility here refers to average per capita utility of members of a generation. Second, physical throughput should be sustained, that is, the entropic physical flow from nature's sources through the economy and back to nature's sinks, is to be non-declining… I adopt the throughput definition and reject the utility definition, for two reasons. First, utility is non-measurable. Second, and more importantly, even if utility were measurable it is still not something that we can bequeath to the future. Utility is an experience, not a thing."* (Daly, 2002)

Economic development has been confused since the late 1940s with economic growth; the best indicator for this is/was the key indicator of development, GNP. This indicator ignores the contribution of nature to production, GNP adds up all production without differentiating between costs and benefits, and is therefore not a good measure of economic health. Dresner (2002) quotes the economist Mishan when he states that GNP was misleading since it included the costs of measures such as anti-pollution expenditures but left out the externalities such as aircraft noise.

This thesis author wishes to present his observation that from the 1950s to 2003, *development* has been a synonym of industrialisation; lately it has been modified to include social and environmental aspects, but its final goal has been the interest of the Western countries to create copies of themselves in the poor countries. This approach has had a great impact both on societies and the environment. For example Redclift and Sage wrote that *"There are two aspects of the "conventional" approach to environmental assets…*

1. *Conventional economic accounting frequently regards the destruction of resources as a contribution to wealth. For example, the destruction of tropical forests is recorded as an increase in Gross Domestic Product (GDP), in the national accounts.*
2. *At the same time the cost of making good any environmental damage is recorded as a positive contribution to GDP. The costs of reducing pollution, for example, and of measures to prevent pollution, are registered as contributions to economic growth.*" (Redclift & Sage, 1994)

This of course creates confusion; if the costs of environmental restoration create wealth to a nation then pollution should be counted as a negative input. These are just a few of the problems in the measurement of GDP. It can be seen that even though GNP was originally created as an indicator of economic activities, over the years it has become, to a great extent, the indicator for development. Regretfully, this indicator is plagued with faults; it does not represent the well-being of a nation and certainly states nothing about the potential sustainability of it.

The trends and major challenges that have arisen from this Development are presented in Box 3-1, note that a detailed explanation of each topic is presented in Appendix 1:

Box 3-1 Trends and challenges that Development has caused

1. **Economic disparity and political instability;**	9. **Climate change;**
2. **Extreme poverty;**	10. **Nitrogen;**
3. **Under-nourishment;**	11. **Natural resource deterioration;**
4. **Disease;**	12. **Loss of biodiversity;**
5. **Marginalization;**	13. **Pollution;**
6. **Population growth;**	14. **Growing water scarcity;**
7. **Consumption;**	15. **Other urban problems;**
8. **Global energy use;**	16. **Interactions between social, economic and environmental problems**.

Source: Dalal-Clayton & Bass (2002)

This thesis author would like to augment the list of Dalal-Clayton & Bass (2002) with the following topics (for more details refer to Appendix 1):
17. **Aging population;**
18. **Gender differences;**
19. **Desertification;**
20. **Deforestation;**
21. **Illiteracy;**
22. **Hunger;**
23. **Unsafe ground-water;**
24. **Corruption;**
25. **Chemicals;**
26. **Developed and developing countries difference (rich/poor nation ratio).**

Issues included among numbers 1 to 7 refer to socio-economic problems; and the remainder through number 17 address some of the many burdens that the current economies are putting upon the ecosystem upon which we are all mutually interdependent.

If the world continues on the same road and the developing countries reach, in the short term, the level of consumption/destruction that the developed countries currently have, global societies will probably need two to three additional planets to accommodate the needs and impacts. This is addressed by Rees and Wackernagel:

"*If the present world population of 5.8 billion people were to live at current North American standards of 4.5 ha/person the productive land requirement would be 26 billion hectares. But, there are only 8.8 billion hectares of ecologically productive cropland, pasture or forest on earth. That is, we need two additional planets at least as productive as Earth to accommodate all its people at a level that less than twenty-five percent of us enjoy today. If population was to stabilize at 10-11 billion in the next century, five additional Earths are needed.*" (Rees & Wackernagel, 1994)

Carley and Christie (2000) present a figure (Figure 3-1) of the major world socio-economic trends and their major consequences. More symptoms of unsustainability can be found in Appendix 1.
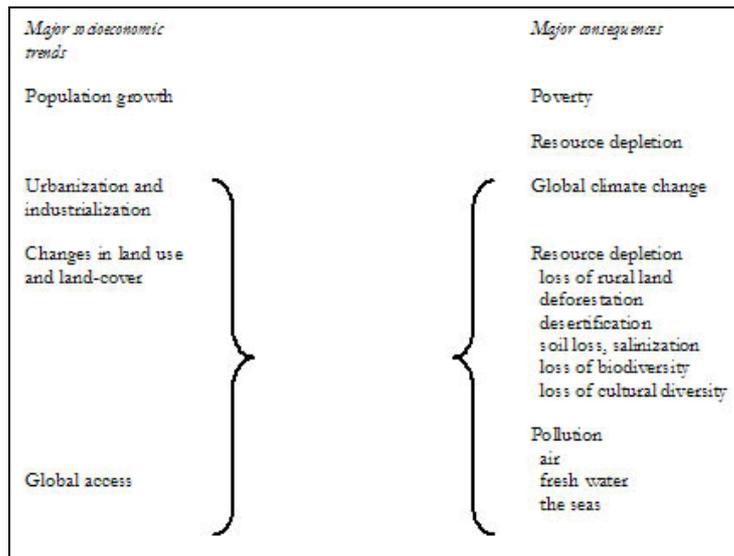
Figure 3-1 Major world socio-economic trends and SD
Source: Carley & Christie (2000)

Orr wrote that in a typical day on the planet "*…humans will add fifteen million tons of carbon [dioxide and monoxide] to the atmosphere, destroy 115 square miles of tropical rainforest, create seventy-two square miles of desert, eliminate between forty to one hundred species, erode seventy-one million tons of topsoil, add twenty-seven hundred tons of CFCs to the stratosphere, and increase their population by 263,000.*" (Orr, 1992)

Carley and Christie (2000) present two pie charts (Figure 3-2) comparing the total emissions of carbon dioxide in 1985 and a projection of 2030, divided into Developing countries and Developed and Eastern European countries. From these charts it can be seen that the amount of CO_2 emitted by the Developing countries will increase dramatically in the next years.

As can be seen on the Figure 3-2 the forecasted generation of carbon dioxide in 2030 will be more than twice that of 1985. While in 1985 the Developed and Eastern European countries accounted for roughly 75%, in 2030 the forecast is that this will be reduced to 44%, being the rest generated by Developing countries. This represents a growth of 5.4 times, compared to 2.4 in the world and 1.4 in the Developed and Eastern European countries. Added to this is the lost of forests through deforestation and desertification mentioned previously.

These examples expand upon the list offered by Dalal-Clayton and Bass (2002).

1985   2030

Developing countries 25%

Developed and Eastern Europe 44%

Developing countries 56%

Developed and Eastern Europe 75%

Total emissions = five billion tonnes of carbon

Total emissions = twelve billion tonnes of carbon
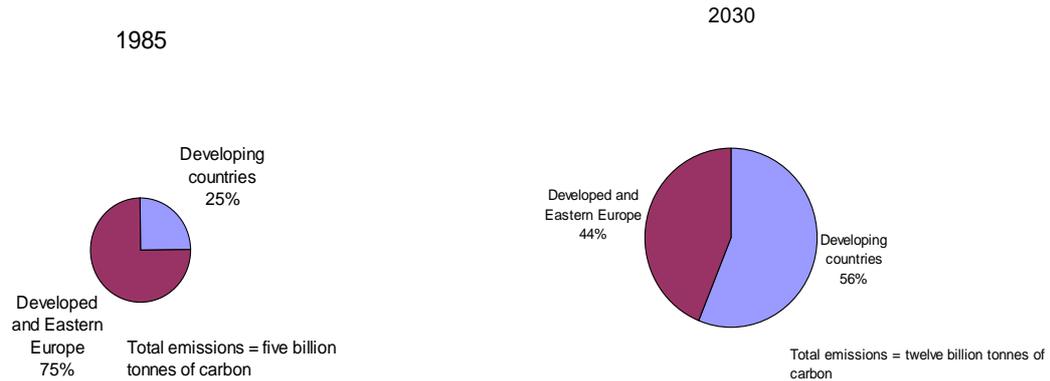
Figure 3-2 Present and anticipated distribution of carbon dioxide emissions between developed and developing countries in 1985 and 2030
Source: Carley & Christie (2000)

The world that we are living in now combined with the way things have been done, or keeping *'business-as-usual'* will never be able to withstand all the pressures of the modern societies. We will sooner or later run out of resources and humanity, together with nature, will suffer the consequences. Dresner (2002) states the environmental impact by using Ehrlich's equation:

$$I = P \times C \times T$$

Equation 1 Ehrlich's equation

Where: I=the environmental impact
P=the population size
C=per capita consumption
T=the environmental impact of the technology.

For example, The Royal Society in its paper about Sustainable Consumption emphasises that, "*The population of Bangladesh is increasing by about 2.4 million per year, while that of Britain is increasing by about 100,000 per year. Yet, because carbon dioxide emissions per person in Britain are 50 times higher than in Bangladesh, the additional 100,000 people in Britain cause more than double the carbon dioxide emissions of the additional 2.4 million people in Bangladesh.*" (Royal-Society, 1997)

This is supported by Bhaskar and Glyn, who state that "*Developed countries account for a predominant share of greenhouse gas emissions, and per capita emissions are many times higher in the North as compared to the South. Developing countries, however, have a higher ratio of emission to GDP… and the fear is that with Southern industrialisation, total emissions would skyrocket.*" This statement relates directly to the Ehrlich equation, in which if the Southern countries reach the consumption and pollution levels of the Northern ones, the Earth will suffer catastrophic disasters that would affect mankind." (Bhaskar & Glyn, 1995)

It is important also to note the rate of population growth in the World, Carley and Christie (2000) state that the population doubled from 1.25 billion in 1850 to 2.5 billion in 1950, and then again to nearly 6 billion in 1999. Redclift and Sage give an example from the UN saying that "*90% of the expected 4.7 billion people that will be added to world population by 2050 will be born in the South, it is the industrialized countries that currently present the biggest threat to global environmental resources.*" (Redclift & Sage, 1994)

In regards to consumption Developed countries eat up the resources, as Redclift and Sage wrote that "*Despite supporting only 24% of global population, the industrialized countries consume 85 per cent of the world's metal, 92 per cent of its cars, 85 per cent of its chemicals, 81 per cent of its paper, 78 per cent of sawn wood, 72 per cent of [the] milk and 48 per cent of [the] cereals. They also consume 82 per cent of gasoline, 72 per cent of [the] diesel [fuel], 85 per cent of [the] gas and 82 per cent of [the] electricity*" (Redclift & Sage, 1994) If Developed countries utilise and consume all of these, what is left for the people of Developing countries? And what will happen if the rest 76% starts consuming at the same rate of Developed countries?

For example, the difference between the 20 richest and the 20 poorest countries is presented by Reid (1995) in Table 3-1:

Table 3-1 Changes in the ratio of income of the richest 20 per cent
to the poorest 20 per cent of world of world population from 1960 to 1991.

1960	30:1
1970	32:1
1980	45:1
1989	59:1
1991	61:1

Source: Reid (1995)

It can be seen on the Table 3-1 that the difference between the 20 richest countries in the world and the 20 poorest countries doubled in 30 years. This trend indicates that while the rich get richer the poor get poorer, this problem of social inequity was already presented in the legend of Robin Hood.

While 20% of the people live in developed countries and receive 80% of the world's income and the remaining 80% of the people live in developing countries receiving only the 20% left. The Developed countries not only have the highest income, but also have a large consumption of resources, and obviously a large generation of wastes. The distribution of income in respect to the world population in the different regions is presented in Figure 3-3.
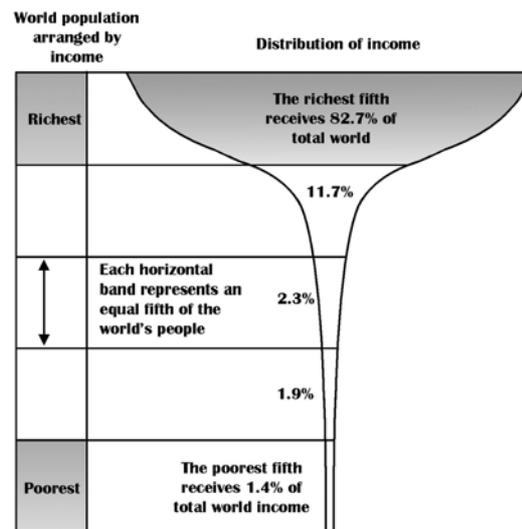
Figure 3-3 The distribution of income in the world and the difference between the richest countries and the poorest ones.
Source: Adapted from Kirby (2003) and Reid (1995)

The increment of world population can be found in more detail in Appendix 1.

Orr wrote that "*Most, however, do not starve because we cannot grow enough food… but because of the politics and economics of food distribution.*"(Orr, 1992) Orr, as well as this thesis author, considers that there is world hunger not because of lack of food but because of an aberration of the economic and political systems of food distribution.

It should be noted that the UNDP (2003b) has set goals for the eradication of extreme poverty and hunger; achievement of universal primary education; promotion of gender equality and women empowerment; reduction of child mortality; improvement of maternal health; combating of HIV/AIDS, malaria and other diseases; ensuring environmental sustainability; and development of a global partnership for development.

Another great problem of modern technology has been the development of new military arsenals capable of wiping out life from the face of the Earth, and probably changing the shape of the Earth, with the push of a button. Some countries have built up their weapons production and sales business to bail out their economies. These terrible processes have and will continue to have increasingly devastating effects upon societies and upon the eco-systems upon which all of us are interdependent. Orr wrote that "*…the costs of Armageddon have fallen sharply since nuclear weapons are relatively cheap. All else – delivery systems, research, conventional weapons, has become exponentially more costly." The environmental catastrophes in the aftermath of both nuclear and conventional wars have become terrible.*" (Orr, 1992) An example of these negative environmental effects after the bombings is presented by The Regional Environmental Centre for Central and Eastern Europe (RECCEE, 1999) after the bombings to the Former Republic of Yugoslavia; the country received 17,000 air attacks took place from March 24, 1999 to June 5 of the same year. Some of the effects of these attacks were the release of carcinogenic compound (VCMs, PCBs, DU) from destroyed industrial facilities, destruction of natural habitats and the direct threat to biodiversity, and transboundary contamination (especially to the countries downstream of the Danube, where several tons of oil leaked).

This is just one example of the many countries that have suffered military attacks or internal disputes, and the effects presented are just a few of the many that can arise from the use of military arsenal; this of course is not counting the human stress and suffering during the attacks and in the aftermath.

This thesis author wishes to emphasise, that the Earth functions as a closed-system in regards to matter, and as an open-system in regards to energy. An energy open-system means that energy flows in and out of the Earth. As for matter, is essentially a closed-system, from this it is to be understood that practically nothing enter or leaves the Earth, with the exception of some meteorites, planetary dust and human made satellites that for practical purposes are considered to be insignificant.

According to the first law of conservation of matter, nothing is destroyed, only transformed; and the laws of thermodynamic say that whenever the matter is transformed it degrades. By this the author of this thesis would like to remark that whatever human kind does in the planet stays in the planet but degraded, and in order to use this matter we have to use more and more energy to transform it again and again. Human kind has to understand that the Earth is a matter closed-system and that economic theories and policies of growth do not consider this. Orr supports the previous points by writing "*The world of nature, in contrast to the international system, functions as a community in which the welfare of the individual and the species is bound to the health of the larger system.*" (Orr, 1992)

The models for modern development as implemented in most countries have been applied at the expense of the local environments and societies. Some of the modern technologies are based on great use of resources and energy, and the modern economic models are based on making the rich countries richer and the poor countries poorer. It is not to say that the current world will reach doomsday soon, but at the current rate of economic growth of developing countries two to three worlds would be needed to withstand the burden of production if the developing countries reach the level of the developed ones. Moreover, new models are needed to improve quality of life and equality for the 80% of the humans that live in developing countries.

3.2 Sustainable Development

On the brink of these environmental and social problems caused by uncontrolled economic growth, a new concept was coined: Sustainable Development (SD).

In 1972 at the UN Conference on the Human Environment, held in Stockholm, the environment became a critical development issue:

> "*The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all Governments.*" (UNEP, 1972)

This thesis author emphasises that even though the Conference was a breakthrough at the moment it lacked the integration of social aspects, viewed in retrospect, it is understandable that this was lacking since the Conference was one of the first attempts to systematically address protection of the environment and served as the base for the new outcomes, presented in the following paragraphs.

In 1974 the concept of Sustainable Society emerged from the World Council of Churches, where they defined four principles of a sustainable society as:

> "*First, social stability cannot be obtained without an equitable distribution of what is in scarce supply or without common opportunity to participate in social decisions. Second, a robust global society will not be sustainable unless the need for food is at any time well below the global capacity to supply it and unless the emission of pollutants are well below the capacity of the ecosystems to absorb them. Third, the new social organization will be sustainable only as long as the use of non-renewable resources does not out-run the increase in resources made available through technological innovation. Finally, a sustainable society requires a level of human activities which is not adversely influenced by the never-ending large and frequent natural variations in global climate.*" (Dresner, 2002)

This definition was the first, of recent times, to integrate economic activities with the environment and the social perspective. According to Dresner the World Council of Churches was heavily influenced by developing world clergymen who "*thought that the environment was a distraction from justice and development. They saw environmentalism as a 'bourgeois' concern. The idea of a sustainable society – one that would not self-destruct – sounded more serious and also had less tension with the concern for justice.*" (Dresner, 2002) This thesis author agrees partly with the previous statement, protection of the environment, or environmentalism, is to a great extent, a concept from the Developed Countries, which have practically all their social problems solved; also, based upon the author's experience, the reactions towards environmentalism tend to be negative, while towards SD most of the time the reactions are quite positive. This thesis author prefers the definition of sustainable society, one that would not self-destruct. He finds it a simple but powerful statement.

The cornerstone of this "sustainable society" was the principle of equitable distribution, which later became the basis for the now famous 1987 Brundtland Report, titled "In Our Common Future." (WCED, 1987) The Brundtland Report will be presented further.

In 1980 the concept of sustainable society was later connected to SD within the World Conservation Strategy that was published by the International Union for Conservation of Nature and Natural Resources. SD was defined as "*the integration of conservation and development to ensure that modifications to the planet do indeed secure the survival and well-being of all people*" (Dresner, 2002), while development was defined as "*the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of human life*" (Dresner, 2002). This approach to SD focuses on meeting the needs of the present generation but it does not consider the needs of future generations.

3.2.1 The Brundtland Report

In 1983 the UN General Assembly set up the World Commission on the Environment and Development (WCED) with the Norwegian Labour Party leader, Gro Harlem Brundtland, as the chairperson. The outcome was "Our Common Future", also known as the Brundtland Report, published in 1987, with the central theme:

> "*…many present development trends leave increasing numbers of people poor and vulnerable, while at the same time degrading the environment. How can such development serve next century's world of twice as many people relying on the same environment? This realization broadened our view of development. We came to see it not in its restricted context of economic growth in developing countries. We came to see that a new development path was required, one that sustained human progress not just in a few places for a few years, but for the entire planet into the distant future*" (Dresner, 2002)

See Appendix 2 for a presentation of a more detailed excerpt from the Brundtland report. The Brundtland Commission called this new path "Sustainable Development", and defined it as

> "**Development which meets the needs of the present without compromising the ability of future generations to meet their own needs**". (Dresner, 2002)

This phrase has become the slogan of sustainable development; it is both very powerful and vague, at the same time.

The Brundtland report was one of the first successful efforts to advocate for a sustainable development. The report's main achievement is the integration of the economic, environmental and social aspects. It emphasises, for example, that the environment where we all live and development, the attempts to improve, are inseparable. It states that "*The environment does not exists as a sphere separate from human actions, ambitions, and needs, and attempts to defend it in isolation from human concerns have given the very word 'environment' a connotation of naivety in some political circles.*" (WCED, 1987) This statement supports the holistic view that this thesis author presented at the end of Section 3.1.

The report states that: "*1. Environmental stresses are linked one to another… 2. Environmental stresses and patterns of economic development are linked one to another… 3. Environmental and economic problems are linked to many social and political factors, [and]... 4. The systematic features operate not merely within but also between nations.*" (WCED, 1987)

Another topic that the report underscores is that a vast majority of people in developing countries do not meet their basic needs and aspirations for a satisfactory quality of life; and

this is not restricted to this generation but will also constrain the ability of future generations to satisfy their needs. This thesis author would like to comment that, the report indicates "to satisfy the needs of future generations" but does not indicate what needs they mean. One might wonder if they will be the same as they are today. This thesis author does not believe it, especially taking into consideration the changes of needs, beyond the basic ones, of the first generation of the twentieth century and those of the last generation.

The critical objectives for SD that the report considers are:

- *"Reviving growth;*
- *Changing the quality of growth;*
- *Meeting essential needs for jobs, food, energy, water, and sanitation;*
- *Ensuring a sustainable level of population;*
- *Conserving and enhancing the resource base;*
- *Reorienting technology and managing risk; and*
- *Merging environment and economics in decision making."* (WCED, 1987)

To which this thesis author would like to add the needs of culture protection and reduction of corruption.

The report also suggests that the political system allows effective participation of its citizens and an international system that promotes sustainability. All of this shows that one of the main concerns of the Brundtland Commission's Report is people; for the conscious use of natural resources in order to give, at least, the minimum quality of life of the people living in the planet at the moment, and to safeguard it so that the future generations can benefit from the natural resources as this generation is.

The Brundtland report presents a summary of proposed legal principles for environmental protection and sustainable development (the detailed explanation is presented in Appendix 2):

1. **Fundamental human right;**
2. **Inter-generational equity;**
3. **Conservation and sustainable use of natural and human resources;**
4. **Environmental standards and monitoring;**
5. **Prior environmental assessments;**
6. **Prior notification, access, and due process;**
7. **Sustainable development and assistance;**
8. **General obligation to co-operate.** (WCED, 1987)

These eight points should become of extreme importance for the well-being of this generation and of future generations, that on the social part, they are equally important for the well-being of the planet and the biodiversity that so richly resides in it. These points serve as part of the base for this thesis.

The way that the Brundtland report defines sustainability is very broad and could have many different interpretations. It is practically impossible to know the needs of future generations, and one can say that we could leave the things as we found them but would that guarantee that the needs of future generations be met? What happens with change? As Spence quotes the great philosopher Heraclitus in a sentence from 520BC *"There is nothing permanent except change"* (Afuah, 1998). Dresner criticizes the Brundtland Report by writing that: *"… it is not always a consistent document. For example, it is critical of the way that income as currently measured fails to take account of the depletion of natural capital, but otherwise uses current measures of GNP growth as real*

measures of increasing income" (Dresner, 2002). It was mentioned in Section 3.1 of this thesis, there are many inadequacies of using GNP as a measure of growth, yet the Brundtland Commission relied heavily upon it. Dresner (2002) also remarks that the Report falls short on the formulations of consumption. While Reid remarks that "*the report does not include a thorough analysis of the reasons for these inequities [North and South] and of the part played by the economically more powerful nations, institutions and corporations in allowing them to persist*" (Reid, 1995) The inequities of North and South nations, as Reid (1995) pointed, is one of the aspects that the report does not focus on, but one has to appreciate the importance of the Brundtland Report on joining the economic, environmental and social aspects, as well as presenting the many factors that affect these three factors.

The Brundtland Report was, and still is, of great importance to get SD in the global agenda. The Brundtland Report has reached and permeated nations, corporations, cities, NGOs, and institutions of education, and many others. The Brundtland Report served as a base and as a marketing "catch-phrase" giving one of the most important thrusts to SD.

3.2.2 More definitions of Sustainable Development

By 1992 there were at least 70 different definitions of SD; with the one presented within the Brundtland report being the one that is most frequently cited (Kirkby, O'Keefe, & Timberlake, 1995). Some of the other definitions SD definitions are presented in the following paragraphs, while some others from the same source are presented in Appendix 3:

> Herman Daly defines SD as: "*… is the amount of consumption that can be continued indefinitely without degrading capital stocks – including 'natural capital' stocks…*", he mentions that "*Definitions of sustainability are also obviously dependent on the time and space scale we are using. Rather than trying to determine the correct time and space scale for sustainability we need to concentrate on how the different scales interact and how we might construct multiscale operational definitions of sustainability.*" (Daly, 2002)

The way that Daly defines sustainability leaves the social aspect out, this is a problem that many authors have also ignored or not fully addressed. This is in part explained by the analysis difficulties of social systems.

> Dresner wrote that "*Environmental economists define sustainability in terms of non-depletion of capital.*" (Dresner, 2002)

This thesis author believes that this is an incomplete definition, since it only takes into consideration the environmental and economic dimensions and neglects the social ones.

> Bhaskar and Glyn offer the following definition: "*Sustainability literally means the capacity for some state or condition to be continued more or less indefinitely.*" (Bhaskar & Glyn, 1995)

The Sustainable Living Network web page presents a compilation by Susan Murcott of different definitions of SD; a few selected ones are presented in the following paragraphs, while some others are presented in Appendix 3:

- "*IUCN, WWF and UNEP. The World Conservation Strategy. Gland, Switzerland. 1980: Sustainable development - maintenance of essential ecological processes and life support systems, the preservation of genetic diversity, and the sustainable utilization of species and ecosystems.*"
- *World Bank. World Development Report, 1992: Development and the Environment. Oxford University Press, New York: Sustainable development means basing developmental and*

> *environmental policies on a comparison of costs and benefits and on careful economic analysis that will strengthen environmental protection and lead to rising and sustainable levels of welfare.*
>
> ▪ *R. Costanza, "Environmental Performance Indicators, Environmental Space and the Preservation of Ecosystem Health" <u>Global Change and Sustainable Development in Europe</u> Manuscript on file at the Wuppertal Institute, Nordrhein-Westfalen, Germany. 1994 : Sustainability: An ecological system is healthy and free from 'distress syndrome' if it is stable and sustainable, that is, if it is active and maintains its structure (organization) function (vigor) and autonomy over time and is resilient to stress."* (Murcott, 1997)

This thesis author chose to present these definitions since they are representative of the many definitions that have been developed. They show some of the different understandings of SD, some with an environmental focus, some with an integrative focus and some with an intergenerational focus. In general the definitions above presented emphasise the maintenance of the natural resources, the interconnection of environmental problems, the necessary reduction of social problem and increment of the quality of life, and the necessity of an intergenerational vision.

3.2.3 The Summits on SD

This section presents the two summits held that had a direct, and appealing, focus on SD: The United Nations Conference on Environment and Development (UNCED), also known as the Rio Summit, in 1992; and the World Summit on Sustainable Development, also known as the Johannesburg Summit, in 2002.

3.2.3.1 The Earth Summit

The most direct follow up of the Brundtland Report was the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, in Rio de Janeiro in 1992. The conference was attended by nearly 50,000 participants from governments, non-governmental organisations, labour unions, industrial corporations, academics, journalists, and indigenous peoples.

The intention of the Earth Summit planners was to provide a forum for expression of global concern about the environmental and development crises. Among the tangible outcomes of this Summit were the following:

▪ Conventions on climate, biodiversity and forests;
▪ The Earth Charter;
▪ Agenda 21, a global action plan outlining the priorities for SD for the 21st century;
▪ An agreement on financial resources to implement Agenda 21; and
▪ Strengthening of UN institutions, such as the Earth Council

The contents of Agenda 21 are explained in more detail in Section 4.3.4.

3.2.3.2 The World Summit on Sustainable Development

The World Summit on Sustainable Development, or the Johannesburg Summit, took place in Johannesburg between August and September 2002, as a ten year after follow-up to the 1992 Rio Earth Summit. In the 2002 World Summit, the "representatives of the world" reaffirmed their commitment to SD. The World Summit highlighted as most urgent, the world problems of poverty, water, consumption and production patterns, natural resources, and the increasing

differences between rich and poor. Based upon the discussions, a Plan for Implementation of SD was created and adopted. The most important points, at least for this thesis author, are:

- Poverty eradication;
- Water quantity and water quality;
- Changing unsustainable patterns of consumption and production to sustainable ones;
- Protecting and managing the natural resources;
- Human and Eco-system Health;
- Diverse regional initiatives for SD;
- Means of Implementation.

The Summit participants strongly urged that all nations work together to ensure the full implementation of Agenda 21. The Summit leaders held plenary meetings on the following topics:

- Water and sanitation;
- Energy;
- Health;
- Agriculture;
- Biodiversity, and;
- Cross-sectoral issues.

The Summit underscored the interconnectedness of the above mentioned aspects.

3.2.3.3 Summary of the Summits

This thesis author considers the role of the two summits of extreme importance for the drive of SD in the World. The Summits emphasised the importance of the integration of social and economic aspects in the modern economic aspects. The amount of participants in both of the Summits indicate that more and more individuals are showing interest in the SD concept and more and more are taking the necessary steps for its adoption world-wide. One of the most important outcomes of the Summits was **Agenda 21**.

3.2.4 Beyond SD definitions

Many definitions and argumentation for SD have been presented, some simple, some complex, some focusing on this generation, some trying to emphasise the planning and utilisation of natural resources must be done so that future generations can fulfil their needs. It is clear that practically all of the different approaches and definitions of SD are designed to integrate the economic growth, or development, with the protection of the natural environment and the human environment, the social aspects, or to put it in Elkington's words: "*Sustainable Development involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity.*" (Elkington, 2002) This approach is known as the triple-bottom-line. Costanza (1991) summarises Sustainability in a concise manner in three points of relationship between dynamic human economic systems and larger but slower ecological systems, where **1.** Human life can continue indefinitely, **2**. Human individuals can flourish and **3**. Human cultures can develop; but without destroying the ecological life support systems.

The triple-bottom line approach presents the essentiality of integrating the economic, social and environmental aspects and giving them the same weight, while in the process of this integration SD will emerge as societies evolve. Figure 3-4 shows that at the moment in the world societies there is little or no integration the economic, social and environmental aspects.

This, as was discussed earlier, has been a historical problem of the modern approaches of development (capitalism, socialism, communism, etc.), too much focus in industrialisation and economic growth, setting aside the environment and the societies.
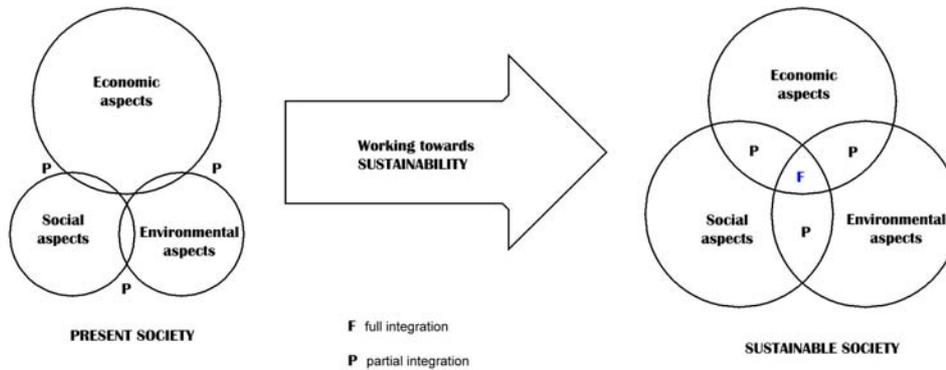
Figure 3-4 The change of the current, unsustainable society, to a sustainable one with the integration of economic, environmental and social aspects.
Source: This author

Dalal-Clayton and Bass (2002) supplement the triple-bottom-line approach with the local, national and global perspectives. The integration of SD is affected by four different societal systems, Politics, Peace and Security, Cultural values, and Institutional/administrative arrangements. This is presented in Figure 3-5. This thesis author would like to add the aspect of Technology to those presented by Dalal-Clayton and Bass. This aspect has become of great importance in the modern world; technology must also be included in the different aspects that are encompassed in SD.
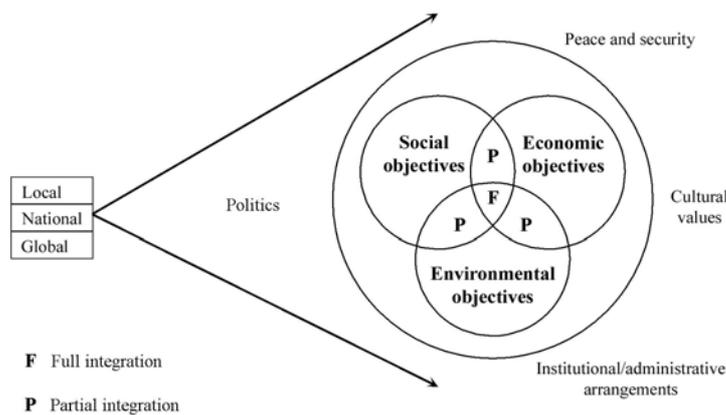
Figure 3-5 The systems of SD underscoring the relationships among the local, national and global levels and underscoring the need to integrate the social, economic and the environmental in a holistic manner
Source: Dalal-Clayton & Bass (2002)

The proposed integration of the economic, environmental and social systems as presented in Figure 3-4 and Figure 3-5 are intragenerational approaches, they do not consider the effect of time, they are static approaches to SD. This thesis author believes that one of the most important contributions of the Brundtland report was the intergenerational approach, which of course, most current economic theories and practices do not adequately address because of

the economist's discount approach which leaves practically nothing to future generations, instead one should take the trans-generational concepts of Chief Seattle speech as a point of departure:

> *"You must teach the children that the ground beneath their feet is the ashes of your grandfathers. So that they will respect the land, tell your children that the earth is rich with the lives of our kin. Teach your children what we have taught our children, that the earth is our mother. Whatever befalls the earth, befalls the sons of the earth. If men spit upon the ground, they spit upon themselves.*
> *This we know, the earth does not belong to man, man belongs to the earth. This we know. All things are connected like the blood which unites one family. All things are connected. Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself."* (Seattle, 1854)

Anne Elsen supports this intergenerational approach by proposing that SD should be understood to have four dimensions:

1. *"The principle of inter-generational justice or futurity.*
2. *Equal access to the world's material and energy [resources].*
3. *Diversity of social and ecological systems leading to the strengthening of local cultures and stability.*
4. *Participation of citizens."* (Elsen, 1998)

Figure 3-6 shows the intergenerational approach of sustainability. The figure depicts the integration of the economic, environmental and social aspects, and how these keep the same weight in respect to each other from one generation to the next. Abstractly, the picture shows the stable and non-diminishing use of resources (economic, human and natural).
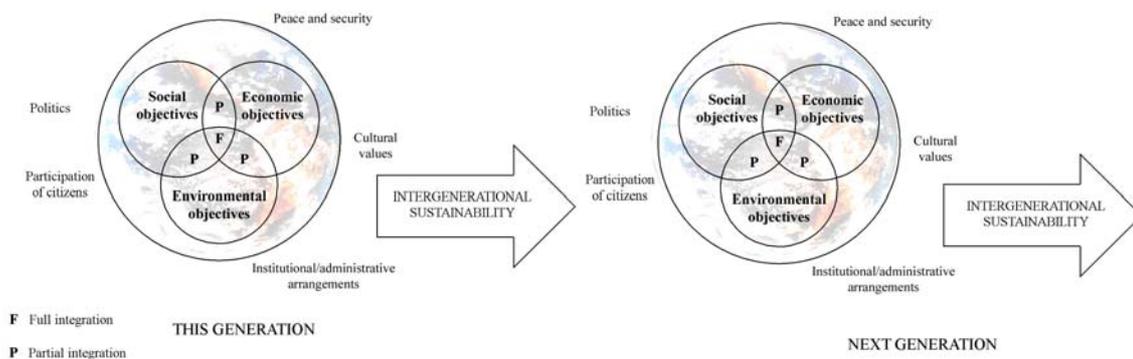
Figure 3-6 Intergenerational sustainability, designed to safeguard the rights and abilities of future generations to also meet their needs.
Source: This author

It should be noted that many references use the terms Sustainability and SD interchangeably; Reid wrote that *""Sustainable Development" usually refers to the process "developing" in a sustainable way… and also to the "goal" of that process; "sustainability" refers to the concept of sustainable development, and also – confusingly- both to a state of sustainable resource use, not necessarily the same as sustainable development, as in "ecological sustainability" and to a state in which the goals of sustainable development have been achieved"* (Reid, 1995). This indicates that sustainable development is the process, or road, to sustainability; to which this thesis author agrees to the extent that sustainability becomes a dynamic goal, that means that once reached it has to be re-assessed and try to improve the quality of life and environment even more. It also means that SD is an ongoing journey, not a destination.

The integration of the definitions of Development, "*to go through a process of natural growth, differentiation, or evolution by successive changes from a less perfect to a more perfect or more highly organised state*" (Gove, 1993), and Sustainable, "*Capable of being sustained*" that means "*to provide for the support or maintenance of*" (Gove, 1993) suggest that SD would be: the capacity of providing the support or maintenance of a process of natural growth, differentiation, or evolution from a less perfect to a more perfect or more highly organised state. This definition would have been used before 1987, the year that the Brundtland Report was published, from then on, SD has evolved into the provision or maintenance of the natural environment and the societies while at the same time having an economic growth that would respect the two previously mentioned, that is to protect and safeguard the material and energetic resources for this generation and the next ones, and ensure an on-going capacity of the eco-sphere to support life on the planet.

This chapter presents the many setbacks that Development has and the future and present challenges. SD presents one solution to these problems; therefore, this author believes that a sustainable society, or working with sustainable development, should have the elements presented in Box 3-2, partly specified by Elsen (1998) and Dalal-Clayton and Bass (2002).

Box 3-2 Elements of a Sustainable Society

1. **A total integration of the economic, environmental and social aspects;**
2. **An intergenerational mentality;**
3. **Peace and security;**
4. **Protection of the culture;**
5. **Protection and respect for human rights;**
6. **Gender equality;**
7. **Equal access to resources (material and energy);**
8. **Protection of the integrity of the environment;**
9. **Respect for all species;**
10. **Improvement, or maintaining, the of quality of life;**
11. **Participation of citizens.**

Source: This author

There are many definitions of SD. For this thesis author SD and sustainability are: **SD is a change process in which the societies improve their quality of life, reaching dynamic equilibrium between the economic and social aspects, while protecting, caring for and improving the natural environment. This integration and equilibrium among these three aspects must be taught and transferred from this generation to the next and the next.**

The SD change process must have sustainability as its dynamic goal, by dynamic is to be understood as the quality of life and the environment can always be at least a little better.

4. Higher Education and Sustainability

This chapter is designed to underscore the dynamic evolution of the understanding of university leaders of their responsibilities and roles in helping society to evolve in sustainable patterns and pathways. Thus, this thesis author underscores the following aspects: **a.** the importance of higher educational institutions as social agents of change, **b.** the importance of higher educational institutions and their role in the process of adoption and diffusion of SD in the world societies; **c.** the points of view of different authors about these evolving roles as well as the current trends in education; **d.** the different efforts some institutions of higher education have taken or are taking in beginning to fulfil their responsibilities towards SD, and **e.** the central role of academic leadership in the process of helping society make the transition to SD.

4.1 Universities and their roles as social agents of change

Universities have, for centuries, been the places where young people have attended to received education and to gain knowledge through the university life experience. Many paradigms have been created in universities and many have been broken. Universities present a very interesting environment, where enthusiastic young people get in touch with knowledgeable and experienced individuals. The students, professors, directors and staff are exposed to the everyday life and the culture of the specific university. This thesis author wishes to highlight the importance of universities as increasingly important organisations that catalyse change.

Many authors have begun to help academic leaders to better understand their responsibilities. Among such authors is David Orr who differentiates among *"schooling"*, *"training"* and *"learning"*. He defines "training" as the inculcation of a rote habit. By "schooling" he refers to what happens in schools and colleges and he writes that it *"…has to do with the ability to master basic functions that can be measured by tests."* (Orr, 1992) "Learning" is, for him, *"what can happen throughout life for those willing to risk it"* (Orr, 1992), it has to do with judgement and it is difficult to measure.

This thesis author agrees with Orr, especially when he writes that *"Schooling may or may not increase intelligence… [but] Real learning on the other hand, always increases intelligence…"*(Orr, 1992) This difference will serve to make the distinction of the "learning" experiences within the university, and the "schooling" that takes place during some courses and programs. This learning view is shared by Rosner (1995) who indicates three types of learning: **a.** by experience, **b.** by being taught, and **c.** by theory. All of them take place in a university. To this respect Cortese wrote that *"Educational psychologists tell us that we retain 80 percent of what we do as opposed to 10–20 percent of what we hear and read."* (Cortese, 1999)

Education has and will continue to fulfil the purpose of preparing the future decision-maker, entrepreneurs and leaders of the world, but as Orr remarks that *"Education in the modern world was designed to further the conquest of nature and the industrialisation of the planet. It tended to produce unbalanced, under dimensioned people tailored to fit the modern economy."* (Orr, 1992)

On a similar vein, James Burke explains that *"…In education, the old reductionist reliance on specialism and testing by repetition will have to give way to a much more flexible definition of ability… New ways will have to be found to assess intelligence in a world in which memory and experience seem no longer of value…"*(Burke, 2000)

This thesis author agrees with Burke (2000) and Orr (1992) in the fact that the old system of schooling is no longer appropriate as it continues to teach students to enter the world to support societal depletion of the natural and human resources. A new method must be developed, or it could have been already developed and implemented by universities and it is not to the knowledge of the author, in which the students are involved in the learning process and do not just sit in a bench and receive information from a professor. With a system of this type, the student would be able to learn by doing and not just by being lectured to; currently there exist some systems and professors who engage the students with different styles inviting them to participate and thus, to learn by doing, and there also exist methods that focus on the conscious use of the natural resources and safeguarding and improvement (development) of societies. These methods and approaches must be integrated in courses and curricula to engage students and at the same time motivate them to help their societies make progress towards SD.

With regard to the responsibilities of universities, Cortese emphasises that "*Higher education institutions bear a profound, moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future. Higher education plays a critical but often overlooked role in making this vision a reality… [Universities prepare] most of the professionals who develop, lead, manage, teach, work in, and influence society's institutions... Higher education has unique academic freedom and the critical mass and diversity of skills to develop new ideas, to comment on society and its challenges, and to engage in bold experimentation in sustainable living.*" (Cortese, 2003), this statement reinforces the ones that this thesis author has already presented.

According to the previous statements, universities must increasingly play multiple important roles in the creation and moulding of individuals who will become decision-makers in the future. In the universities students not only are "schooled" but also learn by the experiences of the university life. However, not only students learn, also the professors, academic directors and staff pass everyday through a learning experience during the day-to-day life in the institution.

4.2 Universities and SD

Once the importance that higher education institution plays in the modern society is explained, this thesis author will connect universities and SD. For example, Cortese emphasises that "*Despite the efforts of many individuals and groups within the formal educational system, education for a just and sustainable world is not a high priority*" (Cortese, 2003). This thesis author wonders, How we can achieve sustainable societies when the institutions, where decision-makers and entrepreneurs are educated, are primarily highly specialised in the different areas of knowledge and do not really learn the full, multi-disciplinary perspectives within which their specialised training is an important but incomplete part?

If we are to be successful as educators for SD, our education must be based upon a switch in paradigms from this highly specialised focus towards a transdisciplinary approach, passing through a process of multidisciplinary and interdisciplinary approaches. Roorda defines these terms as:

- **Multidisciplinary education:** "*…[the] co-operation between various disciplines, keeping intact every separate set of theoretical concepts and methodological*"
- **Interdisciplinary education:** "*…[the] co-operation between various disciplines, where a common methodological approach and theoretical fundament is looked for, as a synthesis of the participating disciplines. Participants try to speak "one language.""*

- **Transdisciplinary education:** *"…not only co-operation takes place between specialists of various disciplines, but also others are directly involved: users, problem owners, clients, stakeholders, etc. (transdisciplinary = (literally :) beyond the disciplines.)"* (Roorda, 2001)

The reasons for the importance of these three terms are explained in the following paragraphs:

Cortese (2003) remarks that currently universities focus is stressed on individual learning and competition, encapsulated in the little world of the respective discipline. This leads to low or no information flow and generation of intellectual cells without any communication and of individuals poorly prepared for co-operative efforts. Constanza adds that *"Our education system is currently characterised by overspecialisation and disciplinary isolation"* (Costanza, 1991).

A paradigm shift is required for a sustainable future in which there is an emphasis on collaboration and co-operation; without these the road towards transdisciplinarism will never take place.

While being in different universities, this thesis author, based upon his academic experiences can strongly attest to the fact that many or most of his learning experiences were too narrowly discipline oriented (discipline-centrism), where the engineers despise the social and administrative disciplines, and even among different types of engineers conflicts occur among the civil, mechanical and chemical engineering subdivisions; each of them believing that they own the world and the experiences and knowledge of the others are of little or no value. These types of attitudes cause the creation of very high change barriers for university faculty to be effective change promoting agents needed for societies to make progress towards SD. By stating this, this thesis author does not wish to generalize and say that all the individuals function like this, however, in modern universities most faculty members unfortunately act this way. There is little or no multidisciplinarism, and even less interdisciplinarism or transdisciplinarism.

On matters of curricula Orr wrote that *"The contemporary curriculum continues to divide reality into a cacophony of subjects that are seldom integrated into any coherent pattern."* (Orr, 1992) To which Cortese adds that the current curricula make the following assumptions:

- *"Humans are the dominant species and are separate from the rest of nature*
- *Resources are free and inexhaustible*
- *Earth's ecosystems can assimilate all human impacts*
- *Technology will solve most of society's problems*
- *All human needs and wants can be met through material means*
- *Individual success is independent of the health and well-being of communities, cultures, and the life support system."* (Cortese, 2003)

All of these assumptions were presented in more detail in Chapter 3 of this thesis.

This thesis author agrees with Cortese (2003) and Orr (1992), and believes that the current university curricula are focused on economic growth and not on development that will allow this generation to enjoy the natural resources and increase its quality of life, and at the same time ensure that future generations will have the opportunity to benefit from these resources.

An important difference must be made, this is the difference between education *about* SD and education *for* SD should also be made clear. As McKeown remarks *"An important distinction is the difference between education **about** sustainable development and education **for** sustainable development. The first is an awareness lesson or theoretical discussion. The second is the use of education as a tool to achieve*

sustainability" (McKeown, 2002) This statement clearly marks the differences between including SD in the curricula and including it in the university life.

Universities' systems differ from those of corporations. Corporations have a focus on making money and revenues, while universities focus, most of the time, on preparing individuals to be decision-makers and entrepreneurs. Thus, the nature of universities is different from that of corporations; that is not to indicate that universities do not search economic efficiency, it is clear that excesses in expenditures will lead to bankruptcy of private universities, and economic limitations in public institutions. For this reason the triple-bottom-line approach, which came from a corporate view, does not fit totally to the universities' dimensions. Therefore, the triple-bottom-line approach has to be merged into the university system, which Cortese (2003) has developed and which is presented in Figure 4-1.
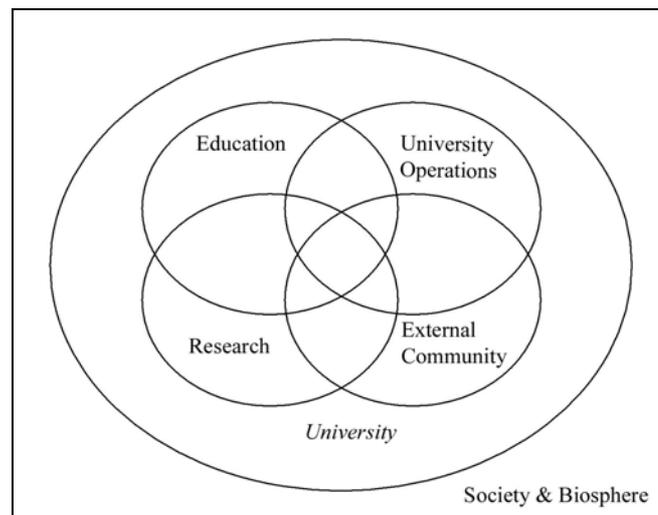
Figure 4-1 Higher Education Modelling Sustainability, as a Fully Integrated System
Source: Cortese (2003)

This section has shown that universities: **a.** Play an important role in the formation of decision-makers and influential individuals, who are potentially the champions of SD, and **b.** the current higher education system does not encourage SD. In order for universities to serve as social agents of change and be SD champions in their communities they have to introduce and include SD within their entire system, as Cortese (2003) proposes, on their education, university operations, research and external interactions within their communities.

4.3 Declarations, charters and partnerships integrating SD in higher education

Calder and Clugston (2003) present a history of the efforts taken in higher education to foster SD. They mention that the relationship between education and SD was first recognized on an international level at the Stockholm conference in 1972, followed by the first international declaration on environmental education in 1977 at the Intergovernmental Conference on Environmental Education in Tbilisi. For them education for SD *"emerged primarily out of the Rio Earth Summit and, for many educators, [it] is defined more broadly than "environmental education" to include issues of international development, cultural diversity, and social and environmental equity. We use the term "higher education for SD" both for its broader implications and for its explicit reference to the goals of the Rio Earth Summit and the WSSD"* (Calder & Clugston, 2003). The authors present Table 4-1 with the significant events and declarations in higher education for SD, the Web pages of each are presented in Appendix 4.

It is important to note that the declarations and charters are intended to serve as supporting and guiding documents; this does not ensure that the signatory institutions apply SD within their systems. It also does not ensure that non-signatory institutions are not involved with SD. Signing a declaration or belonging to a charter indicates a first step towards SD; then it is the obligation of the leaders of the institution to guarantee its incorporation in the university system.

Table 4-1 History of the efforts taken in Higher Education to foster Sustainable Development

Year	Event/Declaration
1972	Stockholm Declaration on the Human Environment, United Nations Conference on the Human Environment, Sweden.
1975	The Belgrade Charter, Belgrade Conference on Environmental Education, Yugoslavia.
1977	Tbilisi Declaration, Intergovernmental Conference on Environmental Education, Georgia.
1989	National Wildlife Federation's Campus Ecology program (formerly known as Cool It) was founded.
1990	Talloires Declaration, Presidents Conference, France.
1990	National Council for Science and the Environment (originally the Committee for the National Institute for the Environment) was founded.
1991	Halifax Declaration, Conference on University Action for Sustainable Development, Canada.
1991	World Resources Institute's Sustainable Enterprise Program (formerly the Management Institute for the Environment and Business) was founded.
1992	Report of the United Nations Conference on Environment and Development; Chapter 36: Promoting Education, Public Awareness and Training.
1992	Association of University Leaders for a Sustainable Future founded.
1993	Kyoto Declaration, International Association of Universities Ninth Round Table, Japan.
1993	Swansea Declaration, Association of Commonwealth Universities' Fifteenth Quinquennial Conference, Wales.
1993	Copernicus University Charter, Conference of European Rectors (CRE). (
1993	Second Nature founded.
1994	Blueprint for a Green Campus, Yale University Campus Earth Summit.
1995	Workshop on Implementing Sustainable Development at the University Level in Bradford, United Kingdom.
1995	Essex Report: Workshop on the Principles of Sustainability in Higher Education in Essex, Massachusetts.
1996	The International Work Programme on Education, Public Awareness and Training for Sustainability adopted by the U.N. Commission on Sustainable Development.
1996	Ball State University Greening of the Campus conference was held. Since then conferences were held in 1997, 1999, and 2001.
1997	Thessaloniki Declaration, International Conference on Environment and Society: Education and Public Awareness for Sustainability, Greece.
1998	World Conference on Higher Education, Paris, France.
1999	World Conference on Science, Budapest, Hungary.
2000	World Education Forum (Education for All), Dakar, Senegal.
2001	Lüneburg Declaration on Higher Education for Sustainable Development, Germany.
2002	World Summit on Sustainable Development in Johannesburg, South Africa (Type 1 outcome: decade of education for sustainable development; Civil Society outcome: the Ubuntu Declaration)

Source: Adapted from Calder & Clugston (2003)

This thesis author would like to emphasise that among all of these educational declarations the most important declarations for universities are:

1. The *Talloires Declaration*, which discusses the role of universities in shaping a sustainable future and provided input for the *Rio Earth Summit*;

2. The *Halifax Declaration*, which serves as an institutional endorsement and emphasises teaching and practising SD with an action plan that outlines short- and long-term responsibilities for Canadian universities;
3. The *Swansea Declaration*, of the Association of Commonwealth Universities, invited all societies to work together;
4. The *COPERNICUS University Charter*, with references to the previously mentioned declarations, stresses environmental literacy for students, faculty, and staff, together with public outreach;
5. The *Kyoto Declaration*, which stresses the ethical obligation of universities to reform, it also recommended specific action plans for universities;
6. The *Thessaloniki Declaration*, which focuses upon poverty reduction as a necessary condition for sustainability and affirmed the reorientation of education to a holistic and interdisciplinary approach;
7. The *Lüneburg Declaration*, which focuses mainly on the creation of networks of universities for SD in higher education and the development of a toolkit as a concrete action;
8. The *Ubuntu Declaration*, which strongly urges the integration of SD into the curricula, better co-operation between North and South universities and much emphasis upon capacity building in SD.

These declarations together with other important charters and organisations that focus on SD in higher education are presented in the following paragraphs.

4.3.1 The Brundtland Report

The Brundtland Report states that "*Education should also be geared towards making people more capable of dealing with problems of overcrowding and excessive population densities, and better able to improve what could be called 'social carrying capacities'. This is essential to prevent ruptures in the social fabric, and schooling should enhance the levels of tolerance and empathy required for living in a crowded world… Education can induce all these, and can enhance a society's ability to overcome poverty, increase incomes, improve health and nutrition, and reduce family size.*" (WCED, 1987)

As presented in Section 4.3.1 the Brundtland Report emphasises that the social aspect is one of the most important, most problematic and with the highest resilience to change; even if the economic and environmental aspects in a society are strong, if society does not wish to adopt the changes, they will not be adopted. It is there that the statement above presented has its major strength; education helps the society to overcome this apathy and resistance to change towards SD.

4.3.2 The Talloires Declaration

The Talloires Declaration was signed in October 1990 by twenty university rectors, presidents and vice chancellors from over the world concerned about the environmental degradation, pollution and the depletion of natural resources, the threat that these present to human and biodiversity survival; in the Declaration the environmental changes are considered to be caused by inequitable and unsustainable production and consumption patterns. It gets its name from the location of the Tufts University European Centre in Talloires, France. The Declaration states simply and starkly: "*We believe that urgent actions are needed to address these fundamental problems and [to] reverse the trends…. [And it considers that] Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible.*" (ULSF, 1990) The Talloires Declaration recommends 10 action points to tackle these problems. The full text of the Declaration is presented in Appendix 5.

4.3.3 The Halifax Declaration

In December 1991 at Halifax, Canada senior representatives from the IAU, the United Nations University, the Association of Universities and Colleges of Canada, together with 20 university presidents from various parts of the world (Brazil, Indonesia Zimbabwe, etc.) met in the conference to discuss the role of universities in improving the capacity of countries to address environmental and development issues, this conference had two main outcomes:

1. A follow-up action plan is presented as a basis for practical strategic plans for SD;
2. A Declaration, which provides a general direction being pursued by the universities involved.

The authors of the Halifax Declaration express dismay about the continuing widespread degradation of the earth's environment, the pervasive influence of poverty on the process, and about the unsustainable environmental practices now so widespread. The Declaration states that "*Universities are entrusted with a major responsibility to help societies shape their present and future development policies and actions into the sustainable and equitable forms necessary for an environmentally secure and civilized world.*" (IISD, 2003b)

The work of the Halifax Declaration was to a large extent parallel to the Talloires Declaration. The Halifax Declaration presents a broad action plan which identifies short- and long-term goals at the local and regional, national and international levels. The complete text of the Halifax Declaration is presented in Appendix 6.

4.3.4 The Earth Summit and Agenda 21

As mentioned previously in Section 3.2.3 during the Earth Summit in Rio in 1992, Agenda 21 was created. The Agenda was intended to be a framework of action for achieving SD. Agenda 21 is a long, over 500 pages, document. It places an emphasis on participation and open government. Agenda 21 also emphasises the importance of the creation of adequate knowledge and institutions. Agenda 21 is divided into four main sections:

- Social and economic development (chapters 1-8)
- The conservation and management of resources for development (chapters 9-22)
- Strengthening the role of major groups involved in achieving SD (chapters 23-32), and
- Means of implementation (chapters 33-40)

Chapter 35 focuses on Sciences for SD. The Chapter remarks "*One role of the sciences should be to provide information to better enable formulation and selection of environment and development policies in the decision making process.*" (UN, 1992a) The Chapter asks also for the improvement of capabilities for scientific research in national, regional, and global levels. Education is thus important to achieve the objectives stated by this Chapter. This thesis author would like to state that even though the literature presents the different chapters of Agenda 21 as separate, they are however really all interlinked and interrelated.

Chapter 36 is dedicated to education; this Chapter has three main foci: **a.** Reorienting education towards SD, **b.** Increasing public awareness, and **c.** Promoting training. (UN, 1992b)

Chapter 36 states that "*Education is critical for promoting SD and improving the capacity of the people to address environment and development issues*" (UN, 1992b)

Chapter 36 also requires for the universal access to education, achievement of primary education 80% for boys and girls, and the reduction of illiteracy level, while at the same time increasing environmental and development awareness and the integration of these to the education. The estimates of the implementation of these facets are, according to the Chapter authors, between $8 billion to $9 billion (from 1993 to 2000). The Chapter urges governmental leaders to give a higher priority to the educational sector.

Chapter 36 also urges the promotion of public awareness of environmental and development issues and the interrelation of these. This is mainly focused upon developing countries. For these efforts, the estimated cost is around $1.2 billion (again from 1993 to 2000).

The third point of Chapter 36, "Promoting training," focuses on the creation of jobs within the environmental and developmental fields, and upon the preparation of individuals for these jobs. The estimate for this work is $5 billion. (UN, 1992b)

Chapter 37 states the Creation of Capacity for SD. The Chapter states very clearly that *"The ability of a country to follow sustainable development paths is determined to a large extent by the capacity of its people and its institutions as well as by its ecological and geographical conditions."* (UN, 1992c) Some of these institutions mentioned in the Chapter 37 are NGOs, businesses, research centres and universities. It is clear that these are some of the important agents that can push the concept of SD into societies.

Principles such as universality, democracy, transparency, cost-effectiveness (and cost-efficiency also), and accountability are required by Agenda 21; these are stated in Chapter 38, International Institutional Arrangements. This Chapter states *"The continued active and effective participation of non-governmental organisations, the scientific community and the private sector, as well as local groups and communities, are important in the implementation of Agenda 21."* (UN, 1992d)

Throughout this thesis, the focus has been on universities, but other institutions are also important on the societal development towards sustainability. This thesis author believes that Agenda 21 is a very important document and action plan in the implementation of SD throughout the world. It demands for the active participation of stakeholders and institutions to help solve the different economic, environmental and social problems of current times.

4.3.5 The Swansea Declaration

The Swansea Declaration was the outcome of the Association of Commonwealth Universities' Fifteenth Quinquennial Conference, in August 1993 in Swansea, Wales. The conference attracted participants from 400 universities from 47 different countries. The Swansea meeting was inspired by the examples of Talloires and Halifax, and was driven by the disappointment of the insufficient University presence in Rio de Janeiro and Agenda 21, together with the topics, again, of degradation of the Earth's environment and the pervasive influence of poverty and the urgent need for sustainable practices. The Swansea Declaration states pertaining to universities that: *"…the educational, research and public service roles of universities enable and impel them to be competent, effective contributors to the major attitudinal and policy changes necessary for a sustainable future…"* (IISD, 2003d). The seven action points of the Declaration directed to all universities are presented in Appendix 7.

4.3.6 The Kyoto Declaration

The Kyoto Declaration was signed in November 1993 in the 8th Round Table of the International Association of Universities (IAU). It is composed of 8 points, of which the first

one borrows the words of the Brundtland report; the second one urges universities to better utilise the natural resources; the third demands the present generation to stop unsustainable practices; the fourth urges educators to teach and do research on the principle of SD; the fifth urges co-operation with all segments of society; the sixth urges universities to review their operations; the seventh urges them to implement the declaration; and the eight reinforces the Halifax and Swansea declarations. (IISD, 2003c)

4.3.7 The COPERNICUS Charter

The Co-operation Programme in Europe for Research on Nature and Industry through Co-ordinated University Studies (COPERNICUS) Charter was signed in Geneva in May 1994. The International Institute for SD wrote about the Copernicus Charter:

> *"The University Charter for Sustainable Development is an instrument created by Copernicus, an inter-university co-operation programme on the environment, established by the Association of European Universities (CRE). The Charter expresses a collective commitment on behalf of a large number of universities. It represents an effort to mobilize the resources of institutions of higher education to further the concepts and objectives of sustainable development. The Charter was introduced and presented to the CRE bi-annual conference in Barcelona, in the autumn of 1993. Two years later, the document has been endorsed by the personal signature of the rectors of no less than 213 universities in Europe."* (IISD, 2003a)

It should be noted that the Copernicus Charter Organisation, CRE, held its last conference (The Sixth) in the University of Pécs in Hungary, from the 2nd to the 4th of July, 2003; to which this thesis author had the honour to participate.

This author learnt that there are many universities in Europe that are currently working towards the incorporation of SD, some on higher levels than others, and some more coordinated. The conference regretfully had a low focus on social aspects, to which this author would have liked to learn more. In general, the conference gave an impression that the incorporation of SD seems to be in a promising path, but there are still many challenges and opportunities to overcome.

4.3.8 Global Higher Education for Sustainability Partnership (GHESP)

The Global Higher Education for Sustainability Partnership (GHESP) was formed in 2000, when the association of the Association of University Leaders for a Sustainable Future (ULSF), COPERNICUS-Campus, the International Association of Universities (IAU), and UNESCO. This partnership seeks to develop and share effective strategies, models and best practices for promoting higher education for sustainability, an to analyse experiences in the south and the north. This partnership is based on the importance of higher education in the achievement of SD. (GHESP, 2003b)

GHESP has the rational that higher education must play a central role in the process of achieving SD. The objectives of the partnership are:

1. *"Promote better understanding, and more effective implementation of strategies for the incorporation of sustainable development in universities and other higher education institutions, beginning with the over 1000 signatories to the charters and declarations sponsored by the partner organisations. Emphasis is put on the need for interdisciplinary approaches to teaching and research;*

2. *Undertake a global review and assessment of progress in making sustainability central to curriculum, research, outreach and operations in institutions of higher education. In so doing, assist UNESCO in its role within the UN system with respect to education for sustainable development;*

3. *Identify, share and disseminate widely, via internet, in print, through seminars and other venues, effective strategies, models and good practices for promoting higher education for sustainable development (HESD);*

4. *Make recommendations on HESD based on the partnership's research and review and in consultation with key stakeholders from North and South, including business, governments, other UN bodies such as the United Nations University (UNU), as well as other relevant non-governmental organisations;*

5. *Demonstrate that it is possible to form a partnership of non-governmental organisations working closely with the UN system to develop and implement a joint action plan addressed to achieve common goals; and analyse this experience as an international demonstration project."* (GHESP, 2003b)

GHESP is helping to develop a toolkit to reorient higher education for sustainability. The toolkit is still in the draft period, but it promises to integrate "*universities, managers, administrators, faculty and students designed to move from commitment to concrete action. The tool kit will include: implementation strategies for higher education institutions that address the incorporation of sustainability in all dimensions of university life, including teaching, research, operations and outreach; a broad inventory of available resources; a variety of assessment and reporting processes; and an inventory of best practices and in-depth case studies.*" (GHESP, 2003a)

4.3.9 The Lüneburg Declaration

The Lüneburg Declaration was signed on the International COPERNICUS Conference under the umbrella of GHESP, in Lüneburg, Germany in October 2001. The main points of the Declaration are: **a**. the building of networks of the ULSF, COPERNICUS and IAU; **b**. increase the inclusion of sustainable development in higher education; **c.** the importance of education, and of higher education specifically, in achieving sustainable development; **d**. create a global learning environment, the signing of the different declarations of higher education; and **e**. the production of a toolkit as a concrete action for the universities. (COPERNICUS, 2001)

4.3.10 The Ubuntu Declaration

On September 9th 2003, during the World Summit on Sustainable Development held in Johannesburg, 11 of the world's foremost educational organisations and scientific academies issued the Ubuntu Declaration. The Ubuntu Declarations demands for the integration of SD into the curriculum at all levels of education. The Declaration aims to create a global alliance to promote SD globally.

The 11 educational organisations and scientific academies that issued the Declarations are:

- United Nations University;
- United Nations Educational, Scientific and Cultural Organisation;
- International Association of Universities;
- Third World Academy of Sciences;
- African Academy of Science;
- Science Council of Asia;
- International Council for Science;
- World Federation of Engineering Organisations;
- Copernicus-Campus;

- Global Higher Education for Sustainability Partnership; and
- University Leaders for a Sustainable Future

The goals of Ubuntu Declaration are:

- *"Curriculum development;*
- *North-South networking;*
- *Strategic educational planning and policy-making; and*
- *Capacity building in scientific research and learning."* (UNU, 2002)

The Ubuntu Declaration explicitly indicates the co-operation between the North and the South, a focus that the other declarations only point out implicitly.

4.3.11 The Earth Charter

In 1987 the UN World Commission on Environment and Development issued a call to create a new charter to deal with SD. In 1994 the Earth Charter was created with the initiative of Maurice Strong, the Secretary General of the Earth Summit, Mikhail Gorbachev, President of Green Cross International, and the Dutch Government. The Earth Charter Commission was established in Costa Rica in 1997.

The Earth Charter is a declaration of fundamental principles for building a just, sustainable, and peaceful global society. The goals of the Earth Charter are:

- *"To promote the dissemination, endorsement, and implementation of the Earth Charter by civil society, business, and government.*
- *To encourage and support the educational use of the Earth Charter.*
- *To seek endorsement of the Earth Charter by the UN."* (Earth Charter, 2003)

The Earth Charter is comprised of 16 principles (see Appendix 8), divided into the following four categories:

1. Respect and care for the community of life (principles 1 to 4);
2. Ecological integrity (principles 5 to 8);
3. Social and economic justice (principles 9 to 12);
4. Democracy, non-violence and peace (principles 13 to 16).

The Earth Charter principles are of vital importance to be included in the educational system as they seek to make progress with SD.

4.3.12 United Nations Decade of Education for Sustainable Development (DESD)

As a follow-up to the meetings in Johannesburg (presented in Section 3.2.3.2) during the 57th Session of the United Nations General Assembly, on 11 December 2002 a draft resolution tilted, "United Nations Decade of Education for Sustainable Development" (DESD) was adopted. This resolution, proposed by Japan, was co-sponsored by 46 countries and was adopted by consensus at the Plenary Meeting. The Executive Board of UNESCO ratified the Decade of Education for Sustainable Development at its 166th Session in April 2003.

The resolution:

- Is based upon Chapter 36 of Agenda 21, for promoting education, public awareness and training on SD, world-wide;
- Emphasises the goal that by 2015 children everywhere, boys and girls, will be able to complete primary school;
- Confirms that, as agreed in Johannesburg, education is of vital importance for SD;
- Proclaims a decade, starting in January 2005, as the United Nations Decade of Education for SD;
- Assigns UNESCO as the lead agency for overseeing and co-ordinating implementation of this mandate;
- Invites governments to include educational measures to implement the Decade for all ages. (UN, 2003)

The DESD (UNESCO, 2003) is divided in three sections:

- Section I: "*elaborates the nature of education for sustainable development and clarifies its links with other major international educational processes and priorities…*"
- Section II: "*describes a partnership approach to the development of a draft international implementation scheme for the DESD…*"
- Section III: "*concludes the paper with a proposed schedule of activities aimed at catalysing world society in preparation for the DESD over the period July 2003 – December 2005…*"

The DESD emphasises that in order to achieve SD different aspects need to be solved and it highlights that education must provide the necessary skills to solve them. These are presented in Table 4-2.

Table 4-2 Aspects provided by education to solve the requirements of SD

Requirements to achieved SD	Skills that education provides
Recognition of the challenge	Learning to know
Collective responsibility and constructive partnership	Learning to live together
Acting with determination	Learning to do
The indivisibility of human dignity	Learning to be

Source: Adapted from UNESCO (2003)

According to the DESD "*education is the primary agent of transformation towards sustainable development, increasing people's capacities to transform their visions for society into reality. Education not only provides scientific and technical skills, it also provides the motivation, justification, and social support for pursuing and applying them*" (UNESCO, 2003). Throughout this thesis the author has been trying to remark the importance of education in the diffusion and adoption of SD in modern societies. It is to be noted that the educational system is comprised by many different levels and that this thesis is focused only on higher education, but without indicating that the other levels are not important; this author believes that all levels of education are important and that SD should be incorporated from the basic levels to higher education, just as the DESD highlights.

The DESD specifies four dimensions of education for SD:

- **Basic education:** The differences of basic education throughout the world vary greatly, and access to basic education still remains a problem.
- **Reorienting existing education programs:** The current curricula, from nursery to higher education, should be revised to include SD.

- **Developing public awareness and understanding of sustainability:** It is important that the concept of SD penetrates the local, national and global levels.
- **Training:** All the different sectors can contribute to the incorporation of SD in the local, national and global levels. Thus it is important that SD be included in the operations and "day-to-day" life of each sector.

This author believes that these four dimensions summarise with great precision the steps to follow so that the Earth and future generations are protected.

The DESD highlights that "*Sustainable development requires a holistic approach: Education for sustainable development has connections with other programmes and concerns in education*" (UNESCO, 2003). This sentence is in accordance to what this author presented at the end of Section 3.1. The DESD presents a list of the key themes in education for SD:

- Overcoming poverty;
- Gender equality;
- Health promotion;
- Environmental conservation and protection;
- Rural transformation;

- Human rights;
- Intercultural understanding and peace;
- Sustainable production and consumption;
- Cultural diversity;
- Information and communication technologies (ICTs).

Most of the themes of the list are presented in Chapter 3. This author highlights that ICTs could, should and do play an important role in modern societies. They allow the information to reach different audiences in different parts of the world in little time with fewer costs.

This author believes that the DESD is an important, and necessary, step for the diffusion of SD in this world's societies. This will serve as a leading agent of change and challenge to the different governments and educational institutional to educate the future generations (and hopefully some individuals of the current one) with the aspects of SD.

This author believes that this DESD is of great importance as a strong mandate and framework for catalysing all governments to ensure the inclusion of the concepts, values and tools of SD in all of their educational systems. Some countries will have to make major adjustments in their educational systems and the inertia that the "old" system has is too strong to accomplish all of the necessary changes within a single decade. This author wishes to emphasise that the Decade activities will establish the foundation for efforts on SD in education and all such efforts should be established and supported with financial and human capital to ensure that the efforts will continue to get stronger and deeper during and after the decade, *per sec*. One limitation that this thesis author finds with this decade designation is that it is only for a decade, while it should be for a longer period. This author is convinced that those who proposed this decade share this vision of on-going educational efforts on SD that go **far beyond** the designated decade.

4.3.13 Summary of the goals, objectives and directions for educators of the array of declarations, charters and partnerships that have been developed within the last two decades

Calder and Clugston (2003) present a resume of all of the presented declarations emphasise the need for promotion of sustainability in:

1. **All the different academic disciplines;**

2. **Research on SD issues;**
3. **The improvement or "greening" of university operations;**
4. **Engagement of interuniversity co-operation ;**
5. **Partnership with government, non-governmental organisations (NGOs) and industries.**

Most of it, the declarations highlight the moral obligation of universities to work towards a sustainable future. Also, these declarations reaffirm university leader's responsibility to fulfil the mandates presented in Chapter 36 of Agenda 21. Also, unfortunately all ignore educator's responsibilities as outlined in Chapters 35, 37, & 38.

Calder and Clugston (2003) emphasise that to date leaders of more than 1,000 universities have signed the Talloires Declaration, the Kyoto Declaration and the Copernicus University Charter; with roughly one-third from the global South and one-fifth from countries in the former Soviet Union and Warsaw Pact nations.

This author would like to summarise on the different declarations and charters:

Box 4-1 Summary of declarations and chapter of SD in Higher Education

1. **Importance of Education, specially Higher Education, as a multiplier of SD;**
2. **Focus on environmental degradation, threats to society, and unsustainable consumption;**
3. **Compromise the institution to SD;**
4. **Create a culture of sustainable development within and outside the institution;**
5. **Include SD in the campus operations, courses, and research;**
6. **Involve all stakeholders;**
7. **Cooperate with other institutions;**
8. **Have continuity and intergenerational view;**
9. **Communicate the SD efforts and results to the community**

Source: This author

4.4 The university system and the dimensions into which SD should be integrated.

The conclusions drawn from the review of these declarations lead one to reflect on how the different dimensions of SD can be most effectively integrated into the total set of university activities. As Calder and Clugston (2003) suggest, SD should be included in all the different academic disciplines, one way to solve this is to integrate it in the curricula of each of the disciplines. It should be noted that though the curricula are part of the core business of the university, they are not the only activities that the university does. The inclusion of SD within all curricula requires that the university system actively supports and facilitates such inclusion and furthermore, that the professors become interested, are taught the concepts and obtain the tools to implement SD as a 'Golden Thread', within their courses and curricula. Such inclusion in the curricula can serve as a multiplier and can serve as the foundation and catalyst for societal adoption of SD. It is important to note that the leaders of the university should bear in mind the three different approaches by Roorda (2001), multidisciplinarism, interdisciplinarism and transdisciplinarism.

This provides one of the key dimensions of SD education, the *curricula*; SD should not be placed as another course but should be integrated throughout all courses as well as within new interdisciplinary courses and research efforts.

Calder and Clugston (2003) propose that *research* on SD must be done within universities, thereby providing support for research on SD as a second major focus. They also propose the "*greening of the campus,*' should be done as the third dimension.

One could ask, what about the surrounding environment, the external community? Calder and Clugston (2003) do not consider this aspect as Cortese (2003) does in his Figure 4-1. The community must be involved, since the university is an integral part of the society, it employs individuals from that society (academic directors, professors, and staff), and it also teaches and forms young people (the students) from that society. So, the community should be included in the process and the introduction of the concept of SD in the society should be another goal for the institution. This, obviously, should be taken as a long-term goal, since the university should first start within its boundaries and then move out, but still it can include "bit by bit" the community. Hence, the fourth dimension, community outreach.

Another question is, how can the university measure its performance towards SD? And what to do with it? The answer for this is the assessment and reporting of SD in the institution, giving step to the fifth dimension. This dimension is addressed in more detail in Chapter 6.

In conclusion, there should be five dimensions in which the university should focus in the path towards SD:

Box 4-2 Dimensions in which SD should be included in the university

1. **Inclusion in the curricula;**
2. **Research towards SD;**
3. **Operation of the campus in a sustainable manner;**
4. **SD in their community outreach;**
5. **Assessment and reporting of the efforts and performance of SD and making continual improvements of their SD programs as time proceeds and as experience and new knowledge are obtained.**

Source: This author

This author emphasises that these five points are not exclusive one from the other, and they are not in a hierarchical order. It is obvious that some of them are easier to implement than the others. However, all are interconnected and mutually reinforcing and all should be done on all campuses, world-wide.

It is implicit the introduction of SD in all of these dimensions will be affected by the attitude and values of the different stakeholders, for example, staff, students, professors, academic directors etc. Some of their attitudes may be positive towards SD and some others may have negative attitudes.

In Chapter 5, some of the negative attitudes and some solutions to overcome them are presented with recommendations of how to most effectively proceed with SD in all dimensions of academic life.

4.5 Examples of universities working towards Sustainable Development

There are many examples of universities and colleges working with and towards SD. It is not the purpose of this thesis to compare all of these institutions; nevertheless a few examples would aid to understand how SD has been adopted, it should be noted that in Section 6.4.2 more examples are presented but focused on the assessment and reporting dimension.

Calder and Clugston (2003) present some examples of the actions taken by different universities towards SD. One of them is the example of Holland, where in 1995, student groups formed the Dutch National Environmental Student Platform that promoted sustainable campus and a reform in the curricula; in 1998 it changed into the present "*Dutch Network for Higher Education and Sustainable Development*", which has project that include:

- Disciplinary reviews;
- Interdisciplinary study projects;
- North/South collaborations;
- Auditing Instruments for Sustainability in Higher Education (AISHE) Consultancy;
- Higher Education for Sustainable Development (HESD) master's programs;
- University operations;
- Biannual awards.

One specific example in Holland is the case of Delft University of Technology (DUT), where in 1996 a committee was created to implement SD in the engineering curricula. The committee reached an action plan with the following points:

- "*The design of an elementary course 'Technology in Sustainable Development' for all students of the DUT;*
- *Interwining [sic] of SD in all regular disciplinary courses, in a way corresponding to the nature of each specific course;*
- *Develop of possibility to graduate in a SD specialisation within the framework of each faculty.*" (Mulder, 1996)

It can be seen that this specific effort taken by the DUT focuses only on the curricula, one of the five dimensions presented in Section 4.4; this is not to say that this is the only program of DUT towards SD, it is just to remark an example.

Another example is the one taken by the University of Michigan (2000): "Sustainable University of Michigan" initiative , which divides its implementation strategies into **a.** Guiding principles, **b.** Education and Research, **c.** Administrative, and **d.** Physical operations. Some of the specific efforts of each category are:

- Guiding principles:
  o Adoption of sustainability mission statement;
  o Establishment of sustainability co-ordinator or committee;
- Education and research:
  o Encourage incorporation of sustainability issues into curricula;
- Administrative:
  o Maximisation of purchase of organic food and food low in the food chain for dining services;
  o Shift to 100% "green" cleaning materials;
- Physical operations:
  o Establishment of life-cycle costing and full- cost accounting;
  o Development of long-term independence from non-renewable energy sources for facilities operation.

In the United Kingdom there is the United Kingdom's Higher Education Partnership for Sustainability (HEPS) that began in 2001. With objective to "…*accelerate the building of a sustainable way of life by taking a positive solutions-oriented approach, an it prioritises partnership work with*

decision-makers in business, government, higher education, and professional bodies." (Calder & Clugston, 2003)

Another example is the University of Costa Rica which initiated n 1995 the Institutional Program of Sustainability and Peace (PRINSOPAS) with the purpose of promoting environmental education, rehabilitation of the wilderness areas and reduction of air and water pollution on campus, surrounding communities and the country. (Calder & Clugston, 2003)

In the Philippines, the government created the Philippine Strategy for Sustainable Development (PSSD) in 1989. One of the PSSD's priorities was to promote environmental education. In 1995, the Philippine Association of Tertiary Level Education Institutions in Environmental Protection and Management (PATLEPAM) was formed; it is designed to help ensure that education, training and research in environment and SD is provided to local communities. (Calder & Clugston, 2003)

The last example, taken for this thesis, is from the Sokoine University of Agriculture (SUA) in Tanzania, which offers an undergraduate program in wildlife management and environmental sciences, and postgraduate training courses in management of natural resources and sustainable agriculture and rural development. (Calder & Clugston, 2003)

These examples show only a part of the many efforts that are being taken internationally to incorporate SD in higher education. Even though many higher education institutions have already started incorporating SD into their systems, there are still thousands in the world that have not yet started; these later ones can learn from the leaders and commence to incorporate SD within their institutions.

5. Innovation, change barriers, and how to overcome them in the incorporation of SD in higher education

One of the main goals of this thesis is to facilitate the process of integration of SD within those institutions that still have not started, and to help those who have already done it. The next sections will present the process of the incorporation a new idea into society and the different difficulties that could arise.

SD is still, a new concept for the vast majority of universities faculty and administrators. The number of universities and their leaders that have taken efforts to incorporate SD in the dimensions of their campus activities remains disappointingly small. The process of incorporation and the process of overcoming the different barriers of change and the breaking of paradigms can be, to a great extent, explained with innovation and change theory. This chapter presents these theories and how they could be utilised by the higher educational institutions in their path towards SD.

5.1 Innovation

Innovation has been defined in different ways, for example Kanter defines it as "*the generation, acceptance, and implementation of new ideas, processes, products, or services.*" (Kanter, 1984), whereas Van de Ven makes a clear difference between invention and innovation as: "*invention is the creation of a new idea, innovation is more encompassing and includes the process of developing and implementing a new idea.*" (Van de Ven & al., 1999) While Rogers defined an innovation as "*an idea perceived as new by the individual.*" (Rogers, 1962) For this thesis the concept of SD falls into the new idea or new paradigm category.

Afuah considers two types of innovation, incremental and radical. By radical he defines "*…if the technological knowledge required to exploit it is very different from existing knowledge, rendering existing knowledge obsolete.*" (Afuah, 1998) And incremental "*…is the knowledge required to offer a product that builds on existing knowledge.*" (Afuah, 1998) This author considers that SD is, in many ways, a radical type of innovation. In order for it to really have an impact, there have to be dramatic changes in attitudes and paradigms, in order to switch from a world based on the belief that it is possible for unlimited economic growth to one that is in dynamic equilibrium with the earth's ecosystem's carrying capacity, in short a sustainable society.

Rogers (1962), Kotler and Armstrong (2001) and Spence (1994) present the same stages in the adoption of an innovation, the following are taken from Spence, since this thesis author considers his explanation clearer:

1. **Awareness:** "*at the start individuals are exposed to an idea previously unknown to them in that form, therefore they are not in possession of any detailed information about it.*"
2. **Interest:** "*Here individuals are motivated, for some personally acceptable reason, to engage in purposeful search activities. They will try at this point to find out whatever additional details may be obtainable about the item which has attracted their attention.*"
3. **Evaluation:** "*… individuals are assumed to be trying very hard to apply the new idea mentally to their present situations in order to judge its potential benefit for the future.*"
4. **Trial:** "*At this point in the process there is, wherever and whenever possible, the actual implementation of the idea on a reduced scale – the 'micro' approach.*"
5. **Adoption:** "*If individuals are satisfied with the results of the trial they will either proceed to put the practice into operation to the extent that their personal circumstances allow them to do so, or, even*

despite the favourable outcome of a trial, reject the idea for reasons that are valid for them." (Spence, 1994)

These five stages indicate the road travelled by an innovation. For this thesis they help to better understand in which point the concepts of SD are within universities. This thesis author wishes that the SD concept would be already in the adoption process, but reality suggests that in the majority of universities in the world, SD is still in the first two stages.

For clarification of the adoption concept, it can be understood using the definition of Rogers which is: *"…a decision to make full use of the innovation. This definition implies that the adopter is satisfied with the innovation."* (Rogers, 1962). Spence also writes about the process of adoption of an innovation: *"…adoption in the context of innovation [is] normally referring to the outcome of a system of personal decision-making which leads, eventually, to the acceptance or rejection of something which is seen as new."* (Spence, 1994) This process is of outmost importance in the integration of SD in Higher Education, given that it is a concept that must be not only supported by the top-level administrators but must also be adopted by everybody within the university.

The author of this thesis considers that SD, in many universities, is still in phase two of *interest*. There are, of course, some institutions that have gone beyond the interest stage and some others that are still not aware, but as Figure 5-1 clearly illustrates, there are innovators, early adopters, early majority, late majority and laggards. It is, therefore, important for the institutions that are not innovators to learn from the experiences from the innovators, as it is **known** that innovators are the ones that usually suffer the most setbacks in the introduction of an innovative idea. In a business analogy, the innovators are the ones that have to create the prototype, bearing the high costs of this, while on the other extreme, the laggards have the convenience of the advantages of economies of scale created by the market adoption of the new idea or new product or process. A similar process happened with French and English universities: *"It was also in the mid nineteenth century that the opposition of the English and French universities to the new science, maintained for over 200 years, began to break down. In England this took place partly by setting-up of new colleges, later to become universities, in London and in manufacturing towns, and partly by adding new departments to already existing universities."* (Bernal, 1969)
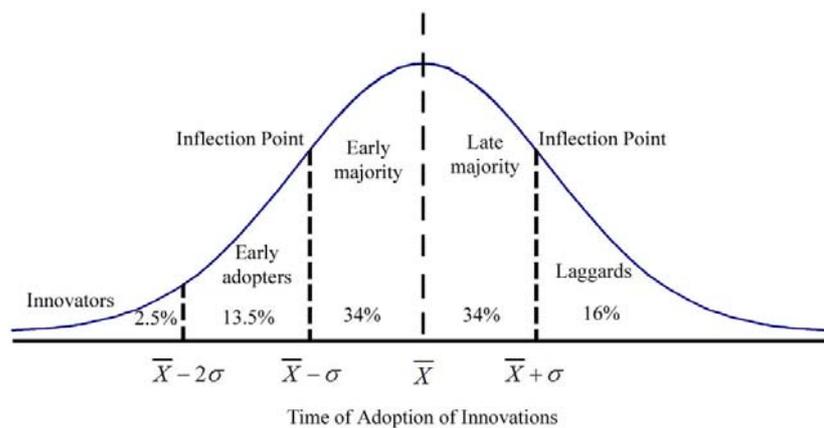
Figure 5-1 Adopter categorisation on the basis of relative time of adoption of innovations
Source: Rogers (1962)

Rogers defines the term adoption period as *"…the length of time required for an individual to pass through the adoption process from awareness to adoption."* (Rogers, 1962) This thesis author finds that the adoption period not only should be focused on the individual but also on the organisation to which the individual belongs. Thus, if Rogers defines adoption period as he does, this thesis

author would like to propose an organisational adoption period, which would be: the length of time required for an innovation to pass through awareness to adoption in an organisation.

Rogers emphasises five different characteristics of innovation:

1. **Relative advantage:** *"…the degree to which an innovation is superior to ideas it supersedes… [it] is often expressed in economic profitability, but the relative advantage dimension may be measured in other ways"*
2. **Compatibility:** *"…the degree to which an innovation is consistent with existing values and past experiences of the adopters. An idea that is not compatible with the cultural norms of a social system will not be adopted so rapidly as an idea that is compatible."*
3. **Complexity:** *"…the degree to which an innovation is relatively difficult to understand and use."*
4. **Divisibility:** *"…the degree to which an innovation may be tried on a limited basis. New ideas that can be tried on the instalment plan will generally be adopted more rapidly than innovations that are not divisible."*
5. **Communicability:** *"…the degree to which the results of an innovation may be diffused to others."* (Rogers, 1962)

This thesis author considers that these five characteristics offer a background in the explanation and possible incorporation of a new idea into an organisation. It is important to note that the five characteristics are independent of each other but are inter-related. An innovation could be of extreme complexity, but easy to communicate and with high relative advantage to the organisation; this will result in a high interest to implement it but it will require extra efforts to educate about the innovation.

This thesis author believes that the five characteristics are of great importance in the process of integration of SD in Higher Education, given that the concept differs from technological innovations in that the idea must be comprehended, integrated and acted upon by numerous different actors, or stakeholders, inside and outside of the institution. The adoption of an idea tends to be slower than that of a technological change; an idea requires changes in attitudes and behaviour, while a technological innovation usually requires only training. For an idea to become part of an organisation it must first infiltrate the mental models of the members of the organisation in order for it to become part of its culture. This process is highlighted by Sherry (2003) who wrote that an innovation usually has three stages: ***initiation*** (or diffusion) ***implementation*** and ***institutionalisation***. She emphasises that there is a need for change agents to serve as initiators and to encourage implementation of the new idea.

In the implementation stage Sherry (2003) uses the Concern-Based Adoption Model (CBAM) in which the individual passes through six levels of the use of the innovation: **a.** Orientation, **b.** Preparation for use, **c.** Mechanical use or task mastery, **d.** Routine use and refinement, **e.** Integration, and **f.** Renewal. This approach assumes that the focus is the individual and that the institution will not change until the members change. This thesis author agrees with this assumption, a deeper analysis of this is presented in Section 5.4.

According to Sherry and Rogers if an innovation is used long enough and increasingly by the different members of the institution until stabilisation, then a point is reached where the innovation loses its quality of innovative and becomes part of the culture of the institution, thus the innovation is institutionalised. This is also presented in Section 5.4.

It should be noted that any new idea is usually taken with caution; Rogers' Figure 5-1 shows that only 2.5% of people are considered to be innovators, Kotler and Armstrong define the innovators as *"venturesome – they try new ideas at some risk."* (Kotler & Armstrong, 2001)

Spence defines the following factors related to an innovation:

- "***Cost:*** *Any new product or practice which is high in financial cost is likely to be adopted more slowly than one which involves lower expenditure, even if the eventual return for outlay is like to be proportionately higher.*
- ***Complexity:*** *Ideas and practices which are relatively simple to understand and operate by the end-users tend to be adopted more readily and quickly than those of greater complexity.*
- ***Visibility:*** *An innovation is likely to be adopted more readily and more widely if it is open to inspection and, above all, if it can be seen to work. This transparency is what communication is fundamentally very much concerned with. Knowledge must not only be transmitted but also received if it is to have any chance of being acted upon.*
- ***Divisibility:*** *Something which can be tried in part before any commitment has to be made to the whole enterprise will generally tend to be adopted more readily than something which cannot be approached in this way.*
- ***Compatibility:*** *The attitudes and values which most people hold in relation to an innovation tend to be affected by their past experience with related ideas. The new idea must not conflict with the values and beliefs which they have developed otherwise it has little chance of success.*
- ***Utility:*** *If something new can be seen to be a major improvement on what currently exists then it could well be adopted fairly quickly.*
- ***Collective action:*** *While most decision tend to be made at individual level there are some situations which require group decision-making, a point of some importance which arises especially in the context of organizations.*" (Spence, 1994)

In regard to these factors for higher education institutions, SD presents:

- **Cost:** the cost of implementing SD, which should be understood as a financial cost, will be the most significant in the operations and reporting dimensions; most of the times if the universities would like to make their campuses more sustainable they would have to expend large amounts of money in rebuilding and renovation. Assessment and reporting is also a costly process since the information has to be collected.
- **Complexity:** SD is a relatively simple yet complex concept. Even though it should be clear to everybody, it is not. Many or most humans have lost their holistic view of the world and therefore, they have difficulty thinking and working with the SD concepts, values and tools. This complexity presents some additional challenges as academic leaders seek to introduce those concepts within all courses and curricula.
- **Visibility:** SD can be visible in different parts of the university, from signs indicating that the university is a sustainable place to having explicit courses on SD, and the teachers of other courses redeveloping their courses to include SD. One interesting activity for SD on all campuses could be a tour through the campus to acquaint the freshman (new) students with the SD efforts already in action on campus. It could be also interesting to invite students to participate in projects not yet in practice, thus increasing the name of SD in the campus.
- **Divisibility:** SD can be tried in a small scale in some courses or departments of the university. This thesis author highly recommends that SD should be introduced on a small scale and then work on including the different stakeholders. The divisibility should not only be used to incorporate SD but also once it is incorporated by creating different focus groups dedicated to a specific area, but always interlinked with the rest.
- **Compatibility:** Regretfully SD, as a new radical idea, will certainly face some compatibility problems, especially in universities where traditions and status tend to be of high importance. This does not indicate that it will stop it from happening but it will restrict the level of introduction, especially among the older people. For example Bras-Klapwijk, Haan, & Mulder wrote that "*Sustainable Development has for example a rather qualitative nature. Even if one would try to quantify some variables, one would probably soon find out that the number of relevant variables ... is by far too*

> *large for any practical purpose. This does not fit in with the numerical/science-based practices of modern engineering.*" (Bras-Klapwijk, Haan, & Mulder, 1998)

- **Utility:** SD has a major utility in higher educational institutions, some of the reasons are the reduction of energy and material consumption, that reflects on costs; and of most important the adoption and spread to the community. SD can reduce costs and at the same time reduce the impact to the environment and increase an awareness of social and cultural importance. The National Wildlife Federation (2003) reported that from 23 cost-saving conservation initiatives in 15 public and private postsecondary institutions in the USA resulted in savings from $1,000 USD to $9 million USD, with a total of $16.8 million USD and an average of $728,500 USD for the 23 projects.
- **Collective action:** One of the principles of SD is the participation of the different stakeholders; this is synonymous with collective action. The universities have different stakeholders that should be included in the process of introduction of SD, and in ensuring the continuity in the SD program. Some of the stakeholders who should be involved include academic leaders, professors, students, staff, alumni, suppliers, local and regional governmental leaders, etc.

These factors are utilised further in subsequent chapters in the process of integration of SD into higher education.

The following section presents the findings of several authors regarding barriers of change and opposition to paradigm shifts. This is designed to help the reader to better understand the barriers and challenges and the ways to overcome them during the process of implementation of SD in higher education institutions.

5.2 Change barriers and how to overcome them

This section presents a basic understanding of the barriers to change that could be present and could hinder the diffusion and adoption of an innovation. In this case, of course, this thesis author applies these concepts to the barriers within universities to incorporation of SD into their entire academic structure and operations.

Rogers (1962) emphasises that societal norms influence the diffusion of new ideas, or innovations. He distinguishes two ideal types of norms: traditional and modern. A system with traditional norms is characterised by "*1. A less developed of complex technology… 2. Literacy and education are at a relatively low level… 3. Little communication by members of the social system with outsiders... 4. Lack of economic rationality… 5. Lack of ability to empathize or see oneself in other's roles…*(Rogers, 1962)*"; while modern norms: "*1. A developed technology with a complex division of labor… 2. A high value on science and education. 3. Cosmopoliteness [sic] of social relationships. New ideas enter the social system freely from external sources, and members of the system interact often with outsiders. 4. Planning is careful and decisions are economically rational… 5. Ability to empathize and see oneself in the other fellow's shoes*" (Rogers, 1962).

This thesis author wishes to emphasise that universities, as social systems, tend to be under the category of the modern norm. That is they have obviously a high value on science and education and, most of the time there is a high level of cosmopoliteness. It is important to observe that not all of the individuals in the university system behave of the same manner; some of the individuals in a university could behave as if they were under traditional norms, that is, with little communication with others, low degree of technology complexity, etc. These could be true of, for the cleaning staff, for example. This thesis author calls such individuals, conservatives. This, of course, goes in accordance with Rogers' Figure 5-1 in which there are innovators, early adopters, early majority, late majority and laggards (or conservatives).

Changes in universities, like in any other organisation are constrained by barriers of change. Montemayor Saenz (2001) makes a reference to Maurer on the three levels that produce this resistance to change:

1. **Level 1. Based on information:** this level includes presentations, diagrams and logic arguments. This level is produced usually for: lack of information, disagreement with the idea, lack of exposition and confusion.
2. **Level 2. Psychological and emotional reaction towards change:** This level presents fear to people, usually accompanied by an increase of arterial pressure, rise in the pulse and adrenaline levels. It is usually produced by: feelings of loss of control or power, status loss, respect loss towards the individual from the rest, feeling of incompetence, feeling of being deserted and feeling of too high pressure and stress and that it's too difficult to change (too many changes)
3. **Level 3. Higher than actual change:** This level marks a serious contrast to the organisation, the individual might be in accordance with the idea of change, and nevertheless, it takes the situation to a personal dimension. Here, other factors are included such as cultural differences, race, and religion. It is generally produced by: history or due to a lack of trust, differences of sex, race, culture or ethnic and significant disagreement towards the values being encountered.

These levels highlight the different problems that can arise while trying to incorporate a new idea. Obviously the easiest level to overcome is number 1, with appropriate and timely information. At the other extreme Level 3 reflects the toughest barrier to break, for this more dramatic actions must be taken. A more detailed explanation on how to overcome these levels is presented in the next section.

The incorporation of a new idea, such as SD, in universities is bound to face at least one of these levels. Universities are maintainers of tradition and tend to be very resistant to change. In this regard, Orr emphasises that "*The concept of sustainability implies a radical change in the institutions and patterns that we have come to accept as normal.*" (Orr, 1992) This view is supported by Mulder by who writes "*A paradigm shift is therefore required in engineering, and it will profoundly affect engineering curricula.*"(Mulder, 2000) referring to engineering departments or schools specifically.

But what are the reasons that these barriers appear? Some of these reasons are addressed by Spence who presents the twelve reasons that Professor James R. Bright outlined in his book Research, Development and Technological Innovation (1998, Harvard University Press) for new technical innovations:

1. "*to protect social status or prerogative;*
2. *to protect an existing way of life;*
3. *to prevent devaluation of capital invested in an existing facility or in a supporting facility or service;*
4. *to prevent a reduction of livelihood because the innovation would devalue the knowledge or skill presently required;*
5. *to prevent the elimination of a job or profession;*
6. *to avoid expenditures such as the cost of replacing existing equipment, and of renovating and modifying systems already in operation to accommodate or to compete with the innovation;*
7. *because the innovation opposes social customs, fashions and tastes and the habits of everyday life;*
8. *because the innovation conflicts with existing laws;*
9. *because of rigidity inherent in large or bureaucratic organizations;*
10. *because of personality, habit, fear, equilibrium between individuals or institutions, status and similar social and psychological considerations;*
11. *because of the tendency of organised groups to force conformity;*
12. *because of the reluctance of an individual or group to disturb the equilibrium of society or the business atmosphere*" (Spence, 1994)

This thesis author considers these twelve reasons of great importance for this thesis. They present a brief overview of the many blocks that occur in institutions of higher education.

This author would like to remark that three additional aspects could slow the diffusion of an innovation, such as SD in universities:

- **Ignorance**: This refers to the lack of familiarity with the idea;
- **Procrastination**: This refers to the fact that the individual is aware of the innovation, but believes that its incorporation is too complicated; this can also be referred as laziness;
- **Power:** The struggle for power inside the universities consumes precious abilities and energy that otherwise could be in the implementation of SD. Another effect of the power struggle is the creation of sides or groups that aim to snatch the resources and eliminate the competition of other groups.

The first one can be solved with the proper information, while the second requires the effort of the SD champion to change the attitudes and demonstrate that it is not complicated, but rather that SD can be easily integrated into every-day activities. The third point is of great distress and difficult to avoid, it is part of human nature and affects deeply universities world-wide.

Once one understands that there are usual barriers to change and that they affect the incorporation of a new idea into an organisation, it becomes clearer that one then needs to focus on ways to overcome these barriers.

5.2.1 Overcoming the barriers to change within academic institutions

The process of incorporating SD into universities is bound to face many barriers to change, because, for many, it will be a radical switch from the normal "*way of life*".

Such change processes are bound to face the resistance from some individuals in the organisation. Luthans (2002) proposes five approaches to overcome this resistance to change:

1. Providing new information;
2. Use of fear;
3. Resolving discrepancies;
4. Influence of friends or peers;
5. Co-opting approach.

Of these, the first four are self-explanatory. The last one refers to the involvement of dissatisfied individuals so that they realise the benefits. It should be noted that 'Use of fear' refers to the blockage of a person's mind when too much fear exists, thus the amount of fear should be reduced to reduce the resistance to change.

To further help facilitate the process of change for SD incorporation one of the three strategies presented by Quinn, et. al. (2000) but developed by Chin and Benne in 1969, could be used:

a) Empirical-rational (making logical arguments for change);
b) Power-coercive (using forms of leverage to force change);
c) Normative-reeducative (using participation and pursuing win-win strategies).

Quinn, et. al. present brief definitions of these three strategies:

> *"The empirical-rational assumes that people are guided by reason and will calculate whether it is in their best interest to change. It assumes that if people understand the logic for change and see themselves as benefiting from the change, they will be more likely to change. Resistance comes primarily from ignorance and superstition. To counter this resistance, individuals must be educated about the logic and benefits of change.*
>
> *The power-coercive strategy focuses on forcing people to change through the use of external sanctions. This strategy emphasises political and economic power… The power-coercive change strategy also has limited use in adaptive situations. In adaptive change, people must commit themselves to the collective purpose. The power-coercive strategy usually evokes anger, resistance, and damage to the fundamental relationships of those involved in the change. Thus, it is not likely to result in the kind of voluntary commitment that is necessary in most adaptive solutions.*
>
> *The normative-reeducative strategy involves a more collaborative change progress. Individuals are still guided by a rational calculus; however, this calculus extends beyond self-interest to incorporate the meanings, norms, and institutional policies that contribute to the formation of human culture. Using this strategy, the leader of change welcomes the input of others as equals into the change process. Change does not come by simply providing information, as in the empirical-rational strategy. Rather, it requires the leader to focus on the clarification and reconstruction of values. In this mode, the leader attempts to identify all values and works collectively through conflict. The emphasis is on communication with the followers rather than their manipulation."* (Quinn et al., 2000)

These three strategies and the five approaches of Luthans (2002) can be utilised to overcome the three levels of resistance to change that Montemayor Saenz (2001) identifies; for example, the empirical-rational strategy can be used to overcome Level 1 (Based on information), this strategy requires that the individual be rational towards change and understand the benefit, as Quinn, et. al. (2000) highlight the resistance to this strategy can be overcome by education about the change, this is also proposed by Luthans (2002) This does not imply that any of the other two strategies could be used to overcome Level 1; it just implies that this strategy is the one that is most closely related to this level.

Level 2 can either be overcome by the power-coercive strategy or the normative-educative strategy; the power-coercive as Quinn, et. al. (2000) remark is based on the use of power, it is a form of command and control from the top-levels of the organisation; this strategy can achieve the desired effect but it would create friction, dissatisfaction and would lead to a slower institutionalisation. While the normative-reeducative strategy would involve the different stakeholders' opinions in a collaborative approach, this offers the advantage of the involvement of the individuals and results in faster institutionalisation. Level 2 can also be approach by Luthans (2002) Resolving discrepancies and/or Co-opting approach. These approaches could help the faculty to understand the causes of the problem and help them to try to overcome them by being actively involved to help incorporate the innovation.

Level 3 represents the highest barrier to change and usually the individuals are not willing to cooperate toward to make changes; Level 3 presents a personal dimension, such as lack of trust and values differences. To overcome this barrier any of the three strategies could be used, but this thesis author believes that the Empirical-rational strategy would give the least results; while the normative-reeducative could, by involving the individual in the process, reduce the frictions and conflicts; the power-coercive strategy should be used as a last result, but a leader should bear in mind this strategy in case the other two fail. Taking Luthans (2002) approaches, either Use of fear or Influence of friends or peers could be used. The first one

should be used when the individual does not respond to any other attempts to encourage him/her to incorporate the innovation. The second, Influence of friends or peers, will, to a great extent, take place after the innovation has been adopted by everyone else; this is known as social pressure. This will require long periods of time, and in the meanwhile the Use of fear, or power-coercive strategy should be used.

It should be noted that in an institution such as a university, the different levels would obviously be present within the system, from the professors, students, staff, etc. Therefore, it is important for the change leader to keep in mind the three strategies and the five approaches to deal with the attitudes that different individuals may have about the proposed changes.

The strategies and approaches to overcome barriers to change is expanded upon by Dobes (Dobes, 2003), who emphasises that mental models can be changed through the learning process, in which old mental models are replaced by new ones. Dobes (2003) considers that the mental models and the learning process can be divided into two types of changes:

1. Changes in conceptual frameworks: this can be accomplished through the change of norms, strategies and/or conceptual frameworks;
2. Changes in routines and skills: this can be accomplished through operational trial and error learning.

Humans have the unique ability of a creative brain that differences us from the rest of the animals, this special feature dictates the way that humans behave; mental models facilitate the understanding of the complexity of human behaviour. As Rosner wrote there are two reasons why mental models help to understand environmental problems:

- *"To understand the whole complexity of the issues we face, we can no longer rely on the analytical approach, which tries to understand all the details, but we have to take a look at the broader picture.*
- *Existing mental models – of managers, politicians, consumers, of everybody – influence to a large part the decisions being made and therefore these models are part of the problem itself. The 'unlearning' of old models and the provision of new ones are part of the solution."* (Rosner, 1995)

In the case of mental models for sustainability Rosner (1995) considers two approaches: **a.** The sophisticated scientific theories (such as climatic models), and **b.** Providing manager with a different mind-set focused on environmental responsibility and intergenerational approaches. The use of these two approaches to incorporate SD is of outmost importance, the first one generates the knowledge of the different disciplines more in a theoretical fashion, while the second allow the incorporation of the SD concept in the different businesses and organisations in the world.

5.2.2 Conflicts that could arise while incorporating SD

As with any other system the incorporation of an idea could face conflicts between the individuals, Carley and Christie wrote that "*conflict between organizations is an inevitable result of functional interdependence and scarcity of resources*" (Carley & Christie, 2000). These authors present the types of conflict that could arise in this implementation.

These types of conflict are divided into two categories:

1. Unnecessary but easily manageable;

2. Genuine, inevitable and difficult to avoid.

The first occur due to:

1. Misperceptions or stereotypes, miscommunication or habitual negative behaviours;
2. Data conflicts from lack of information, misinformation, disagreement over data relevance or misinterpretation;
3. Value conflicts from incompatibility belief systems.

The genuine conflicts occur from:

1. Structural conflicts from oppressive patterns of human relationships;
2. Interest conflicts over substantive issues, procedural issues and psychological issues.

The process of incorporation of SD into the university system is bound to face some, or all, the barriers presented. Universities, usually, are places where traditions are important, even though they should be change agents, the sole interactions of, usually, thousands of individuals present a challenge for this incorporation of SD. Positive and negative reactions are bound to arise towards SD. Therefore; it is important for the leaders, or the SD champions, to be aware and understand these barriers in order to take the necessary steps to overcome them. Some of these are in the form of the three strategies proposed by Quinn, et. al. (2000), but even though conflicts are bound to arise, it is the duty of the leaders or champions to know which type of conflict is/are present at any given time and situation in order to learn from it/them and solve it/them. This thesis author believes that some of the conflicts can be avoided by taking a proactive approach instead of a reactive approach.

5.3 Opinion leaders

This section presents who opinion leaders are and why they have an important role in the process of the diffusion and adoption of innovations in any organisation.

Rogers defines an opinion leader as: *"…individuals who are influential in approving or disapproving new ideas"* (Rogers, 1962). He considers two types of opinions leaders: **a.** the active ones, and **b.** the passive ones.

Spence (1994) suggests the path presented in Figure 5-2 for an innovation to be adopted by a community:
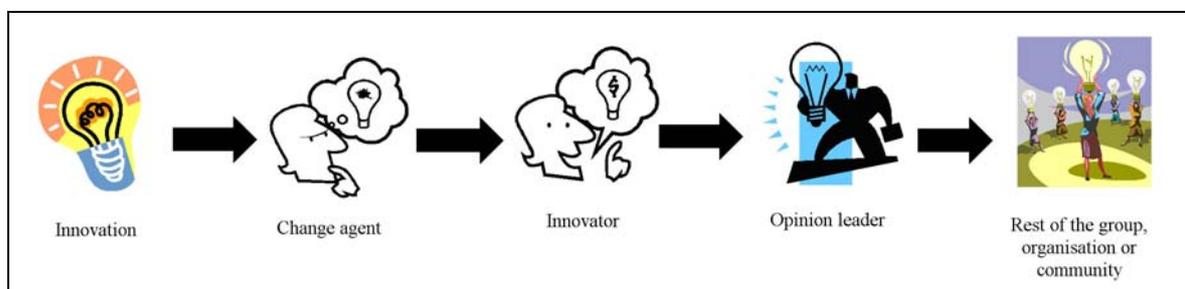
Figure 5-2 Path for the adoption of an innovation
Source: Adapted from Spence (1994)

As it can be seen Figure 5-2 underscores the importance of working with the change agents (champions), innovators and opinion leaders to push a change in an organisation; thus catalysing and speeding up adoptions of new ideas.

Burke (2000) writes that there are two main motivators for the changes in the world: the first being the need for recognition in a particular research niche so that there is only room enough for the specialised individual; and the second being the CEO of a corporation, who encourages specialists to generate change before someone else does it.

In the case of universities the role of the CEO is, or should be, taken by the dean or rector, who should be convinced of SD to be implemented. By this statement the author does not wish to say that it has to be like that, but it does facilitate the process if there is commitment and leadership from the top of the organisation.

Orr emphasises that *"Throughout history, leadership has been equated mostly with bold, aggressive, militarily heroic men. Their role in ecological perspective has been to expand a particular society's niche, increasing opportunities, geography, resources, population, and energy… The task of leadership in coming decades will … [help] us to stabilize and contract our role in the natural world, but with as little trauma as possible… Transformative leaders, then, will be people whose loyalties are rooted in a place but extend to the planet. They will not be dividers and hatemongers [sic] who can only appeal to fear and greed."* (Orr, 1992) Bustani complements this by remarking that the role of leadership in the incorporation of SD in higher education is *"To drive the understanding of the concept [SD], to develop projects related with it and above all to drive the institution to move towards SD."* (Bustani, 2003b)

In several interviews made at Monterrey Tec and Lund University, used as the case studies for this thesis, it was emphasised that a top-down approach is the best to integrate SD into a higher educational institution. This requires a command and control approach and as Prof. Lars Hansson (2003a) stated, it is a necessary but not a sufficient condition. During the interview with Dr. Acevedo (2003) of Monterrey Tec, he emphasised that one of the best strategies to integrate SD is to attack on two fronts; the first a clear and transparent policy that states the commitment of the institution towards SD, this could be understood as a top-down approach. The second could/should be a multi- and transdisciplinary program which involves students in the process of integration. This could be more of a bottom-up approach. In this double pronged approach, the social pressure and competitive advantage of the group of students involved creates a peer pressure over the other students, while the attack over two fronts demands that the professors get up to date with SD issues.

It is of great importance that these opinion leaders or change agents be recognised and fostered as vital to the necessary institutional change towards SD.

5.4 From the individual to the organisation

Dobes (2003) considers the process of an innovation be spread from the individual to the organisation as being a bottom-up approach. This is not to be confused with the normal managerial approaches, it is of course obvious that if the leader of the organisation is convinced of the innovation then within the organisation the approach will be top-down, but Dobes (2003) refers to the institutionalisation of an innovation, which in this case the approach is bottom-up since the innovation has to penetrate the culture of the organisation.

This process according to Dobes (2003), is divided into four steps: **1.** Intuition, **2.** Interpretation, **3.** Integration and **4.** Institutionalisation. The first two are considered to be at the individual level, while numbers two and three are especially at the group level, and numbers three and four are at the enterprise or organisational level.

This is somewhat confusing but as one realises that some of the changes must occur both within the individual and within the organisation, more broadly, it becomes clear that there is some overlap of changes that are essential to be successful.

Figure 5-3 presents the flow of change from the individual to the organisation. It underscores that on the individual level, skills and insights affect each other. This is equal in the organisational levels; but from the individual level it is slowly adopted within the organisation. This thesis author believes that this is an important point in the understanding of the shift of paradigms in an organisation, where the values, norms and conceptual frameworks work their way from the individual(s) to the organisation. By this it can be understood that the "*way things are done*" which creates a working environment and are part of the organisational culture that resists change must be understood and then worked with to replace that statement and attitude behind it to, "the new ways we now do things in this organisation."
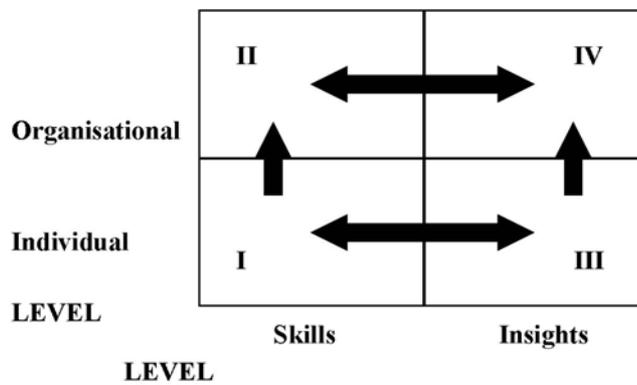
Figure 5-3 Mental structures flow, from the individual to the organisation
Source: Dobes (2003)

This thesis author would like to highlight that in order for an idea to be institutionalised it is important to know and meet the individual's needs. These needs were clearly stated and put into a hierarchy by Maslow, presented by Luthans (2002), who identified five levels in the hierarchy of needs, or the motivation that a person has can. These levels are shown in Figure 5-4.
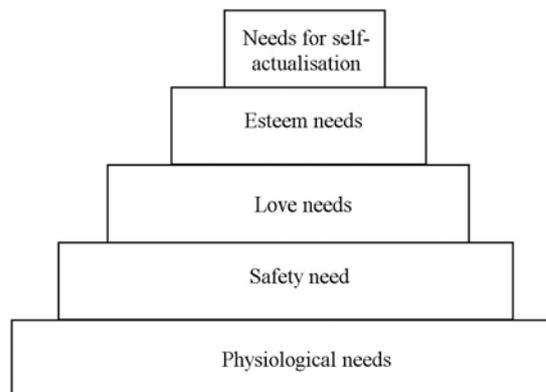
Figure 5-4 Maslow hierarchy of needs
Source: Luthans (2002)

1. **Physiological needs:** The most basic level. It generally corresponds to primary needs such as hunger, thirst, sleep and sex.
2. **Safety needs:** This is equivalent to security need. It is both emotional as well as physical safety.
3. **Love needs:** This corresponds to the affection and affiliation needs.
4. **Esteem needs:** It represents the higher needs of humans. The needs for power, achievement and status. It contains both self-esteem and esteem for others.
5. **Needs for self-actualisation:** This is the culmination of the needs. Self-actualisation is the person's motivation to transform perception of self into reality.

All of Maslow's levels play an important role for SD and its incorporation in an organisation. The first two levels, physiological needs and safety needs must be met first, since they relate to hunger reduction, poverty, illiteracy and the other social problems, once they have been fulfilled then the attention should be focused on the others.

Thus, in order for SD to be incorporated on a continuous manner into higher education institutions, it is important that the individual needs are satisfied, because unsatisfied and unmotivated individuals will have higher change resistance levels, which could lead to more conflicts. It is the role of the champion (opinion leader) to understand these needs; also it is his/her duty to make sure that SD passes from the level of awareness to the level of adoption, this on the individual level, allowing the further institutionalisation of SD in the university or college.

The opinion leader must convince all the stakeholders that working towards and with SD bring benefits to economics, environment, and society while having an intergenerational vision. It has been presented that different individual and institutions behave differently towards an innovative idea, that there are different levels and barriers to change that must be overcome and conflicts that could arise in the process of SD incorporation. This chapter has presented an overview of them and how to overcome them.

5.5 Chapter summary

SD has permeated universities at different rates, some universities are at the foremost positions in the adoption and incorporation of SD into their systems, these are the innovators; while for most other universities, the laggards, SD is still a foreign concept. Thus, while some universities have gone to the incorporation stage (trial stage), most have barely entered the awareness stage.

As with any new idea, the incorporation of SD into universities is bound to encounter barriers to change; some of the stakeholders might not know about it (Level 1), some might consider SD to be too difficult (Level 2), while others may feel that SD is in conflict with their personal ideology or academic freedom to choose what they teach or research (Level 3).

Some of the approaches to overcome these change barriers include: **a.** to provide the correct and complete SD information, **b.** to reduce the fear towards SD, **c.** to resolve discrepancies, **d.** to use the influence of peers or friends, and **e.** to make clear the benefits that could be gained.

Some of the strategies to help overcome the barriers are: **a.** the empirical-rational, **b.** the power-coercive, and **c.** the normative-reeducative strategies. The empirical-rational strategy assumes that people are guided by reason and will calculate the benefit of changing; the normative-reeducative strategy has a more collaborative nature and the inputs of the different

individuals are taken into consideration; while the power-coercive strategy, as its name suggests, focuses on change through force and external sanctions.

The leaders of the university must be committed to SD and make all the necessary efforts so that the different stakeholders apprehend and apply SD to their everyday life. An important aspect to consider is that an organisation is made of individuals and that the needs of each individual must be fulfilled in order for them to become committed to a concept such as SD. Thus, SD must be incorporated by every stakeholder in the university, so that, on the long term SD becomes institutionalized and is not just a fashion that soon fades away.

6. Assessment and reporting on progress in incorporating SD into the university system

The chapter presents a comparison of different tools used currently for assessing and reporting sustainability[1]. It also presents how some of these tools can be used for universities. Two examples are provided; one specifically designed for universities, Auditing Instrument for Sustainable Higher Education (AISHE), and the other one a modification for universities of a tool designed for corporation (GRI). The latest one is supported with two examples.

On the preparation journey for this thesis, the author began asking questions such as: **a.** how do we measure sustainability? **b.** How could it be done for universities? These questions are answered in the following sections.

6.1 Sustainability assessment and reporting

Dalal-Clayton and Bass (2002) mark five key questions that the measurement and analysis of Sustainability should answer:

1. *"How well is the ecosystem in question?*
2. *How are people affecting the ecosystem?*
3. *How well are the people (including current and future generations)?*
4. *Is their well-being fairly shared?*
5. *How are these questions connected?"* (Dalal-Clayton & Bass, 2002)

These questions encompass two of the three dimensions of sustainability; they do not include the economic dimension, which, to an extent, is important in the current world economies. Dalal-Clayton and Baas emphasise that there are three main approaches to measuring and analysing sustainability:

1. **Accounts:** these are constructions of raw data that are then converted to a common unit, monetary, area or energy.
2. **Narrative assessments:** these combine text, maps, graphics and tabular data. Narrative assessments might use indicators but they are not a cornerstone.
3. **Indicator-based assessments:** these may include text, maps, graphics and tabular data, such as the narrative assessment, but they are organised around indicators (by indicator the authors define them as: "a measurable part of a system"). (Dalal-Clayton & Bass, 2002)

Dalal-Clayton and Baas present a table (Table 6-1) in which they compare the three approaches:

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[1] It must be noted that in reporting, the term Sustainability is used instead of SD. This author emphasises that for him Sustainability is the goal for which the SD process should be designed to achieve. For a more detailed explanation the reader is invited to read Section 3.2.4.

Table 6-1 Three main approaches to measure and analyse sustainability

Approach	Accounts	Narrative assessments	Indicator-based assessments
Examples	Index of Sustainable Economic Welfare Genuine Progress Indicator	State of environment reports World Development Report	Well-being Assessment Dashboard of Sustainability
Potential for transparency	Low	Medium	High
Potential for consistency	High	Low	High
Potential for participation	Low	High	Medium
Usefulness for decision-making	Medium	Medium	High

Source: Dalal-Clayton & Bass (2002)

As this thesis author decided that the indicator-based assessment to be the best for reporting, it is relevant to explain what are essential characteristics of indicators and how the should be used. This explanation is done clearly by Dalal-Clayton and Bass (2002) who remark that an indicator is fully representative if: **a.** It covers the most important parts of the component concerned; **b.** It shows trends over time and differences between places and groups of people. Further, an indicator is likely to be reliable if: **a.** It is accurate, **b.** It is measured in a standardised way with sound and consistent sampling procedures, **c.** It is well founded, and **d.** It directly reflects the objective of the element or sub-element concerned.

Dalal-Clayton and Bass (2002) present an example of different indicator-based assessments of sustainability on Table 6-2:

Table 6-2 Indicator-based assessments of sustainability

Type	Number of subsystems	Number of levels between subsystem and indicator	Indices of the state of the systems and subsystem
Well-being Assessment	2: ecosystem, people	2-4	Yes
Dashboard of Sustainability	3: environment, economy, society	1	Yes
Dashboard of Sustainability for CSD	4: environment, economy, society, institutions	2	Yes
CSD indicators of sustainable development	4: environment, economy, society, institutions	2	No
Global Reporting Initiative Sustainability Reporting Guidelines	4: environment, economy, society, integrated	1-3	No

Source: Dalal-Clayton & Bass (2002)

It should be noted that an indicator-based assessment not only has advantages, but also carries a set of disadvantages, some examples are:

- Extra work to gather all the data to fulfil all the indicators;
- Once started with the process of reporting it becomes almost impossible to stop it;

- The stakeholders tend to demand more from the corporation/institution;
- Keeping up the balance on details and core information.

6.2 Assessment and reporting of Sustainable Development in Universities

The previous section included some of the general assessment and reporting tools for either corporations or nations/states/regions. One could ask, can they be used for universities and colleges? This thesis author believes that they can be used, with some modifications. For example in the GRI Guidelines some new indicators are being developed at this time in order to satisfy the new dimension that Cortese (2003) proposes for the triple-bottom-line approach of Elkington (2002) for universities and colleges. By this, the author of this thesis underscores his predilection of the GRI guidelines, but by no means, does he wishes to select these guidelines without a proper comparison with other methods such as the ASHIE method or the combined ISO 9000 and 14000.

Shriberg (2002) makes a comparison between 11 tools for assessing sustainability in higher education, these are presented in Table 6-3. Shriberg (2002) emphasises that ideal cross-institutional sustainability assessment should:

- **Identify important issues:** "*Sustainability assessment tools must address contextually appropriate issues of major importance to campus environmental, social and economic efforts and effects*"
- **Be calculable and comparable:** "*The ability to calculate progress toward sustainability is often a limiting factor in assessment.*"
- **Move beyond eco-efficiency:** "*…eco-efficiency indicators stress material utilization, environmental performance and regulatory compliance, while sustainability indicators stress issues at the nexus of the environment, society and economy with the goal of no negative impacts.*"
- **Measure processes and motivations:** "*…the tools to measure sustainability must delve [sic] deep into decision making by asking about mission, rewards, incentives and other process-oriented outcomes.*"
- **Stress comprehensibility:** "*Sustainability assessment tools must be comprehensible to a broad range of stakeholders.*" (Shriberg, 2002)

Table 6-3 Summary of major strengths and weakness of cross-institutional sustainability assessment tools

Assessment tool	Major strengths	Major weaknesses
National Wildlife Federation's State of the Campus Environment	Comprehensive Combines eco-efficiency and sustainability Identifies barriers, drivers, incentives and motivations Identifies processes and current status	Little use of the term "sustainability" Small sample within each college/university
Sustainability Assessment Questionnaire	Emphasises (cross-functional) sustainability as a process Useful as a conversational and teaching tool Probing questions that identify weaknesses and set goals	No mechanism for comparison or benchmarking Difficult for large universities to complete
Auditing instrument for sustainability in higher education	Flexible framework for institutional comparisons Process-orientation which helps prioritise and set goals through developmental stages Created through international consensus	Difficult to comprehend Motivations are potentially excluded
Higher Education 21's Sustainability Indicators	Process-orientation that moves beyond eco-efficiency with a relatively small set of indicators Recognizes sustainability explicitly and strategically	Difficult to measure and compare Indicators may not represent most important issues
Environmental Workbook and Report	Useful in strategic planning and prioritising Collects baseline data and best practices	Operational eco-efficiency and compliance focus Difficult to aggregate and compare data Motivations are largely ignored
Greening Campuses	Comprehensive, action orientation incorporating processes Explicitly and deeply addresses sustainability User friendly manual with case studies, recommendations	Calculations and comparisons difficult Focus on Canadian community colleges Resources out-of-date
Campus Ecology	Cross-functional, practical "guide" and framework Baseline for current tools	Environmentally focused (i.e. not sustainability) No longer "state-of-the-art"
Environmental performance survey	Process-oriented Compatible with environmental management systems	Operational eco-efficiency focus Neglect of sustainability and cross-functional initiatives
Indicators Snapshot/Guide	Quick, prioritised environmental "snapshot" Opportunity for more depth on issues of concern	Operational, eco-efficiency focus, with little reference to processes, motivations, benchmarking and sustainability
Grey Pinstripes with Green Ties	Model for data collection and reporting Links programs and reputations	Not sustainability specific Neglects decision-making processes and operations
EMS Self-assessment	Rapid self-assessment focused of processes	Operational eco-efficiency focus

Source: Shriberg (2002)

Shriberg (2002) writes that the 11 tools presented converge in:

- Decreased throughput;
- Incremental and systematic progress;
- Sustainability education as a core function;
- Cross-functional reach;
- Cross-institutional action.

Sustainability, or SD, assessment differs from other types of assessment, such as economic and environmental, in that a broad view of the entire system has to be adopted. As explained many times, SD encompasses economic, environmental and social aspects, so its assessment must deal with the three of them and also with their interactions. SD assessment must go beyond the measurement of material and energy use, since it involves economy and people, and it must also have a key emphasis on the effects that today's actions could have on tomorrow's environment and society (intergenerational approach). SD tends to be sometimes an abstract concept, so its assessment should make as clear as possible the aspects being measured.

Once universities start working with SD they would find that there are many tools available for corporations, but not so many specifically designed for higher education institutions, so whether the institution decides to use one of the already existent or create one, it should contain the points presented by Shriberg (2002).

As mentioned, there are many tools to assess sustainability, Table 6-3 presents the 11 tools that Shriberg (2002) analyses; Cole (2003) makes an analysis of 12 others:

- **Global Reporting Initiative:** "*Some of the elements of the reporting system are useful, but most are not applicable to a campus. One campus has used this method with much difficulty, but there is potential to adapt it to meet the needs of the higher education sector.*"
- **ISO 14 000 Series:** "*Misses social elements. More relevant for industry and business who want to be compliant with standards. Quite cost-prohibitive and labour intensive. Some campuses are using it.*"
- **OECD Guidelines on Multinationals:** "*Not really useful. Some elements dealing with labour standards, human rights, health and safety could be drawn into a different tool, but this is oriented to a corporate audience.*"
- **Triple Bottom Line:** "*Could be useful to campus management, as they are increasingly forced to make decisions based on bottom-lines. Likely too human and financial resource intensive for a campus.*"
- **The Natural Step:** "*Could be useful for a campus, although in my opinion it doesn't offer very much to work from.*"
- **Ecological Footprint:** "*Somewhat useful for campuses (and some campuses have used this tool). Does not address all issues of sustainability (lacking in social and economic dimensions.) Quite complex.*"
- **Compass of Sustainability:** "*useful for specific campuses wanting to build community, and work from the bottom-up. Not really useful for a standardised national campus sustainability framework – the scale is too large for participatory design and use of the tool*"
- **Local Agenda 21:** "*Offers some interesting ideas to sustainable campuses work. Many of the indicators aren't relevant to a campus, but methods and participatory approach are useful.*"
- **National Round Table on Environment and Economy:** "*Likely somewhat useful for campuses in that it speaks in an economic language. Doesn't reflect values of sustainability very well.*"
- **UN Commission on Sustainable Development, Dashboard of Sustainability:** "*Not really appropriate for use at other scales or organizational types. Dashboard is based on UN*

CSD indicators, but is a more user friendly and accessible tool. It can be manipulated to include different data sets on different indicators, and thus may be appropriate for campus application"

- **Other UN Reports, including GEO, HDI:** *"Too high level for the campus context. Issues of concern in these reports are quite different than for a campus – especially the human/development measures"*
- **Genuine Progress Index:** *"Not very useful for a campus as it is focused on a system of national accounts quite specifically Again, new accounting techniques would be quite complex for a campus to undertake".* (Cole, 2003) (Cole, 2003)

It should be noted that of all the tools reviewed by these two authors, the GRI guidelines include, to a large extent, the triple-bottom-line approach.

This thesis author believes that ISO 14000, as a tool, offers the advantages, between many, of **a.** a systematic approach and clarity, **b.** a third party certification, **c.** international recognition. But one of the main weaknesses of this system is that it primarily focuses on environmental aspects.

This thesis author agrees with Cole (2003) that the GRI has some elements that are useful but others that are not applicable to universities. In the beginning stage of this thesis the author became acquainted with the fact that the ULSF had a workshop in Washington, D. C. in (May, 2003) where they presented a draft of the modified GRI guidelines for universities. This, of course, is a work in progress, but this author would like to point out that different universities have already used a modified version of the GRI guidelines with satisfactory results, some examples are presented in Section 6.4.2, with two detailed ones. This draft satisfies some of the requirements of the integration that Cortese (2003) makes and fulfils the criteria presented by Cole (2003) in regards to the assessment and reporting of SD in universities and colleges. This author also believes that the use of GRI could be very useful since it offers an understandable and easy to compare methodology and a standardised reporting format and mechanism. Cole (2003) does not include the "Auditing Instrument for Sustainable Higher Education" (AISHE) of Roorda (2001) in his analysis, therefore this thesis author reviews this tool and assess its potential applicability for academic institutions as they seek to track their progress on the SD journey.

6.3 AISHE

Roorda (2001) presents AISHE, which is a tool designed for use within academic institutions. It is a modification of a model for quality management, developed by the European Foundation for Quality Management. The tool consists of five stages presented in Table 6-4.

Table 6-4 Stages of AISHE

Stage 1 Activity oriented	▪ Educational goals are subject oriented ▪ The processes are based on actions of individual members of the staff ▪ Decisions are usually made ad hoc
Stage 2 Process oriented	▪ Educational goals are related to the educational process as a whole ▪ Decisions are made by groups of professionals
Stage 3 System oriented	▪ The goals are student oriented instead of teacher oriented ▪ There is an organisation policy related to (middle) long-term goals ▪ Goals are formulated explicitly, are measured and evaluated. There is feedback from the results
Stage 4 Chain oriented	▪ The educational process is seen as part of a chain ▪ There is a network of contacts with secondary education and with the companies in which the graduates will find their jobs ▪ The curriculum is based on formulated qualifications of professionals
Stage 5 Society oriented	▪ There is a long-term strategy. The policy is aiming at constant improvement ▪ Contacts are maintained, not only with direct customers but also with other stakeholders ▪ The organisation fulfils a prominent role in society

Source: Adapted from Roorda (2001)

The AISHE method has 20 criteria, divided into five fields of attention and encompassed by three categories based upon the four phases of the Deming circle: plan, do, check, and act. The criteria and their division are presented in Table 6-5, it should be noted that Roorda (2001) does not specify any division for Act.

Table 6-5 AISHE criteria list

Plan	1. **Vision and policy**
	    1.1. Vision
	    1.2. Policy
	    1.3. Communication
	    1.4. Internal environmental management
	2. **Expertise**
	    2.1. Network
	    2.2. Expert group
	    2.3. Staff development plan
	    2.4. Research and external services

Do	3. **Educational goals and methodology**
	    3.1. Profile of the graduate
	    3.2. Educational methodology
	    3.3. Role of the teacher
	    3.4. Student examination
	4. **Education contents**
	    4.1. Curriculum
	    4.2. Integrated Problem Handling
	    4.3. Traineeships, graduation
	    4.4. Speciality

Check	5. **Result assessment**
	    5.1. Staff
	    5.2. Students
	    5.3. Professional field
	    5.4. Society

Source: Roorda (2001)

Application and implementation of the AISHE method includes the "need" for workshops and participation of various individuals of the university. It also requires that all the decisions have to be reached by consensus.

The method utilises radar graphs which present the results from the five stages in a clear and easy to use mode. The graph is generated from a Score form in which the 20 indicators are graded from 1 to 5.

This thesis author finds this method a good start for the assessment of the university, but it does not present, with enough detail, the different aspects that could appear in an institution. It lacks the evaluation of the campus operations and its outreach to the community. In matters of reporting, its performance is good and it could be used satisfactorily in a benchmarking process against other institutions or with the same institution, over time.

The main advantage of the method is that it is relatively easy-to-use and the results of it is application can be easily seen and understood by the different stakeholders.

6.4 GRI Sustainability Guidelines and their use for universities

The GRI Sustainability Reporting Guidelines are a long-term, multi-stakeholder and international process. The use of the guidelines is voluntary and is intended for use in any organisation of any size and in any location. The Guidelines are organised in terms of economic, environmental and social performance. One of the primary goals of the guidelines is the stakeholder dialogue. Andrews (2002) emphasises that the GRI Guidelines has given companies an impressive multi-stakeholder process. Andrews (2002) writes that the guidelines incorporate the active participation of business, accountancy, human rights, environmental, labour, and governmental organisations.

The guidelines are divided in five sections:

1. *Vision and Strategy*
2. *Profile*
3. *Governance Structure and Management Systems*
4. *GRI Content Index*
5. *Performance Indicators*
   a. *Integrated*
   b. *Economic*
   c. *Environmental*
   d. *Social*

It has to be noted that in order to do a complete GRI report the three aspects, economic, environmental and social, as well and their integration have to be addressed.

In the guidelines the GRI leaders emphasise the benefits of reporting by stating that reporting sharpens competitiveness, helps to ensure and to incorporate the needed dialogue with stakeholders, and helps to assess the organisation's contribution to natural, human and social capitals. (GRI, 2002)

The performance indicators in the GRI report are divided into:

1. **Core indicators:** which are relevant to most reporting organisations and of interest of most stakeholders, and

2. **Additional indicators:** which represent a leading practice in any of the three dimensions, provide information of interest to stakeholders; and they are being tested to be possible future core indicators.

These two types are used in each of the three aspects. It must be noted that in some occasions the additional indicators are intended to be more of guidelines and they could even be considered optional.

The Guidelines are based on 11 principles, organised in four clusters (Figure 6-1), these are:

The framework of the report:

- **Transparency:** This is essential for the credibility of the report, especially in the full disclosure of the processes, procedures, and assumptions. Transparency is the centre of the accountability of the report.
- **Inclusiveness:** This principle demands that the report should systematically engage its stakeholders. Inclusiveness ensures that the report reflects the need of diverse users.
- **Auditability:** This principle refers to the extent to which information management systems and communication practices can be scrutinised for accuracy both internally and externally. The principle demands that reported data and information to be recorded, compiled, analysed and disclose, so that it could be tested for reliability by internal and external auditors.

Inform decisions about what to report

- **Completeness:** This principle requests that the information is in sufficient detail, and be consistent with the boundaries, scope and time period of the report. The boundaries have to be selected with consideration of the economic, environmental and social impacts of the organisation. The scope refers to aspects such as energy use, health and safety, and other aspects. The temporal dimension demands that the information reported be completed with the time period declared by the organisation.
- **Relevance:** This is the degree of importance that a particular aspect, indicator or information presented in the report is significant enough for the user.
- **Sustainability context:** This principle refers to the holistic view of the report and how the organisation affects economic, environmental and social aspect in local, regional or global levels.

Relate to ensuring quality and reliability

- **Accuracy:** This refers to the exactness and margin of error in the reported information.
- **Neutrality:** The reported information should not be biased; the information should present a fair and factual presentation of the organisation.
- **Comparability:** The reported information should be comparable with the organisation's early performance or with other organisations.

Inform decisions about access to the report

- **Clarity:** The information presented should be understandable and usable.
- **Timeliness:** The information should be presented on a regular schedule and is of use within the organisation.

This thesis author would like to remark that the GRI Guidelines are voluntary, and even though the 11 principles demand that the report be clear, understandable and unbiased, the organisation could manipulate the information to its benefit. This, of course, is not what is

intended by the Guidelines and this thesis author hopes that any organisation that uses the GRI would use and adhere to the principles behind GRI.
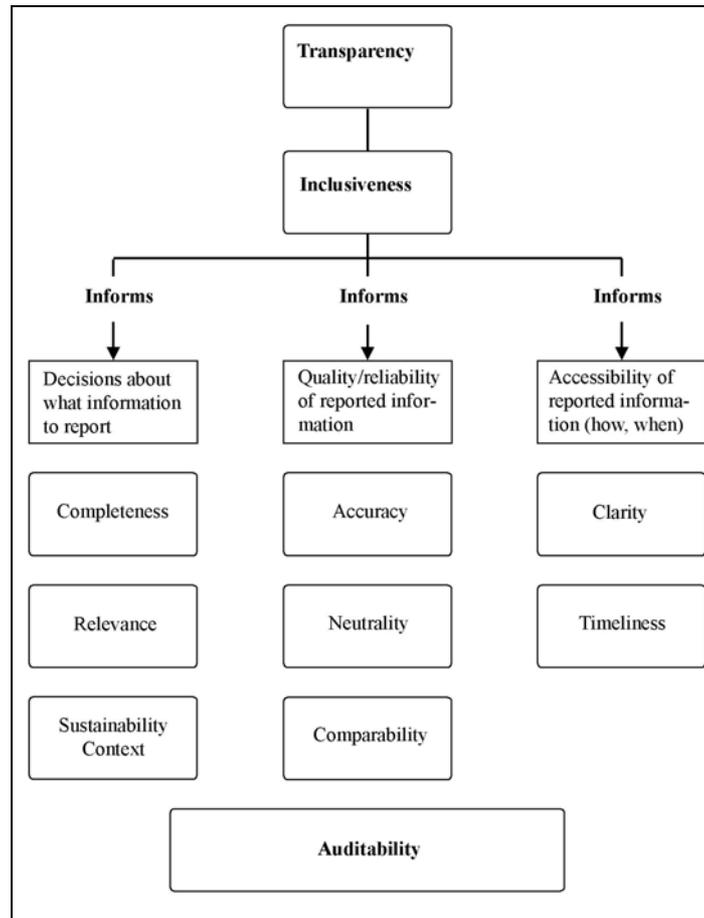
Figure 6-1 GRI Sustainability Guidelines Reporting principles
Source: GRI (2002)

The GRI guidelines framework is as follows:

1. Vision and Strategy
2. Profile of the company
3. Governance structure and management systems
4. Performance indicators
5. Additional indicators

The performance indicators are divided in three categories, **economic**, **environmental** and **social**. Table 6-6 presents these categories with their respective aspects. It should be noted that the guidelines intend to include integrated indicators, but these are still not fully developed, there are only marked as two types, **a.** systematic indicators (relate the activity of an organisation to the larger economic, environmental and social systems) and **b.** cross-cutting indicators (which directly relate two or more dimensions of economic, environmental and social performance as a ratio).

Table 6-6 GRI Indicators hierarchy

	Category	Aspect
Economic	Direct Economic Impacts	Customers
		Suppliers
		Employees
		Providers of capital
		Public sector
Environmental	Environmental	Materials
		Energy
		Water
		Biodiversity
		Emissions, effluents, and waste
		Suppliers
		Products and services
		Compliance
		Transport
		Overall
Social	Labour Practices and Decent Work	Employment
		Labour/management relations
		Health and safety
		Training and education
		Diversity and opportunity
	Human rights	Strategy and management
		Non-discrimination
		Freedom of association and collective bargaining
		Child labour
		Forced and compulsory labour
		Disciplinary practices
		Security practices
		Indigenous rights
	Society	Community
		Bribery and corruption
		Political contributions
		Competition and pricing
	Product responsibility	Customer health and safety
		Products and services
		Advertising
		Respect for privacy

Source: GRI (2002)

The complete list of the GRI sustainability guidelines indicators is presented in Appendix 14.

As can be seen from the contents of Table 6-6 the hierarchy of the guidelines is designed for companies; it serves of course as a good base for universities but indicators such as child labour, forced and compulsory labour, customer health and safety, and products and services, are not suited for universities. The educational aspect in higher education is missing from these guidelines. The ULSF team is currently co-working with several educators to develop a draft that will include this aspect and others that are missing from the industry-oriented GRI.

Andrews (2002) wrote that the first step for organisations to start using the GRI is to put together the reporting team and to set up the appropriate management support; with the ideal team being comprised of:

- A management champion;
- An internal report process group, encompassing managers from environment, safety, health, human resources, finance, public relations, manufacturing, and any other appropriate functions;
- A co-ordinator and manager who drives the process and schedule;
- A writer/editor;
- A production team for graphic design;

Andrews remarks that *"Although the reporting process adds to the management workload, successful companies do not view it as a burden… the work integrates reasonably well with other management tasks and responsibilities…"* (Andrews, 2002) This thesis author agrees with Andrews' statement, even though making a full report could appear as extra workload, the payback in performance, integrations and transparency is worth it; the worst is not to try, the laws of physics indicate that the force of the friction is higher when a body is still than when a body is already in movement. Taking this analogy, the most difficult part of a journey, being SD in this case, is to start it.

The content, as well as all of the indicators for the economic, environmental and social aspects are presented in Appendix 14 . It should be noted that the indicators table presents an additional category for performance indicators, the Educational Performance. This category is explained in the following section.

6.4.1 GRI for universities

The GRI guidelines are, as previously shown, a useful tool for companies to assess and report their sustainability efforts. Universities differ substantially in their core competence to corporations; they have a focus on education and research. Thus, a tool designed for businesses, such as the GRI has to be modified to fit the university system.

The ULSF team proposed a Resource Document based on the GRI Guidelines. The reporting desires to bring up the universities' sustainability reporting to the level of other sectors. The Resource Document will help the university to, besides the reporting, to identify gaps and additional needs for improving in sustainability matters. The author of this thesis had, previous to acknowledging of the efforts of ULSF, thought about modifying the GRI Guidelines and set them in accordance with institutions of higher education.

The proposed modification to the GRI Guidelines adds a new dimension to the three (economic, environmental and social) that the GRI has already in its framework: the Educational Performance Indicators. A correct and complete GRI report must fulfil the reporting requirements of the three aspects, economic, environmental and social, and for universities, it should also consider the proposed Educational aspect. The complete framework and the list of indicators for the economic, environmental and social aspects are presented in Appendix 14. It should be noted that the table in Appendix 14 enlists all of the normal requirements of the GRI corporate reporting, with additional columns stating whether the indicator(s) in question could be used as such in universities and if not how could it be modified or if it should be eliminated. The table also presents the additional Educational aspect, which is the conclusion of the following paragraphs.

The ULSF proposes for the Educational aspect the following indicators, it should be noted that all of them are considered in the proposal as additional indicators:

1. **Curriculum**
   1.1. Available courses
       1.1.1. Number and percent relative to total of courses taught each year related to sustainability concepts
       1.1.2. Number of students enrolled in sustainability-related courses
   1.2. Administrative support
       1.2.1. Number and percent of departments and colleges including sustainability curriculum
       1.2.2. Sustainability courses included in general education requirement
       1.2.3. Existence of available sustainability-related majors and minors
2. **Research**
   2.1. Grants
       2.1.1. Total revenues from grants and contracts specifying sustainability-related research
   2.2. Publications and products
       2.2.1. Published research with focus on sustainability-related issues
   2.3. Programs and centres
       2.3.1. Number and function of centres on campus providing sustainability-related research or services
3. **Service**
   3.1. Community activity and service
       3.1.1. Student, faculty, and staff contributions to community development and service
       3.1.2. Partnerships for sustainability with educational, business, and government entities at the local level
       3.1.3. Quantity and composition of student groups focusing on one aspect of sustainability
   3.2. Service learning
       3.2.1. Existence and strength of service learning programs
       3.2.2. Total faculty, staff, students, involved in service learning projects

Different universities have already started modifying the GRI guidelines for their operations; many of them are part of the ULSF and are taking part in a standardised framework of the GRI. For example, F. J. Lozano (2003), from Monterrey Tec, proposes for the Educational aspect the indicators presented in Table 6-7.

Table 6-7 Lozano's Proposed indicators for the Educational Dimension of GRI

Core indicator	Additional Indicator
Curriculum	
SD incorporation in Curricula	
HE1 Number of specific course(s) on SD or sustainability	List with courses' titles and contents
HE2 Number of courses whose content has SD themes	List with courses' titles and SD theme contained
SD capacity building	
HE3 Specific course to "Educate the Educators" in SD	Course structure, goals and duration
SD monitoring in curricula	
HE4 Management procedures to monitor SD themes incorporation in Curricula	Management structure, incorporation follow up procedures, continuous improvement methods, etc.
Research	
HE1 Research in the area of sustainability	List issues addressed: Renewable energies, ecological economics, urban planning, etc.
HE2 Percentage of graduate students doing research in sustainability	List of knowledge field involved
HE3 Percentage of faculty that does research in sustainability issues	List of faculty members and department or centre they belong to
HE4 Institutional support and management procedures for multidisciplinary and interdisciplinary research in sustainability	Type of support provided: budget allocation, office and personnel especially dedicated, etc.
HE5 Number of research projects that are multidisciplinary and interdisciplinary in the area of sustainability	List of Departments and Centres involved

Source: F. J. Lozano (2003)

It can be seen that the first additional indicator proposed by the ULSF and the first core indicator proposed by Lozano are practically the same, to which this thesis author decided to use the ULSF, but as a core indicator. F. J. Lozano (2003) does not present the number of students enrolled in SD courses or its percentage, in consequence this thesis author decided to use the ULSF second additional indicator as a core indicator. In the matters of research the ULSF proposal and Lozano's complement each other, for which the table for the Educational Dimension of the proposed GRI for universities, according to this thesis author, would be the one presented in Table 6-8.

Table 6-8 Integrated proposed performance indicators for the Educational Dimension for the GRI Guidelines

Core indicator	*Additional Indicator*
Curriculum	
SD incorporation in Curricula	
CU1 Number and percent relative to total of courses taught each year related to sustainability concepts	CU6 List with courses' titles and SD theme contained
CU2 Number of students enrolled in sustainability-related courses	
CD3 Number of courses whose content has SD themes	
SD capacity building	
CU4 Specific course to "Educate the Educators" in SD	CU7 Course structure, goals and duration
SD monitoring in curricula	
CU5 Management procedures to monitor SD themes incorporation in Curricula	CU8 Management structure, incorporation follow up procedures, continuous improvement methods, etc.
Administrative support	
	CU10 Administrative support (with a detailed plan and budget)
	CU11 Number and percent of departments and colleges including sustainability curriculum
Research	
RE1 Research in the area of sustainability	RE6 List issues addressed: Renewable energies, ecological economics, urban planning, etc
RE2 Percentage of graduate students doing research in sustainability	RE7 List of knowledge field involved.
RE3 Percentage of faculty that does research in sustainability issues	RE8 List of faculty members and Department or Centre they belong to.
RE4 Institutional support and management procedures for multidisciplinary and interdisciplinary research in sustainability	RE9 Type of support provided: budget allocation, office and personnel especially dedicated, etc.
RE5 Number of research projects those are multidisciplinary and interdisciplinary in the area of sustainability.	RE10 List of Departments and Centres involved
Grants	
	RE11 Total revenues from grants and contracts specifying sustainability-related research
Publications and products	
	RE12 Published research with focus on sustainability-related issues
Programs and centres	
	RE13 Number and function of centres on campus providing sustainability-related research or services

Source: This author

The service aspect remains as the ULSF proposes.

Additional indicators, as marked in the previous section, are to be taken as **a.** Indicators that are being tested for future possible use as core indicators, **b.** Indicators that provide information that complements the core indicators, **c.** Optional, to an extent that they are not

of vital importance for the report, the institution could skip the report of some of them and still come out with an appropriate sustainability assessment.

This thesis author would like to question whether the Guidelines offer a systematic approach on the data collection, classification and capturing. In case that it does not, the institution could learn from the systematic approach of the ISO standards (both 9000 and 14000)

6.4.2 Examples of universities using Sustainability Reporting

The ULSF (2003) presents in their web page eight universities that have done a campus assessment, audit, survey and/or report. These universities are presented in Table 6-9

Table 6-9 Universities that report their sustainability efforts

University	Web page where the report is available
Australian National University Annual Reports	www.anu.edu.au/facilities/anugreen/annual_report.html
Pennsylvania State University	www.bio.psu.edu/Greendestiny/index.shtml
University of British Columbia's Annual Report for 2002	www.sustain.ubc.ca/pdfs/annual2003cb.PDF
University of Florida Sustainability Indicators Report	www.sustainable.ufl.edu/indicators.htm
University of Michigan Sustainability Assessment	http://css.snre.umich.edu/css_doc/CSS02-04.pdf
University of North Carolina - Chapel Hill Campus Sustainability Report	http://sustainability.unc.edu/Documents/AnnualReportWeb2003.pdf
University of Oregon Annual Reports	http://darkwing.uoregon.edu/~eic/
University of Vermont's Environmental Report Card	www.uvm.edu/greening

Source: This author

Another higher education that has a very interesting sustainability report is the Dartmouth College (2003), this is not presented by the ULSF but this thesis author considers it to have fulfilled to a great extent the GRI and proposed interesting indicators for education.

It is obvious that a complete analysis of all of these sustainability reports would need the time and effort of another master thesis. For this reason this thesis author decided to analyse two universities them. The ones chosen were the University of Florida and Dartmouth College, this due to the attempts of these universities to use the GRI Sustainability Guidelines as their framework.

6.4.2.1 University of Florida Sustainability Reporting

The University of Florida (Newport & Chesnes, 2001) published their sustainability report on June 2000, in accordance with the GRI guidelines.

The report fulfils the requirement of the GRI for sections 1 (Vision and strategy) and 2 (Profile of the company) and Section 3 (Governance structure and management systems), which are the ones that require the least amount of effort in the report. The interesting part in a GRI report is the data collection and fulfilment of the economic, environmental and social indicators, and as it could have been guessed, the additional educational indicators for universities.

The report does an excellent work on the economic, environmental and social aspects. It is important to remark how the report presents in a clear mode a chart for each indicator of each aspect, with at least four years before. It is interesting to remark some proposed educational indicators such as:

Box 6-1 Educational indicators proposed by Florida University

▪ Quality of the faculty;	▪ Undergraduate enrolment by family income;
▪ Diversity of faculty;	
▪ Gender of ranked faculty;	▪ Undergraduate graduation rate;
▪ Ethnicity of faculty;	▪ Graduate program applicants;
▪ Gender of total faculty;	▪ Graduate program enrolment;
▪ Incoming freshman GPA and STA scores;	▪ Total graduate program minority enrolment;
▪ Student diversity;	▪ Total graduate program female enrolment.

Source: University of Florida (Newport & Chesnes, 2001)

One aspect of these indicators that takes the attention of this thesis author is the lack of focus into what this author believes to be the core competences of a university, such as curricula and research, which are not included in the University of Florida report.

It is in part understandable that it took immense university's efforts to generate the sustainability report and to propose thirteen indicators for the educational aspect; but the indicators proposed by the University of Florida, according to this thesis author, should be part of the social aspects. For example, the Student diversity and Gender of total faculty; instead the university should have included in the educational aspect some of the courses that it offers related to SD and the percentage that these represent in relation to the total number of courses they offer on the campus. Another aspect is the reporting of the number of students that attend these courses and the percentage that these students are in respect to the total number of students. It should be noted that most of the environmental indicators fulfil the Operations dimensions of the campus and not the academic, research or the outreach dimensions.

The aspects proposed are just a few of the ones that have been already proposed in previous sections of this thesis.

6.4.2.2 Dartmouth College

The Dartmouth College (2003) made a feasibility study of sustainability reporting in 2003. In this study Dartmouth College compared seven options for sustainability reporting: GRI, Global Compact, Global Sullivan Principles, SA 8000, AA 1000, ISO 14000 Series, and OECD Guidelines for MNEs. Of which the College decided to utilise the GRI Guidelines.

The report is quite complete in the four aspects of sustainability reporting for universities. All of the normal GRI indicators are addressed. The College proposes different indicators that relate to universities, some of these that are considered under the aspect of education should have been integrated in the other aspects, for example, Ethnic diversity of faculty. But the report proposes, such as the ULSF proposal, three categories directly related to education: Curriculum, Research, and Services. The indicators proposed by Dartmouth College are presented next:

Curriculum:

- Available courses pertaining sustainability;
- Administrative support;

Research:
- Grants-total revenues from grants and contracts specifying sustainability related research;
- Publications and products;
- Programs and centres;

Service:
- Community activity and service;
- Service learning;

As it can be seen, all these indicators are very similar or identical to those proposed by the ULSF and addressed in previous section of this chapter.

6.4.2.3 Conclusions drawn from these examples

The two universities chosen to be examples of sustainability reporting are among the innovators of the many thousands of universities of the world. They should be taken as examples for their efforts and proposals. This thesis author believes that the other universities of the world, from the Early majority adopters to the Laggards, should learn from the innovators and start incorporating SD at a faster rate. One of the learning possibilities is that all the universities, from innovators to laggards, sign one of the many charters and incorporate those concepts into their policies, strategies and daily practice in education, research, outreach and campus operations. Another option is the exchange of, or loan, of the champions and their teams in an inter-university manner, so that they could serve as expert consultants and could help develop programs and projects that would boost the incorporation and adoption of SD in the welcoming universities. Of course there could be many other options to be explored.

7. Case studies

This chapter presents two case studies: ITESM Campus Monterrey, in Monterrey, Mexico (also known as Tec) and Lund University, in Lund, Sweden. It should be noted that the author of this thesis studied at Tec from 1994 to 1998 and during the period August 2002 to October, 2003 at the IIIEE, at Lund.

The chapter contains information pertaining to the general characteristics of each university; the policy of the universities pertaining to SD; their SD program, the ongoing efforts towards SD; the results of the interviews made in each university; and the findings of the research and life as a student within each university.

7.1 ITESM Campus Monterrey

Tec is a private university located in the north-east of Mexico. Its formal name is Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM). It was founded in 1943 by a group of industrial entrepreneurs lead by Eugenio Garza Sada.

The overall characteristics of the Tec system, for the current academic year, are:

- 31 campuses;
- 16 Virtual University (VU) sites in Mexico;
- 9 Virtual University sites outside Mexico (Central and South America;
- 19 reception centres in Mexico, that can receive the VU signal;
- 20 reception centres outside Mexico that can receive the VU signal (Central and South America) ;
- 7 preparatory school, 34 undergraduate, 51 masters and 6 doctorate programs;
- Approximately 95 thousand full time students (approximately 17,000 at the Monterrey Campus);
- Approximately 7,600 professors (approximately 500 full time teachers and 1,000 part-time at the Monterrey Campus);
- Approximately 23 thousand employees;
- Approximately 141 thousand alumni;
- Exchanges with 300 national and international universities;
- Approximately 7 thousand students abroad;
- Approximately 3 thousand foreign students.

7.1.1 Institutional mission and planning

The mission of the Tec system is:

> *"…the mission of educating individuals who are committed to the social, economic and political improvement of their communities, and who are internationally competitive in their areas of specialty. Carrying out research and extension relevant to Mexico's SD is also part of the Institute's mission"* (ITESM, 2003d).

The inclusion of SD in the institutional mission does not guarantee that the concept is included in the system, but it marks the interest of the university to incorporate it.

7.1.2 Efforts taken by Tec to implement SD

The Rector of the Monterrey campus of ITESM, Dr. Alberto Bustani, signed the Talloires Declaration on the 7th of March of 2003 under the auspices of the ULSF. (ITESM, 2003c)

It was pointed out to this author that at present the Sustainable Campus Program has a set of activities and issues that partially address the Talloires declaration and through short and medium term planning they will proceed to fully address the Talloires declaration.

Tec has taken the first formal steps in the introduction of SD in its Monterrey campus. In August 2001 they launched the *"Sustainable Campus Program" (Programa Campus Sostenible),* of which its mission is: to help to catalyse the transition of the Tec system towards SD, which will have dramatic immediate and future impacts on society by generating a conscience of the social, economical and environmental needs of the country, and to have consideration of the well-being of future generations. (ITESM, 2003a)

The mission of the program is: *"To increase the capacity and commitment of Monterrey Tec's academic community to effectively develop and empower "SD Change Agents," who will be aware of Mexico's and the World's social, economic and environmental needs and who will become actively engaged in helping society make the transition to ecologically, environmentally and ethically sustainable patterns for the short and long term."* (ITESM, 2003a)

The program has six focal points:

1. To incorporate the concept of SD into courses and curricula;
2. To operate the campus in a more sustainable manner;
3. To do basic and interdisciplinary research using SD as a cornerstone;
4. To have a SD impact and influence in the community through outreach to the "real world";
5. To report and disseminate the achievements on SD through publications and information within the Tec community and outside; and
6. To establish and operate the "Conservation and SD Professorship" (ITESM, 2003a)

This thesis author observes that until the creation of the Sustainable Campus, the concept of SD was present but not really institutionalised. This author corroborated this in 1999 when he was involved in an international project of the student organisation AIESEC with the intention of creating an international SD network. This author was responsible of creating a Mexican SD network. The experiences on the time spent on this project were interesting; on one side there were many individuals interested in the project, from various stakeholders such as academic directors, professors, students, etc.; on the other side the amount of information, costs and workload was excessive. Another limitation at the time was the low involvement on the top levels of Tec.

This author believes that the Sustainable Campus Program has more possibilities to incorporate the concept of SD into the Tec system. Some of the reasons for this are: **1.** Academic directors convinced and involved in the process, **2.** A program that co-ordinates and has practically unrestricted access to information, **3.** More developed international networks of expertise in the subject of SD in HE, **4.** Stakeholders willing to get involved in the project (an example of these is the main student organisation of Tec).

The above mentioned reasons indicate that a top-down approach, in this case, had more strength than the bottom-up in pushing SD through the university system.

In the next sections present some of the efforts already taken in the incorporation of SD at Tec by the Sustainable Campus Program.

7.1.2.1 Incorporation of SD into the curricula

The Sustainable Campus Program has helped and in helping to facilitate the incorporation of SD into diverse courses and curricula throughout the campus. Thus far, the following divisions and courses have been or are being transformed to include SD as the golden thread:

- **Management and Financing:**
    - *Management:* 6 courses;
    - *Economy:* 9 courses;
    - *Marketing:* 1 course.
- **Electronic, Computation, Information and Communication:**
    - *Physics:* 1 course;
    - *Centre to foster Sustainable Development:* 1 course.
- **Engineering and Architecture:**
    - *Architecture:* 6 courses;
    - *Civil Engineering:* 7 courses;
    - *Agronomy and agricultural engineering:* 4 courses;
    - *Chemical engineering:* 7 courses;
    - *Chemistry:* 3 courses.
- **School of graduates in public management and policy (EGADE):**
    - *Master in administration:* 32 courses;
    - *Master in marketing:* 10 courses;
    - *Master in direction for manufacturing:* 3 courses. (ITESM, 2003b)

The complete list of the courses is presented in Appendix 9. These courses are for students from the first until the last semesters of both undergraduate and postgraduate programs.

7.1.2.2 Campus operations

Under the campus operations the program overviews four major categories: water, energy, gardens and residues, and purchases.

1. **Water:** The campus has, since 1991, a wastewater treatment plant, which treats 70% of the wastewater of the campus and uses much of it for watering of the landscape planning. (That is it is a kind of *'Grey Water'* reutilisation program.) The campus also has a campaign of water conservation culture, in order to make everybody more conscious of the water usage. The water usage per capita for last year was 28m^3/person. The water usage, from 1998 to 2001 declined from 32 to 26m^3/person, while in 2002 increased back to 28m^3/person.
2. **Energy:** Several steps have been taken to save both electrical energy and natural gas usage, such as: monitoring of natural gas and electricity use; substitution of inefficient lighting with high energy efficiency bulbs; a program for the detection and repair of water, gas and steam leaks throughout the campus. In 2002 the consumption of electricity per person in the campus was 5.85 GJ and of gas 1.35GJ, this last figure has dropped steadily from 2.08GJ in 1996. This is shown in Figure 7-1.
3. **Gardens and residues:** Currently there is a program to transform all the gardens inside the campus into a Botanical garden, with informative plates for each of the plant species. Also, progress in being made in planting more plants that are native to the region, thus increasing the potential water savings in the landscape of the campus and helping to ensure local species diversity.

4. **Purchases:** The campus facility managers and others are working on the development of purchasing policies that are friendlier to the environment, to satisfy the internal customers and to reduce costs. One example is the introduction of recycled paper and paper made of sugar cane bagasse. (ITESM, 2003e)
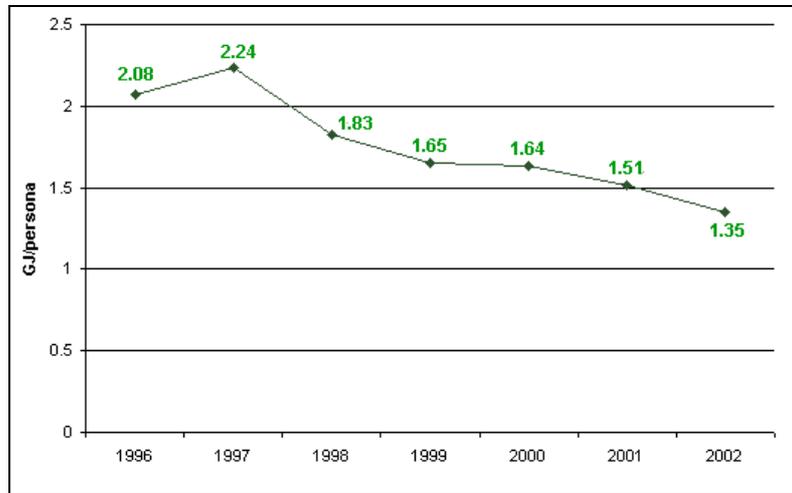
Figure 7-1 Natural gas consumption per person at Monterrey Tec
Source: ITESM (2003e)

One major environmental problem that the campus has is the large consumption of polystyrene cups; these are sold in each of the cafeterias and restaurants inside the campus whenever one buys a soda. It is a fact that the recycling of this type of plastic is low and requires of much specialised machinery to perform it, machinery that is not available in Mexico.

7.1.2.3 Research

In the category of research the campus offers 24 research chairs on SD for multidisciplinary teams and has numerous research centres. The campus sustainable development program team is working with the researchers to help them more fully incorporate SD concepts and approaches into their research programs. Tec is also collaborating with the ULSF to develop and to implement the usage of a toolkit of higher education for sustainability.

7.1.2.4 Community Outreach

The Campus SD program in working to integrate the faculty members and the students with the community with the aim of applying the SD concepts they have learned in their courses to the solution of real world problems... Currently two associations are working jointly with the Sustainable Campus Program: The Association for the development of the ecological culture (FOMCEC from its abbreviation in Spanish), and Friends of the Earth Monterrey Chapter.

7.1.2.5 Reporting

The program team is currently providing information pertaining to the program for:

- The on-campus community, including the administrators, staff, faculty and students; this is being accomplished through many different media including the campus newspaper,(Panorama), the campus radio and official reports;

- The off-campus colleagues in the Monterrey region and throughout Mexico; This is being accomplished via newspaper and regional journal articles;
- The academic community, worldwide. This is being accomplished via publication of scientific articles in international journals, participation in international conferences and congresses on SD in Higher Education and in planning for hosting a major, international congress on SD in Higher Education that will be held on the Monterrey Tec campus during June, 2004.

While interviewing Tec faculty during June 2003, this author learned, that the Tec SD team is also working closely with the ULSF in the development of the GRI guidelines for higher education institutions.

7.1.2.6 The SD Professorship

The SD Professorship was created in honour of Andres Marcelo Sada, a Mexican entrepreneur and business-man who in the 1970's promoted Mexican pride in business and the development of the industry with a social profile for the workers.

The SD Professorship was established in order to contribute environmental perspectives for the educators and students at Tec in order to help them become increasingly effective agents of change that will help set the pace of the society towards SD. (ITESM, 2003f) This professorship is not filled by one person but by a series of people for short periods of time throughout the year, on a rotating basis. Thus ensuring a continual influx of new ideas and concepts from diverse leaders.

7.1.3 Interviews

This thesis author spent over one month doing research at Tec, part of this research was the application of a questionnaire on a personal basis in face-to-face interviews. This questionnaire is presented in Appendix 10. The following people were interviewed:

- Dr. Alberto Bustani, Monterrey Campus President;
- Dra. Lucrecia Lozano, Dean of the Division of Humanities and Social Sciences;
- Dr. Eugenio Garcia, Dean of the Division of Engineering and Architecture;
- MSc. Osmar Zavaleta, Associate Dean of the Division of Management and Finance;
- Dr. Carlos Narvaez, Director of the automation centre;
- Dr. Joaquin Acevedo, Director of the chemical engineering department;
- Carlos Cruz, co-ordinator of the SD section of the Students Federation of Tec (FEITESM);
- Dr. Francisco Lozano, co-ordinator of the Sustainable Campus Program.

The questionnaire presented in Appendix 10 was used as the framework for the interviews with the first seven people of this list. A different set of questions was used while interviewing Dr. Francisco Lozano. This due to his leadership responsibilities of the entire Sustainable Campus Program and his vast experience in SD.

Other interviews were sought but the workload in the campus and the limitation of time that the thesis author had, while he was at Tec, made it impossible to perform them.

The results of the interviews are presented in the following section.

7.1.4 Responses to the questionnaire applied at Tec

It must be noted that the interviewee sample from the various levels of Tec was not designed to be statistically significant. The questionnaire was designed to:

- Provide an understanding of how the concept of SD is perceived among the faculty at Tec;
- Gain insight into the relatedness of the interviewee's position to the concepts of SD;
- Determine whether the interviewee has knowledge of the Sustainable Campus Program;
- Determine whether, and how the interviewee measures his/her SD performance;
- Determine who, according to the interviewee, should be involved in SD in the university;
- Provide the opportunity to the interviewee to pretend to be in the position of dean of the university and to envision and verbalise the changes necessary to that she/he would make and the challenges that could arise from attempting to make such changes.

The interviewee's answers are presented in the following paragraphs.

Question 1 (How long have you been employed in your current position?) and question 3 (How do you think your position relates to Sustainable Development?):

These questions were used for background purposes.

Question 2 (What does SD mean for you? (Please explain in a brief manner)):

Some of the responses for this question were:

> "*SD does not exist; it is an ideal to which we should reach, it sets the goal line and it helps to create an improvement plan. It sets the grounds where to go; it is possible to get close to it.*" (Bustani, 2003a)

> "*SD is a harmonic, integral and that fundamentally it does not cause any harm, that not sustainable is that which harms… [SD] is not only with respect to the environment…*" (Narvaez, 2003)

> "*SD is a culture, a way of rationalisation of the natural resources so that future generations have the opportunity to use them as we are using them; [SD helps] to make people and industry conscious of these resources.*" (Cruz, 2003)

From the totality of the responses it can be observed that over 70% of the responses relate SD with environmental aspects, 40% with intergenerationality, near 30% with either economic aspects or social aspects, and almost 15% with either cultural aspects or value systems. It should be noted that any answer could have one or more of the categories presented in Figure 7-2.

As this thesis author's experience revealed, SD is usually understood as referring only to environmental aspects. Multidisciplinarism, interdisciplinarism and transdisciplinarism can help to overcome this environmental bias which currently does not include the economic and the social aspects, according to many people.

Question 4 (Are you familiar with the Sustainable Campus Program?)

All of the interviewees answered that they were familiar with the program.
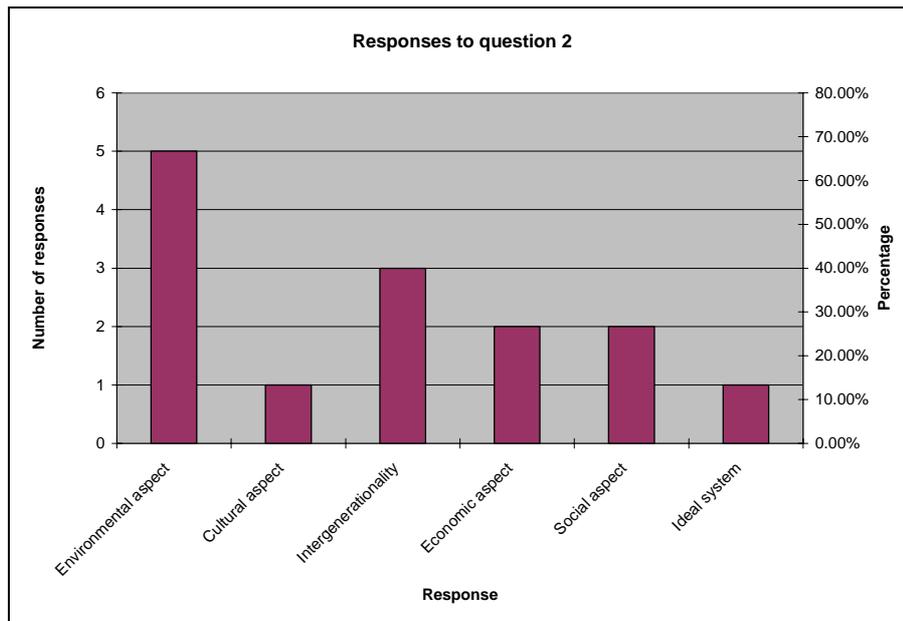
Figure 7-2 Responses to Question 2 (the meaning of SD for you? (please explain in a short manner)?) at Tec
Source: This author

Question 6 (How do you measure your [SD] performance? Which indicators do you use?):

For this question all of the interviewees responded that they do not measure their SD performance, hence the non-use of indicators.

The responses to this question and the previous one indicate that the concept of SD is known in the university and that the individual are motivated towards it, but they still have not really tried to apply it in their day-to-day activities. Thus, the concept of SD is still on the stage of *interest* in the process of the adoption, presented on Section 5.1. The two questions (5 and 6) relate to the stakeholders and their involvement in the university. The responses to these two questions where mainly: all should be involved and the reason is that every stakeholder should be included. This goes in accordance with the stakeholder involvement required by the two Earth Summits (presented in Section 3.2.3)

Question 8 (Do you consider it to be important that SD be taught in universities? Why?):

Some of the responses to this question were:

> "*Universities form the future decision-makers*" (Garcia, 2003)

> "*[Universities] are part of the cultural change fundamental for the Mexican culture, which does not have a SD culture*" (Narvaez, 2003)

All of the interviewees' responses agree that it is important that SD be taught in universities.

Question 9 (With regard to Sustainable Development, what do you think should be the role of?):

The responses to this question can be resumed into the following:

- **Academic Directors:** To support SD with strategies and policies and to create a consciousness and commitment towards SD.

- **Professors:** To introduce the concept of SD into their courses, to create the SD consciousness and to promote the ideological changes from unsustainable to SD
- **Students:** To have open minds, learn and experience the concepts of SD in the campus. Dr. Bustani (2003a) remarked that they should be the main actors. It should be noted that at Tec the ration of students/full-time professors is around 30:1.

This thesis author considers that for the undergraduate level is a normal number, in which the professor and the students can have enough engagement and interaction.

Only three of the actors are presented above, they are considered by this author, and most of the interviewees, to be the most important in the university system.

Question 10 (If you would be in a top management position in your University, what would you change and why? What types of challenges and opportunities would you anticipate in seeking to make these changes?):

Some of the responses to this question were:

> *"We need to have more direct intervention in SD matter. Here at Tec nothing changes from down to up, everything moves from up to down… The one on top [the rector] has to put on the t-shirt and send the message that he is totally convinced on the matter [SD]"* (Narvaez, 2003)

> *"I believe that many of the things, at least in the beginning, have to be made with command and control, until they reach their steady state… in order to create the culture."* (Zavaleta, 2003)

This question challenges the interviewee by offering the hypothetical option of being the top director in his/her university. The respondents expressed that the incorporation of SD should be faster, and that the academic directors must take a "hands-on" approach.

Question 11 (Have you heard about the Decade of Education for Sustainable Development of UNESCO? If so, what do you think it means for you, for your university and for your community?):

None of the interviewees had heard of the DESD prior to the interview. This thesis author believes that the reason of this lack of knowledge about the DESD is due to the fact that it was just recently ratified (April 2003) and the UNESCO has still not been made it public

This thesis author would like to emphasise that the information that he obtained about the DESD was from a Draft, the complete document is still not ready to be published.

Question 12 (How do you perceive the future with and without SD?):

The responses to this question were to a great extent predictable, all of the interviewees replied that there is no future without SD.

7.1.5 General conclusions from the questionnaire responses

During some of the interviews performed at Tec, it became evident that in order for SD to take place and take off in Tec, it is necessary that the top-levels of management, the academic directors have to be convinced of it. It was also clear evident of the central importance of a champion who could be in charge of monitoring and reviewing the progress within the institution.

This led the author to the belief that a top-down approach is necessary. The author's experiences, as a student, on the creation of a network of SD in Monterrey, and especially at Tec, showed him that the efforts of a bottom-up approach are usually not adopted, as easily as they would if it comes from the top-levels. But still, this author believes that the best approach to introduce SD in a university is the introduction at all levels and the subsequent motivation and challenge to all of the stakeholders.

One problem that was pinpointed was that, in general, the professors have a very heavy normal workload and they consider the inclusion of SD as just an additional burden. This understanding comes mainly from the lack of definition and understanding of the possibilities and characteristics of SD to create a better present and future. In one of the interviews (Acevedo, 2003) it was revealed that the motivation does not really go down the organisation, the middle and lower levels follow the leader but there is a lack of conviction on the topic of SD among professors.

From the interviews, it was clear that the concept of SD is known to most of the people interviewed, but it was also clear that it is necessary to educate the educators more fully on the concepts, values and tools, since the main understanding of SD is currently only linked with the environmental aspects while social and economic aspects are largely neglected, perhaps because they are the most difficult to grasp and understand.

In one of the many discussions with Dr. Lozano it was revealed that one of the biggest barriers to change is communication, it was noted that the information is most of the times there but there is not enough sharing and transparency between the owners of the information and the decision-makers, opinion leaders and SD champions.

This thesis author believes that more cooperation between the stakeholders is necessary; SD must be understood as a process that helps the entire system and that the actions or lack of actions of one individual can affect the entire organisation. Therefore is important that all of the members of the organisation are aware and involved while incorporating SD in the university.

7.2 Case study 2. Lund University

Lund University is the largest unit for research and higher education in Sweden. It has seven faculties and various centres and institutes. It was founded in 1666 by the Swedish Government and inaugurated in 1668. Lund University is also known as Academia Carolina. (Lund, 2002)

The overall characteristics of the Lund University system, for the current academic year, are:

- 3 campus (Lund, Malmö and Helsinborg);
- 53 university certificates, 656 bachelor's degrees, 997 master's degrees, and 1,736 professional degrees;
- Approximately 34,000 undergraduates and 3,200 graduate students;
- Approximately 4,300 teachers and researchers;
- Approximately 350 professors;
- Approximately 6,500 employees;
- Exchanges with hundreds of universities;
- Approximately 1,000 students abroad;
- Approximately 1,000 foreign students.

7.2.1 Institutional mission and planning

Lund University's vision is:

> "*Lund University has a leading international, national, and regional position. Education, research, and artistic development work are carried out at the highest international level. In collaboration with the various sectors of society, Lund University helps to explain and shape people's living conditions and the development of society.*
>
> *A versatile academic environment well developed international collaboration, closeness to other universities, and vigorous cultural life and business in the Öresund region lead to boundary-transcending and innovative co-operation. Lund University is developing its multidisciplinary, creative, and innovative capacity and creating new meeting places in education and research.*
>
> *Lund University is continuously renewing an attractive and dynamic setting, characterised by social and ethnic diversity, gender equality, democratic values, openness and critical thinking, and by work for sustainable global development. Lund University is an important cultural institution in society, preserving and renewing a long tradition of culture and scholarship.*" (Lund, 2001)

7.2.2 Efforts taken by Lund University towards SD Program

It is to this author's amazement that Lund University has not yet signed any of the following Declarations: Talloires, Halifax, Swansea or Kyoto, and does not belong to COPERNICUS or the ULSF.

It came to this author's attention during one of the interviews (Gustafsson, 2003) that Lund University offers many courses on SD and environmental aspects, but it also was pointed out that it is difficult to find interested students to take the courses. And there is no real program or project to join them together. This will be clarified in the following section, especially in the responses to question 8.

7.2.3 Interviews

This thesis author utilised the questionnaire presented in Appendix 11 in face-to-face interviews to the following persons of Lund University:

- Göran Bexell, vice-chancellor;
- Lars Hansson, director of the International Institute for Industrial Environmental Economics Masters program;
- Kerstin Gustafsson, environmental manager;
- Gustaf Olsson, dean of industrial, electrical technology and automation department;
- Thomas B. Johansson, director of the International Institute for Industrial Environmental Economics
- Cécile Brokelind, researcher at the Business law department;
- Thomas Lindhqvist, associate professor in the International Institute for Industrial Environmental Economics;
- Lennart Olsson, director of Centre for Environmental Studies

7.2.4 Responses to the questionnaire used at Lund University

The findings of the questionnaire applied at Lund University are presented in this section. As with the case of Tec they are presented in the order of the question in the questionnaire. As with the Tec Questionnaire the interviewee sample is not intended to be statistically significant

but rather to obtain insight into the general perceptions about SD on the campus as emphasised in 6 points stated in Section 7.1.4.

Questions 1 (What is the name of your University and where is it located?) and 2 (Which position do you hold in the University? How long have you been employed in the position? How do you think your position relates to Sustainable Development?):

These two questions were stated for background purposes.

Question 3 (Can you give a brief definition of what Sustainable Development means to you?):

Some of the answers to question were:

> *"To create prerequisites, to create awareness and the ground ideas, the philosophical framework to work on a daily life level and not consider SD as something you have to check every second week, it should be integrated into your daily life, based on your basic values, concerning how you want to be as a good human being. From the university point of view we can provide good examples that sustainability could be integrated in normal daily life."* (Gustafsson, 2003)

> *"It's in an intergenerational perspective. As an economist, you have interest rates, you are discounting the values, the outcomes for future generations, that means that impacts 50, 60, 100 years from now tend to get an extremely low value when you use discount rates of 6, 7, 8 percent, that means in practice it has very little value in economic calculations, therefore for me as an economist to put SD into context I have to define a framework to stay within. And that's' why I try to define it in a way like this: To stay within carrying capacity"* (Hansson, 2003a)

> *"We look at [sustainability] on a narrow perspective from our profession, how can we increase sustainability; it's not a black and white concept it's rather a degree of sustainability on my view. For example, if I can save resources in terms of chemicals, raw materials, energy, I can contribute to the sustainability, saving the resources for the next generation… In my view you have to have life-cycle perspective to check that we use the interest from the Earth and not the capital. In other words, we should leave as much resources to our children as we have received."* (G. Olsson, 2003)

All of the responses to this question are summarised in five categories (presented in Figure 7-3): Environmental aspects, Intergenerationality, Economic aspects, Framework (for SD), and those who chose to respond: the Brundtland Report definition of SD.

This thesis author would like to remark that the responses of the interviewees for question 3, shown in Figure 7-3, do not explicitly indicate the social aspect; it is indicated indirectly within the Brundtland Report, but it is not found as a response from any of the Lund University respondents.
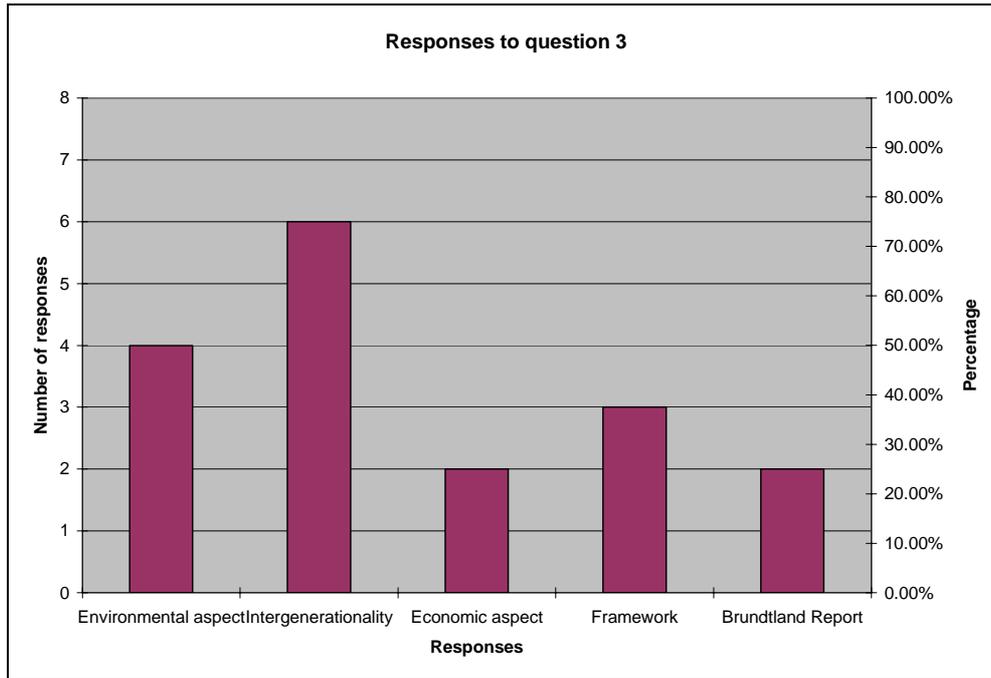
Figure 7-3 Responses to Question 3 (Can you give a brief definition of what Sustainable Development means to you?) at Lund
Source: This author

Questions 4 (Do you consider universities important to the diffusion of Sustainable Development? Why) and 5 (Do you think it is important that Sustainable Development is taught in the Universities? Why?):

Some of the responses to these questions were:

"[Universities] are vital. Young people give hope for the future. Young people try the impossible… From the very first day at the university [to] tell [all] the students you have to think in these terms [SD]. SD is an attitude, a way of thinking." (G. Olsson, 2003)

"They should be, I wouldn't say that they necessarily are today. Normative they should be. The most efficient way to [effect] real change is to work through the educational system. Universities play an important part because they are the ones who are training the teachers at all levels." (Lindhqvist, 2003)

"Universities educate the most influential and powerful people." (L. Olsson, 2003)

It should be noted that, similar to the Tec respondents, all of the interviewees a Lund consider that universities play, or should play, a vital role in the diffusion of SD.

Question 6 (Who do you think should be involved and who should be the key actors for Sustainable Development in Universities?):

The responses to this question fell mainly in one of the following categories: **a.** All of the people in the university, **b.** Teachers, and **c.** Students. These are illustrated in Figure 7-4.

Responses to question 5
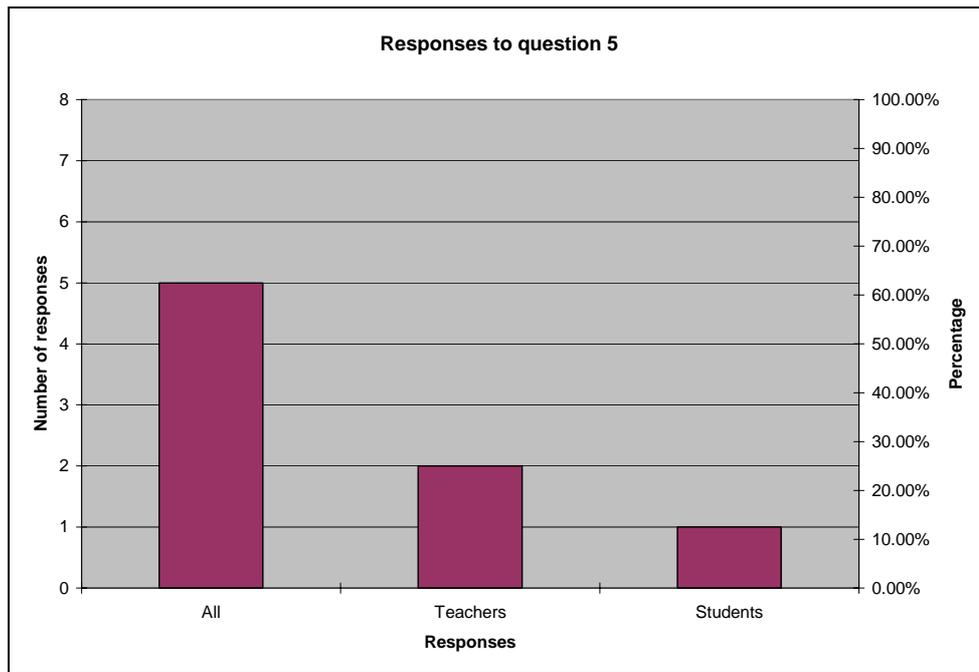
Figure 7-4 Responses to Question 5 (Do you think it is important that Sustainable Development is taught in the Universities? Why?) at Lund
Source: This author

Question 7 (What do you think are the main barriers in the University that affect the integration of Sustainable Development?):

The responses to this question can be summarised into:

- Conservationism and traditionism (people don't like changes);
- "Not-invented-here" syndrome;
- Lack of time;
- Lack of SD knowledge among the teachers.

Question 8 (What is your University doing for Sustainable Development?):

It is interesting to note that the interviewees consider Lund University to have different courses and centres focused on SD, but there is no specific program that interrelates and co-ordinates all of these centres and courses. These answers are supported by the responses to the following question.

Question 9 (Does your University have specific programs towards SD? If so which departments are involved?):

All of the interviewees responded that there is not a specific program at Lund for SD.

Question 10 (How do you measure your Sustainable Development performance?):

Practically all of the interviewees responded that there is no current measurement of SD performance; it should be noted that there are environmental and economic measurements but not for SD.

Question 11 (With regard to Sustainable Development, what do you think should be the role of?):

Some of the responses for Academic Directors were:

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"*Provide leadership. Create a vision. Encourage, motivate and award SD efforts.*" (G. Olsson, 2003)

"*Pushers, push the process, encourage the organisation and follow up*" (Gustafsson, 2003)

"*[Provide] overall guidance, putting priorities, promoting the image of the university and a place that work towards SD.*" (Johansson, 2003)

It can be concluded from these responses, as for the responses of Professors and Students:

- **Academic directors:** It can be seen from the following answers that Academic directors are understood to be the leaders and motivators of SD.
- **Professors**: To provide overall guidance, and SD knowledge, methods and tools.
- **Students**: They should absorb the SD knowledge and create pressure for more knowledge, while at the same time engaging the professors.

Question 12 (If you would be in a top management position in your University, what would you change and why? What types of challenges and opportunities would you anticipate in seeking to make these changes?):

Some of the responses to this question were:

"*To be the inspiration leader in term of our goals and making sure that people are aware of the strategic plans*" (G. Olsson, 2003)
"*I think it is necessary, for all types of change processes, to give all the management levels the possibility to be good leaders... The systems of recruiting manager [at the university] is a catastrophe, that's why we have such problems to implement for instance environmental management systems*" (Gustafsson, 2003)
"*I would look for a way of awarding department, people who did [SD] in a serious way.*" (Lindhqvist, 2003)

Most of the interviewees declined the opportunity to respond to the hypothetical situation of being appointed vice-chancellor of Lund University. This author believes that the position requires many administrative efforts and is affected by heavy bureaucracy. The attitude taken towards the positions give the impression there is no real leadership from the vice-chancellor's office. It should be remarked that the current vice-chancellor, Göran Bexell, has been in the position for only six months, and he appears to be convinced and eager to work with the SD concept. The examples of the responses indicate that there are different strategies to follow in the incorporation of SD at Lund.

Question 13 (Have you heard about the Decade of Education for Sustainable Development of UNESCO? If so, what do you think it means for you, for your university and for your community?):

Only two of the interviewees had heard of the DESD. Even though the rest of the interviewees had not previously heard of the DESD they considered the Decade of vital importance and necessary for the incorporation and adoption of SD into universities.

7.2.5 General conclusions from the questionnaire responses

After the interviews at Lund this author realises that SD is regarded at Lund as, mainly, environmental aspects. Lund University still has not taken explicit steps to include SD in its system, even though it is explicit in its vision, it is not yet incorporated in its activities.

The different responses indicate that the individuals are aware of the concept and show some interest; in general, this author would indicate that Lund University is still on the interest stage of the innovation process. It is important to note that within Lund University there are individuals, centres and departments that can be considered as innovators in SD, this goes in accordance with Rogers (1962) categorisation presented in Figure 5-1.

Another aspect that was indirectly discovered was that, like at Tec, the different individuals are over-loaded with work. This, together with the fact that there is no real program that demands the incorporation of SD in the different faculties and centres leads to a very disorganised approach towards SD. The efforts of some individuals or centres are in accordance with a bottom-up approach, which can be beneficial but requires too much efforts, dedication and time; this can be complemented with a top-down approach in which a SD framework is set up and the SD innovative individuals or centres are rewarded for their efforts. On the same path, these individuals or centres can serve as multiplier educators centres and boost up the incorporation of SD with the other types of innovative categories.

7.3 General findings

This section presents the finding of the two cases shown previously.

It is important to note that both, Lund and Tec, have SD incorporated into their mission (or vision); Tec explicitly and Lund more implicitly. This thesis author believes that it is important that SD is included into the institution's strategy. It is another matter whether the institution goes from the words to practice.

It can be seen from the previously presented information that Tec has started to incorporate SD into the different dimensions (curricula, research, operations, community and assessment/reporting) with the newly created Sustainable Campus program; while Lund University is lacking a program of an integrative nature. It is understandable that Lund still has not created such a program, since SD is currently not a top-priority in the institution, as a whole. It also has to be remarked that while Tec has signed the Talloires declaration and is in close contact with the ULSF, Lund has done neither.

This thesis author does not wish to indicate that Lund University is not a prestigious university; it is just to remark that in matters of SD, the institution is still, on the average, only at the awareness level, while Tec could be put on the evaluation level or even getting closer to the trial level. The comparison between the two universities, in regards to SD, is presented in Table 7-1.

Table 7-1 Comparison of the two presented university cases

Aspect	Lund	Tec
SD in mission/vision	Yes	Yes
Specific integrative program of SD	No	Yes
Signatory of a SD declaration	No	Yes
From the interviews		
SD viewed as:		
Intergenerational	75%	43%
Social aspect	-	28%
Economic aspect	25%	28%
Environmental aspect	50%	71%
Main key actors in SD in the university		
All	63%	100%
Professors	25%	
Students	12%	
Knowledge of the DESD	Low	Low

Source: This author

From both of the universities it can be concluded the role of the three main key actors, according to this thesis author, in the universities:

- **Administrative directors:** Be SD leaders and motivators.
- **Professors:** Introduce and provide SD guidance.
- **Students:** Absorb and live SD in the institution.

It should be remarked that the main change barriers detected in both of the universities were the following:

- Conservationism or unwillingness to change;
- Extra work with the "day-to-day" activities;
- Lack of relevant and complete SD information, and how to incorporate it into the individual activities;

These reasons can be supported by some of the twelve one presented by Spence (1994) in Section 5.2 , for example:

1. To protect an existing way of life;
2. To prevent a reduction of livelihood because the innovation would devalue the knowledge or skill presently required;
3. Because the innovation opposes social customs, fashions and tastes and the habits of everyday life;
4. Because of rigidity inherent in large or bureaucratic organisations;
5. Because of personality, habit, fear, equilibrium between individuals or institutions, status and similar social and psychological considerations.

It is interesting to note that these barriers affect the individual and thus restrain the institutionalisation of SD in the university. This thesis author would like to remark that these aspects are combined with the three levels proposed by Montemayor Saenz (2001), Level 1 (Based on information), Level 2 (Psychological and emotional reaction towards change) and Level 3 (Higher than actual change), and they could be present within any given individual in the university.

This thesis author would like to point out that during the interviews in both of the universities, he detected that SD is still perceived, in a majority of the cases, as a synonym of environmental aspects, which is understandable since the social aspects are more complicated to grasp and measure. Even though, as presented in Section 3.2, SD is the integration of economic, environmental and social aspects with an intergenerational vision.

8. Observations and recommendations

This thesis author believes that a process of incorporation a radical idea, such as SD into universities, should be implemented in small steps. This first part of this process is proposed by this thesis author to have the following steps:

1. Provide the information and skills to all the stakeholders through different media (such as internet, education, etc.), a clear understanding of SD is necessary for the incorporation of the concept;
2. Detect and incorporate the individuals who are already convinced with the idea;
3. Educate and make champions of these individuals;
4. Provide the necessary institutional framework for the SD efforts to have continuity.

These steps can help to introduce the concept of SD into the university; once the innovators have grasped the concept, then the issues proposed by McKeown could be used:

1. Increasing of awareness;
2. Structuring and placing SD in the curricula;
3. Linking to existing issues: educational reform and economic viability;
4. Facing the complexity of SD concept;
5. Developing an ESD program with community participation;
6. Engaging traditional disciplines in a transdisciplinary framework;
7. Sharing the responsibility;
8. Building human capacity;
9. Developing material and financial resources;
10. Developing policy;
11. Developing a creative, innovative and risk-taking climate;
12. Promoting sustainability in popular culture. (McKeown, 2002)

It is interesting to remark that McKeown (2002) does not explicitly incorporate Research, Operation and Assessment and reporting, from the five dimensions stated in Section 4.4.

8.1 Changing university attitudes towards SD

This thesis has shown the importance of SD for this generation and for future generations, it has also demonstrated the important role of universities as social agents in societies. It is clear that higher education institutions do, to a great extent, behave like individuals in the innovation aspect, that according to Rogers (1962) there is the range from Innovators to Laggards; it is expected thus that in the quest of incorporation of SD in higher education institutions there would be the entire range, from very forward institutions that would be the spearhead of the incorporation of SD to the ones that would behave more conservatively (laggards) and be reluctant to incorporate SD up to the last moment.

It is also clear that within the university, whether it is an innovator or a laggard, there would be individual members who comprise the institution; these could be innovators, laggards or any other one. It is then that the three levels of resistance to change proposed by Montemayor Saenz (2001), the conflicts between individuals, and the conflicts between new ideas and the system, could come into place.

This author believes that the incorporation of SD into all facets of higher educational institutions should be a top-priority in the short term. Thus, attitudes within the university

should be changed to facilitate this incorporation, it is important to observe the following points:

- Make SD explicit in the universities' institutional mission and planning;
- Information about SD should be available for everybody and at any time. A good option is to name a SD co-ordinator or committee, who could serve as champion;
- Stakeholders must be included in the process of incorporation and ensuring continuity of the SD program, SD demands stakeholder participation; it is also mandatory or at least preferable that all the disciplines share their knowledge;
- The fear of changing towards SD should be reduced, and if possible eliminated, the previous points can help to achieve this;
- SD must be incorporated into the five dimensions (curricula, research, operations, community outreach, and assessment and reporting);
- The efforts taken by the institution should be visible to everyone within and outside;
- Specific strategies should be developed in order to help overcome the different barriers to change, specifically the levels 2 and 3, since 1 can be overcome with information. One of these strategies can be the normative-educative, where the different individuals are involved in SD projects, thus reducing their resistance to change;
- Multiplying efforts can reduce the time of SD adoption; this can be achieved by utilising some of the individuals involved in small projects. It can also be achieved by educating educators to educate other educators to educate other educators and thus obtain a multiplier effect.
- SD should be incorporated into the everyday life, it should not be seen as an abstract concept that does not relate to the day-to-day work;
- Individual needs must be understood and met, if the individuals do not internalise SD the institution will never be sustainable.

By taking into consideration the points presented it will be easier for a university to incorporate SD into its systems. The points presented are directly related to Spence's (1994) factors presented in Section 5.1. This author would like to remark that some are intermixed with Spence's factors, but they are in accordance with everything presented in Chapter 5.

8.2 Universities in which SD has not yet been incorporated

This thesis author would like to offer some recommendations to all of those universities, including its administrative directors, professors, students, etc., which still have not yet incorporated the concept of SD into their institution.

The first recommendation is to recognise that SD is a must in the current world, that the modern economic tendencies are degrading the resources, both natural and human. SD offers one, of the many probable solutions, to slow down this degradation and hopefully to turn it back. This will set your institution in the level of awareness, you will be aware that SD exists and that, most probably, your university is being run in an unsustainable manner. In this step you should also be aware and try to sign at least one of the SD declarations for universities and contact one of the charters to provide you with guidance.

The second recommendation is to investigate and pinpoint the individuals that could be transformed into SD champions, it is compulsory that they receive the proper education about SD, so that they do not fall into a level 1 change barrier, which can be easily overcome by providing sufficient and clear information.

Third recommendation, you should start to implement SD in your institution's strategy and campus policy. After which you should consider incorporating SD into the five dimensions (curricula, research, operations, community, and assessment/reporting). This thesis author recommends starting with the one that is the easiest to implement and will give the fastest results, operations, by this is to be understood, the analysis of energetic and material use efficiency among some others. Curricula and research should follow operations, this is due not to the facility of incorporation but to the difficulty with the other two aspects, community and assessment/reporting, which require a concrete SD program in order to be shared with the community and assessed/reported. The incorporation in the dimensions should follow a concrete plan, project or program and should be set up in such a manner that it could be easily analysed and measured.

The fourth recommendation is to establish a formal position of SD leader on each campus who is responsible to ensure continuity for SD to reach all of the individuals of the university and to provide the framework to institutionalise SD.

8.3 Universities in which SD has been incorporated, to some extent

For you the road is paved now, but this does not mean that you have finished your journey. SD is to be understood as a path not a destination.

The first recommendation for you as a campus that has already started to work with SD is to verify that you are including SD in the five dimensions (curricula, research, operations, outreach, and assessment/reporting).

Perform thorough and regular assessments on where your institution stands currently within the five dimensions. To do this, it is advisable to detect the different departments, centres and individuals that **a.** have been the most eager to work with SD, and **b.** the most reluctant. This way you will pinpoint the innovators, and the laggards. It is then the time to utilise the innovators as multipliers; and to understand and to overcome the barriers to change.

The next recommendation is to start planning on how to report your achievements, if you have not done it already. Some of the tools for assessment and reporting are presented in Chapter 6. This thesis author recommends you to consider the use of the GRI for universities, and especially his analysis worksheets, presented in Section 8.5, but it is your choice which tools or method suits your institution the best.

As a final recommendation it is essential that you establish a **high level SD** coordinator position who is empowered and funded to ensure continuity of the SD efforts throughout the entire campus community.

8.4 Recommendations for the three main key actors in universities

This thesis author considers three major points of entrance, or actors, of the concept of SD in a Higher Educational institution. The three major actors that this thesis author proposes are:

1. Academic directors;
2. Professors;
3. Students.

These are proposed since, according to this thesis author, they are the most significant agents of change in a university; it is not to say that they are the only ones. This thesis author would like to propose different recommendations to each of these groups.

To the **academic directors**: You are the ones that have led and guided your university, you are the CEOs of your institutions. It is imperative that you, as representatives understand the importance of SD in the modern world. It is then, essential that you take the first steps in introducing SD in your institution. This thesis author recommends you to review the different declarations and charters presented in Chapter 4, and to choose to sign at least one of the declarations. It is, also, of great importance that you introduce SD into your institution's mission, policy and strategic planning. This thesis author recommends that you select a champion from your institution and give her/him the responsibility to co-ordinate and assess the different aspects and dimensions of SD in universities, it is important to remark that a concept such as SD could indeed create some discomfort, so it is advisable to start with small groups and to increase the size and scope of the program, gradually. It is also important that at first, you help to develop multidisciplinary courses, and later to transform them into transdisciplinary.

To the **professors**: You are the ones who are in contact with the students, you are the ones who have a "*hands on*" approach, you are the ones that transfer the knowledge and motivate the future decision-makers and entrepreneurs. For you the task is not easy, but not impossible, there is common knowledge of your excess workload but you are essential for ensuring the incorporation of SD into your university. This thesis author recommends you to make a strong effort to incorporate the concept of SD into your courses and curricula; SD is not an esoteric task, SD relates to most of the disciplines currently taught in universities. It is important that you work with your colleagues from others departments, even if you believe they are not related to your discipline, you will find out that everything in this world is related and interlinked. Your participation is necessary to improve this world.

To fellow **students**: You are the future decision-makers and entrepreneurs, you know, you are the ones who will rule the world in the next generations. You have the energy and time to spare. It is thus essential for you to undertake the task of implementing SD within your university and most importantly within your life and in your professional work after you complete your formal education. If your university is not currently involved in a SD program, get involved in a student organisation or create one to promote SD. This will give you the advantage of not being a lonely voice, like this you will be able to push the upper-levels of the university to start making changing and introducing SD. It is important that you learn SD in your university, and not only from your courses but from the interaction with your fellow students, professors and academic directors. It is mandatory that you take your learning of SD and spread it in your community. It is up to you to become the future protectors of your economy, your nature and your society.

8.5 Assessment and reporting

This thesis author recommends the use of radar graphs for the evaluation and indication of the SD in higher education. An example of these graphs is presented by Kuhndt, Schäfer and Liedtke (2002) for sustainability in the aluminium industry. The author would like to point out that the use of this type of graphs offers a clear and understandable graphical representation of each category of the GRI guidelines. In his paper (R. Lozano, 2003) the author, did an analysis of six companies comparing their sustainability reports and presented the results with the help of radar graphs, with excellent benchmarking results.

This thesis author has developed a work sheet in which the user has the opportunity to fill in the different indicators of the GRI Guidelines, this is the university version proposed by the ULSF and Lozano (2003). The work sheet generates 9 charts: one general (which presents the performance of economic, environmental, social and educational dimensions) one for the economic dimension, one for the environment, five for the social (one overall, one for the labour practices and decent work, one for human rights, one for society, and one for product responsibility) and one for the educational dimension. It is important to underline that the product responsibility is not considered to be of great importance for universities.

The work sheet is designed so that the user can either choose or write a number from five different choices, 0 to 4, where:

0. There is a total lack of information for the indicator, it is non-existent. This is the minimum grade that can be assigned.
1. The information presented is of poor performance, this is an equivalent of around 25% of the required full information
2. The information presented is of regular performance, an equivalent of around 50% of the full information required by the indicator.
3. The information presented is considered to be of good performance, an equivalent of around 75%.
4. The information has an excellent performance; this grade fulfils totally what the indicator asks for. This is the maximum grade that could be given.

The work sheet has three modalities for the aspects; an example of an aspect is in the direct economic impacts the customers, which has two indicators: net sales, and geographic breakdown of markets.

The **first** modality is when the aspect has only core indicators, for this modality the core indicators has a weight of 100%, this means that for example if the aspect has two indicators, one with a grade of 3 and the other with 4, they are added together, which gives a 7 and then they are divided by 8 to give the percentage of the total of the aspect, 88%. The formula for this are:

$$At = \sum_{1}^{n} C \qquad\qquad Ar = \frac{At}{Max(grade) \times n} \times 100$$

Equation 2 Aspect total (1ˢᵗ mode)   *Equation 3 Aspect relative (1ˢᵗ mode)*

Where: **At**= Aspect total, total sum of the core indicators
C=Grades of the different core indicators
n=Number of core indicators in the aspect
Ar= Aspect relative, the percentage of what the sum of the indicators is in respect to the maximum grade achievable
Max(grade)= The maximum grade achievable, in this case 4

The **second** modality is when the aspect has both core indicators and additional indicators, in this case the core indicators have a weight of 75% and the additional indicators have 25%, for example, the aspect of Employment under Labour practices and decent work, has two core indicators and one additional indicator, for this the calculation would be (2+3)*0.75 + (4) +0.25 to give the Aspect total of 4.75 and the Aspect relative of 68%. The formulas for this are:

$$At = \left(\sum_{1}^{n} C \right) + \left(\sum_{1}^{m} A \right)$$

Equation 4 Aspect total (2nd mode)

$$Ar = \frac{At}{\left(Max(grade) \times 0.75 \times n \right) + \left(Max(grade) \times 0.25 \times m \right)} \times 100$$

Equation 5 Aspect relative (2nd mode)

Where: **At**, **C**, **n**, **At**, **Max(grade)** are presented above, and:
A=Grades of the different additional indicators
m=Number of additional indicators in the specific aspect

The **third** modality is similar to the first, with the only difference that there are only additional indicators, and these account for 100% of the aspect. The formulas for this are:

$$At = \sum_{1}^{m} A$$

Equation 6 Aspect total (3rd mode)

$$Ar = \frac{At}{Max(grade) \times m} \times 100$$

Equation 7 Aspect relative (3rd mode)

These three modalities give the total and relative results of the aspects. The totals of the aspects are then added and divided by the maximum grade achievable of each dimension (economic, environmental, social and educational).

One should remember that this does not measure the performance of the organisation but the performance of the report, which if the university does good reporting, then their performance would be the same as their reporting performance.

The work sheet automatically generates, as mentioned, 9 charts, or radar graphs. An example of these charts is presented in Figure 8-1, while the other 8 are presented in Appendix 13. These charts are generated with hypothetical numbers to demonstrate the practicality of their use. It can be seen from the Figure 8-1 that the hypothetical university has an excellent performance in Suppliers, and an average in Products and Services, and Emissions, effluents, and waste, but should improve the other indicators. The data for the creation of the charts are presented in Appendix 13. Two categories should be further explained, Suppliers, and Products and Services, they relate to the suppliers of the different products and services used in the university, such as office furniture, which could be bought in an environmental friendly way, and products such as paper, which could be purchased through environmentally friendly procurement.
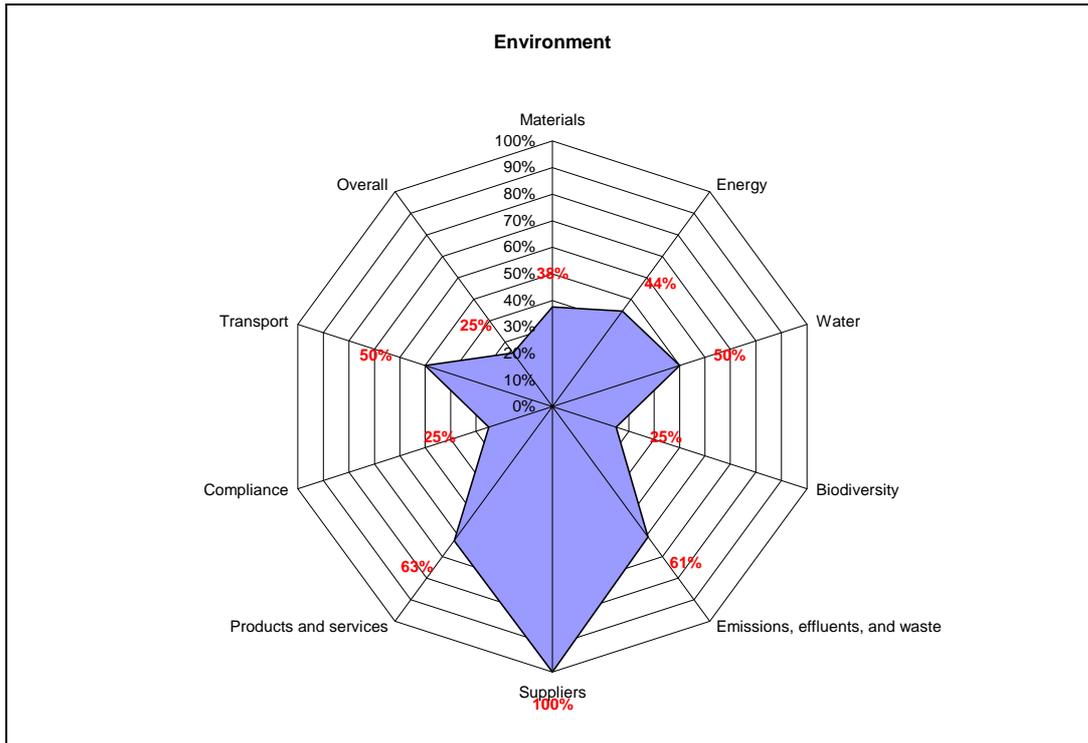
Figure 8-1 Graphical representation of the Environmental aspect of the GRI for universities
Source: This author

8.6 Further research

This section presents the aspects and disciplines that this thesis author would like to explore as future research to give this thesis continuity.

The questionnaires used for this thesis were designed to gain insights into the stage of incorporation of the SD concept into the two universities of the case studies. This author proposes for further research the creation of one or a series of questionnaires in order to have both better qualitative and quantitative information on the stage of the incorporation of SD in the university and the detection of the barriers of change that are presented.

This thesis author would like to propose the use of organisational learning, organisational psychology and behavioural change in order to get a better understanding of the human processes that restrain the change process and which help to delay the incorporation of SD into higher education institutions.

Also, it could be useful to compare more universities, both the innovative ones and the laggard ones, and to utilise the previously proposed questionnaires to develop better guidelines for the incorporation of SD in higher education.

This author would like to suggest the assessment/reporting of the two cases with his proposed work-sheet to find out how the two universities could be graded.

Another aspect that this thesis author would like to investigate is the relevance (or irrelevance) of Information and Communication Technologies (ICTs) in the diffusion and adoption of SD in the entire educational system.

9. Conclusions

This thesis presents some of the many setbacks of what has become to be known as development; these setbacks can be put into four different aspects, economic, environmental, social and intergenerational. The setbacks are not exclusive of modern times; during the history of human kind many species have become extinct due to anthropogenic activities and social inequities have always been present, but the rate of species disappearance and the increase of the social inequity ratios have increased rapidly within the last decade.

SD has, since the publication of the Brundtland Report, become a need for modern societies in order to reverse these setbacks and to start integrating the four aspects (economic, environmental, social and intergenerationality) into their national SD programs. As the previous sentence indicates SD is, in short, the integration of economic, environmental and social aspects with a vision of safeguarding the resources (natural and human), while having sound economic development, for the future generations.

This thesis has indicated that one of the many efforts that can help the adoption of SD in current societies is through education. Higher educational institutions, universities and colleges, are the educators of the majority of the world's decisions-makers and entrepreneurs. It is thus important that the concept of SD is included into higher education; many institutions around the world have shown interest, this is indicated by the number of declarations signed by universities and colleges directly related to SD, and the SD charters that have been created. One of the most recent and important efforts has been the creation Decade of Education for Sustainable Development (DESD) by UNESCO, recently ratified (April 2003). This thesis also presents the five different dimensions into which SD should be incorporated, curricula, research, operations, community outreach, and assessment and reporting.

The process of adoption of an innovation is usually divided into five categories, 1. Awareness, 2. Interest, 3. Evaluation, 4. Trial, and 5. Adoption. As with the introduction of any new idea into an organisation, the introduction of SD into higher education institution is bound to face different levels of resistance, these levels range from the simple (level 1) lack of information to the more difficult to overcome (level 3), such as cultural, race or ethic differences. This thesis presents these levels and some of the alternatives to overcome them, such as empirical-rational, power-coercive and normative-reeducative strategies. It is important to understand the role of opinion leaders in the process of application of these strategies. The strategies, as it should be obvious, are directed to the individual, but an idea such as SD should not be kept only in the individual level; it should be made part of the organisation's culture, thus, first it is important to understand the needs of the individual (as Maslow remarks) and then understand how to institutionalise SD throughout the entire organisation.

There are many authors who have researched on the curricula, research and operations dimensions. This thesis author proposes the use of the GRI sustainability guidelines as a framework for preparing their evaluative reports. However it is essential that the GRI be modified so it is more directly useful for universities. That is being done the modified GRI will be available in the last part of 2003. This thesis presents the analysis of two different universities, Tec and Lund University, in respect to SD. Part of the analysis was the application of face-to-face interviews; the purposes of these interviews were **a.** to have a understanding of what SD means to different individuals in the universities, **b.** the efforts that the university has taken/is taking toward the incorporation of SD into their five dimensions, **c.** identify whether the university measures its SD performance, **d.** detect the different barriers

of change in the incorporation of SD, and **e.** who are, or should be, the main key actors within this incorporation.

The interviews in both universities showed that SD is, of course, of great importance and that it must be included in the five dimensions; that everybody should be involved in the process of SD incorporation. The results also indicated that Lund University currently is between the levels of awareness and interest and Tec between interest and evaluation. While the barriers of change that affect the incorporation of SD are: **a.** Conservationism or unwillingness to change, **b.** Extra work with the "day-to-day" activities, **c.** Lack of relevant and complete SD information, and how to incorporate it into the individual activities.

This thesis author proposes recommendations for **a.** Universities that have not yet made efforts to incorporate SD, **b.** Universities that have incorporated SD, and **c.** The three main key actors in universities (administrative directors, professors and students).

This thesis presents the results of a worksheet prepared by the author, in which all of the indicators of the proposed GRI for universities are graded between 0-4 and then used to generate nine different charts (radar charts) that can be used to analyse the current situation of the university and pinpoint the categories where the university has a good performance and those that need to be addressed. The charts are standard and can be used to compare the university from year to year or to benchmark it against other institutions.

Thus, this thesis presents an analysis on how to incorporate SD into the five dimensions of a higher education institution; the different problems and challenges that might arise from this incorporation and how to overcome them; a proposed tool to analyse and report the SD performance; two university case studies and how they see and act towards SD.

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Abbreviations

AIESEC   Association Internationale des Etudiants en Sciences Economiques et Commerciales

AISHE   Auditing Instrument for Sustainable Higher Education

COPERNICUS   Co-operation Programme in Europe for Research on Nature and Industry through Co-ordinated University Studies

DESD   Decade of Education for Sustainable Development

DUT   Delft University of Technology

GDP   Gross Domestic Product

GHESP   Global Higher Education for Sustainability Partnership

GNP   Gross National Product

GRI   Global Reporting Initiative

HDI   Human Development Index

HEPS   Higher Education Partnership for Sustainability

HESD   Higher Education for Sustainable Development

HIV-AIDS   Human Immunodeficiency Virus. Acquired Immune Deficiency Syndrome

IAU   International Association of Universities

ICTs   Information and Communication Technologies

IIIEE   International Institute for Industrial Environmental Economics

ISO   International Standard Organisation

ITESM   Instituto Tecnológico y de Estudios Superiores de Monterrey (Monterrey Institute Of Technology University System)

NGO   Non-governmental organisation

OECD   Organisation for Economic Co-operation and Development

PATLEPAM   Philippine Association of Tertiary Level Education Institutions in Environmental Protection and Management

PRINSOPAS   Program of Sustainability and Peace (from the University of Costa Rica)

PSSD   Philippine Strategy for Sustainable Development

SD   Sustainable Development

SME   Small and Medium Enterprise

SUA   Sokoine University of Agriculture

ULSF   Association of University Leaders for a Sustainable Future

USA   United States of America

UN   United Nations Organisation

UNCED   United Nations Conference on Environment and Development

UNDP   United Nations Development Program

UNESCO   United Nations Educational, Scientific and Cultural Organisation

UNU   United Nations University

WCED   World Commission on Environment and Development

WSSD   World Summit on Sustainable Development

Appendix 1.   Development setbacks

On the world development Michael Carley reported that over the past 30 years has had an "*unprecedented progress …Life expectancies in developing countries has [sic] risen by more rising more than 20 years, infant mortality rates have been halved and primary school enrolment rates [have] doubled. Food production and consumption have increased around 20 per cent faster than population growth. Improvements in income levels, health and educational attainment have sometimes closed the gap with industrialized countries. Advances have been made in the spread of democratic, participatory governance, and there have been forward leaps in technology and communications.*" But this progress has a negative side, such as "*…economic disparity and poverty; the impact of diseases such as HIV-AIDS and malaria; over-consumption of resources in the industrialized countries, contributing to climate change; and environmental deterioration and pollution of many kinds, including the impacts of intensive farming, depletion of natural resources and loss of forests, other habitats and biodiversity.*" (Dalal-Clayton & Bass, 2002) These are just some of the burdens that nature and humanity have had to withstand with the uncontrolled economic growth that is the cornerstone of capitalism.

On the drawbacks of GNP, Paschke wrote that GNP "*…does not include housework, neighbourhood help, leisure time, natural resource degradation, natural sink capacity depletion or income distribution*". Furthermore to calculate GNP some strange references are taken, for example "*If there are more and more people with health problems because of pollution they will more and more consult doctors which increases the GNP. Pharmaceutical sales will increase so will GNP. If there are more and more crimes in the society, and the number of police officers increase, the number of prisons will increase, and the revenues of private security companies will rise, so will GNP. If a timber company cuts down more and more forests the GNP will increase. If a man or a woman marries his maid-servant or her butler the GNP will normally decline because the former wage wouldn't be paid any longer, even if the servant or the butler does the same job as before. If someone decides to care for his or her parents in the last years of life, and quit his or her job therefore, GNP would decline.*" (Paschke, 2001)

Bhaskar and Glyn (1995) present also a table (Table 1-1) with, mainly, symptoms of environmental unsustainability.

Table 1-1 Symptoms of environmental unsustainability

Problem	Principal agents
Pollution	
Greenhouse effect/climate change (global)	Emissions of CO_2, N_2O, CH_4 CFCs (and HFCs) O_3 (low level)
Ozone depletion (global)	Emissions of CFCs
Acidification (continental)	Emissions of SO_2, NO_x, NH_3 O_3 (low level)
Toxic pollution (continental)	SO_2, NO_x, O_3, particulates Heavy metals Hydrocarbons, carbon monoxide Agrochemicals, organochlorides Eutrophiers Radiation Noise
Renewable Resource Depletion	
Species extinction (global)	Land-use changes (eg development, deforestation) Population pressure Unsustainable harvest (eg over-grazing, poaching) Climate change (possible ozone depletion in future)
Deforestation (global, regional)	Land use changes Population pressure Unsustainable harvest (eg hardwoods) Climate change (possible in future)
Land degradation/loss of soil fertility ((bio)regional, national)	Population pressure Deforestation, overgrazing Unsustainable agriculture Urbanization, 'development' Climate change (possible in future)
Water depletion ((bio)regional, national)	Unsustainable use Climate change (possible in future)
Fisheries depletion (national, local)	Over-fishing, pollution Habitat destruction
Non-renewable resource depletion	
Depletion of various resources, eg fossil fuels, mineral (global, national)	High levels of consumption
Other environmental problems	
Congestion (national)	Waste disposal Traffic

Source: Bhaskar & Glyn (1995)

It can be seen on the Table 1-2 that the population of the world increase 1.7% in five years. The table also shows that the majority of the people live on the 'South' and it is there where the biggest increase took place. It should be noted that the majority of the people live in Asia, which has a high average rate growth, compared to the others, even with the Chinese policy of one child. The fastest growth was on Africa and Latin America, but in absolute terms they do not compare with Asia. The table also shows the urban growth, of which the highest were Africa, Asia and Latin America. This point is supported by Girardet who wrote that *"…in 1800 in the UK there was only one city with a million people – London. At that time the largest*

100 cities in the world had 20 million inhabitants, with each city usually extending to just a few thousand hectares. In 1990 the world's 100 largest cities in the accommodated 540 million people and 220 million people lived in the 20 largest cities – mega-cities of over 10 million people… In addition, there were 35 cities of over 5 million and hundreds of over 1 million people". (Girardet, 2002)

Table 1-2 Population indicators for major world regions

Region	Population million 1990	Average rate growth (%) 1990-1995	IMR per 1000 1990	Percentage urban 1990	Urban growth (%) 1990-1995
World	5,292.2	1.7	63	45	3.0
'North'	1,206.6	0.5	12	73	0.8
'South'	4,084.6	2.1	70	37	4.2
Africa	642.1	3.0	94	34	4.9
N. America	275.9	0.7	8	75	1.0
L. America	448.1	1.9	48	72	2.6
Asia	3,112.7	1.8	64	34	4.2
Europe	498.4	0.2	11	73	0.7
Oceania	26.5	1.4	23	71	1.4
USSR	288.6	0.7	20	66	0.9

Source: Redclift & Sage (1994)

Dalal-Clayton and Bass list:

1. **Economic disparity and political instability**: *"The economic fortunes of most nations have risen steadily in the past 20 years, but still too many nations have experienced economic decline and falling per capita incomes… Disparity in incomes between the rich and poor within nations, between wealthy and poorer nations, and between many multinational companies and the countries in which they operate (or avoid), continues to widen… a relatively small percentage of the world's people, nations and corporations control much of the world's economic and natural resources."*

2. **Extreme poverty**: *"…extreme poverty still ravages the lives of one out of every five persons in the developing world. In 1993, more than 1.3 billion people were living on less than US$1 per day – nearly 1 billion of these in the Asia and Pacific region. The highest proportion of the poor and the fastest growth in poverty are both in sub-Saharan Africa where half the population was poor in 2000…"*

3. **Under-nourishment**: *"Currently, global food production is adequate to meet overall human nutritional needs, but problems with the distribution of economic resources and foodstuffs mean that some 800 million people remain undernourished…"*

4. **Disease**: *"HIV-AIDS and malaria are serious diseases that erode both the productive capacity and the social fabric of hard-hit nations… nearly 500 million people suffer from acute malaria every year, of which 1 million die."*

5. **Marginalization**: *"Many countries are struggling under the combined pressures of slow economic growth, a heavy external debt burden, corruption, violent conflict and food insecurity…"*

6. **Population growth**: *"… World population now stands at nearly 6 billion and, while it is growing more slowly than predicted a few years ago, it is still expected to increase substantially before stabilizing…"*

7. **Consumption**: *"The demands of people in high-consumption, developed economies can have a more dramatic environmental impact than in countries with low levels of per capita resource consumption. Consumption of natural resources by modern industrial economies remains very high – in the range of 45-85 metric tons per person annually when all materials … are counted…"*

8. **Global energy use**: *"Since 1971, global energy use has increased by nearly 70 per cent and is projected to continue to increase by over two per cent per year over the next 15 years – despite the fact that two billion people are still largely unconnected to the fossil fuel-based economy…"*

9. **Climate change**: *"In the late 1990s, annual emissions of CO_2 were almost four times the 1950 level with atmospheric concentrations of CO_2 reaching their highest level in 160,000 years…"*

10. **Nitrogen loading**: *"Intensive agriculture, dependent on high levels of fossil fuel combustion and the widespread cultivation of leguminous crops, is releasing huge quantities of nitrogen to the environment, exacerbating acidification, causing changes in the species composition of ecosystems, raising nitrate levels in freshwater supplies above acceptable limits for human consumption, and causing eutrophication in freshwater and marine habitats..."*

11. **Natural resource deterioration**: *"Environmental deterioration continues to increase with serious depletion of natural resources, including soil erosion, and loss of forests and fish stocks. Deforestation (most often due to conversion to farms, pastures, human settlements or for logging) continues to reduce the extent and condition of world's forests. Some 65 million hectares of forest were lost between 1990 and 1995…"*

12. **Loss of biodiversity**: *"Biologically derived products and processes account for an estimated 40 per cent of the global economy. Much of this production is based on the cultivation of an increasingly narrow range of species and genes, with many large-scale production processes in agriculture and forestry dependent on eradicating local biodiversity and replacing it with mono-cultural production. However, there is also growing realization of the value of biodiversity, both for providing insurance in case of failure of given species and genes (due to disease, climate or economic change), and for providing 'intellectual property' to develop new uses…"*

13. **Pollution**: *"Most countries now experience anything from moderate to severe levels of pollution, which places a growing strain on the quality of water, soil and air. Despite clean-ups in some countries and sectors, a massive expansion in the availability and use of chemicals throughout the world, exposure to pesticides, heavy metals, small particulates and other substances all pose an increasing threat to human health ant the environment."*

14. **Growing water scarcity**: *"Global water consumption is rising rapidly… One third of the world's population lives in countries already experiencing moderate to high levels of water shortage. That number could rise to two-thirds in the next 30 years… Some 30-60 per cent of the urban population in low-income countries still lacks adequate housing with sanitary facilities, drainage systems and piping for clean water."*

15. **Other urban problems**: *"Continuing urbanization and industrialisation, combined with a lack of resources and expertise, and weak governance, are increasing the severity of environmental and social problems, which reinforce one another in densely populated areas…"*

16. **Interactions between social, economic and environmental problems**: *"There are extensive interactions between many of the challenges described above…"*(Dalal-Clayton & Bass, 2002)

This author complements to Dalal-Clayton and Bass list

17. **Aging population:** Kinsella and Velkoff wrote that between 1999 and 2000 the world's elderly population grew by 9.5 million people, by elderly is to be understood the group over 65 years old(Kinsella & Velkoff, 2001).

18. **Gender differences:** Joshi emphasises that *"Virtually all human societies display a gender division of labour, both between and within the spheres of paid work and unpaid activities. Very broadly, men's activities are primarily productive, and women's (traditionally) have been more concerned with reproduction and nurturing within the family… An extreme example of the oppression of women comes from the Muslim-fundamentalist Afghanistan, where strict seclusion of women is brutally enforced, reportedly on pain of death."* (Joshi, 1999)

19. **Desertification:** The UN signed in 1994 a convention to combat desertification which is defined in the convention as: *"… land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities"* (UN, 1994)

20. **Deforestation:** According to FAO *"The latest global figures on forest cover indicate that in 1995 there were 3 454 million hectares of forest (including natural forests and forest plantations) world-wide. Between 1990 and 1995, the total area of forests decreased by 56.3 million hectares - the result of a loss of 65.1 million hectares in developing countries and an increase of 8.8 million hectares in developed countries. Major causes of forest cover change include conversion of forests to agricultural land and large infrastructural development in developing countries, and forest growth on abandoned agricultural land in developed countries. The many causes of forest degradation include overharvesting [sic] of industrial wood and fuelwood [sic], overgrazing, fire, insect pests and diseases, storms and air pollution; of these, forest fires were the most visible in 1997-1998."* (FAO, 1999)

21. **Illiteracy:** Raskin wrote that in Africa the illiteracy percent was 45, in China 18%, in Latin America 14%, in the Middle East 38%, in South and South East Asia 40%, in Eastern Europe, the Former Soviet Union, North America and the Pacific OECD 0%, and in

Western Europe 4%. Making an average of 2% in OECD countries, while on the rest it was 29%. This is one of the most alarming problems since this stops the path for development and constrains the increment on quality of life. (Raskin, Gallopin, Gutman, Hammond, & Swart, 1998)

22. **Hunger:** Raskin wrote also that the percentage of hunger in Africa 34%, in China 16%, in Latin America 14%, in the Middle East 16%, in South and South East Asia 19%, in Eastern Europe 1%, in the Former Soviet Union 4%, in North America 2%, in the Pacific OECD 1%, and in Western Europe 1%.(Raskin et al., 1998)

23. **Unsafe ground-water:** According to Sampat *"…some 97 percent of the planet's liquid fresh water is stored in aquifers"* (Sampat, 2001) These aquifers serve around 1.5 to 2 billion people in the world. Sampat wrote that some of the contaminants of these aquifers are nitrates, from fertilisers runoff and septic systems; pesticides, from farms runoffs; petrochemicals, from underground storage tanks; chlorinated solvents, from diverse sources; arsenic, that occurs naturally; other heavy metals; radioactive materials; fluoride; and salts, from seawater intrusion. (Sampat, 2001)

24. **Corruption:** According to the World Bank *"Corruption deters investment and hinders growth. It spurs inequality and erodes macroeconomic and fiscal stability. It reduces the impact of development assistance and provides an incentive to exploit natural resources, further depleting our environmental assets… In short, it increases wealth for the few at the expense of society as a whole, leaving the poor suffering the harshest consequences."* (Worldbank, 2001)

25. **Chemicals:** Miller wrote that each year 1,000 new synthetic chemicals are introduced into the market, and of the 75,000 current commercially available chemicals only 10% have been thoroughly tested for toxicity and 2% to determine if they are carcinogenic, teratogenic or mutagenic. (Miller, 2002)

26. **Developed and developing countries difference (rich/poor ratio):** Reid wrote that in 1991 the ratio between the 20 most developed countries and the 20 least developed was 61:1. This topic will be developed further in Section 3.1. (Reid, 1995)

Appendix 2. The Brundtland report

1. **"Fundamental human right**: *All human being have the fundamental right to an environment adequate for their health and well being.*
2. **Inter-generational equity:** *States shall conserve and use the environment and natural resources for the benefit of present and future generations.*
3. **Conservation and sustainable use:** *States shall maintain ecosystems and ecological processes essential for the functioning of the biosphere, shall preserve biological diversity, and shall observe the principle of optimum sustainable yield in the use of living natural resources and ecosystems.*
4. **Environmental standards and monitoring:** *States shall establish adequate environmental protection standards and monitor changes in and publish relevant data on environmental quality and resource use.*
5. **Prior environmental assessments:** *States shall make or require prior environmental assessments of proposed activities which may significantly affect the environment or use of natural resource.*
6. **Prior notification, access, and due process:** *States shall inform in a timely manner all persons likely to be significantly affected by a planned activity and to grant them equal access and due process in administrative and judicial proceedings.*
7. **Sustainable development and assistance:** *States shall ensure that conservation is treated as an integral part of the planning and implementation of development activities and provide assistance to other States, especially to developing countries, in support of environmental protection and sustainable development.*
8. **General obligation to co-operate:** *States shall co-operate in good faith with other States in implementing the preceding rights and obligation."* (WCED, 1987)

"*The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.*

Meeting essential needs requires not only a new era of economic growth for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth. Such equity would be aided by political systems that secure effective citizen participation in decision making and by greater democracy in international decision making.

Sustainable global development requires that those who are more affluent adopt life-styles within the planet's ecological means – in their use of energy, for example. Further, rapidly *growing populations can increase the pressure on resources and slow any rise in living standards; thus sustainable development can only be pursued if population size and growth are in harmony with the changing productive potential of the ecosystem.*

Yet in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. We do not pretend that the process is easy or straightforward. Painful choices have to be made. Thus, in the final analysis, sustainable development must rest on political will. ." (WCED, 1987)

Appendix 3.   More SD definitions

- *"Prime Minister H. Gro [sic] Brundtland. At the "Sir Peter Scott Lecture," in Bristol, 8 October, 1986: The World Commission does not believe that a dismal scenario of mounting destruction of national global potential for development - indeed, of earth's capacity to support life -- is an inescapable destiny. The problems are planetary - but they are not insoluble. I believe that history will record that in this crisis the two greatest resources, land and people, will redeem the promise of development. If we take care of nature, nature will take care of us. Conservation has truly [come] of age when it acknowledges that if we want to save part of the system, we have to save the system itself. This is the essence of what we call sustainable development. There are many dimensions to sustainability. First it requires the elimination of poverty and deprivation. Second, it requires the conservation and enhancement of the resources base which alone can ensure that the elimination of poverty is permanent. Third, it requires a broadening of the concept of development so that it covers not only economic growth, but also social and cultural development. Fourth, and most important, it requires unification of economics and ecology in decision-making at all levels."*

- *R. Goodland and G. Ledoc. Neoclassical Economics and Principles of Sustainable Development" Ecological Modelling. Vol 38, 1987: Sustainable development is defined "as a pattern of social and structured economic transformations (i.e. development) which optimizes the economic and societal benefits available in the present, without jeopardizing the likely potential for similar benefits in the future. A primary goal of sustainable development is to achieve a reasonable (however defined) and equitably distributed level of economic well-being that can be perpetuated continually for many human generations.*

  Sustainable development implies using renewable natural resources in a manner which does not eliminate or degrade them, or otherwise diminish their usefulness for future generations... Sustainable development further implies using non-renewable (exhaustible) mineral resources in a manner which does not unnecessarily preclude easy access to them by future generations... Sustainable development also implies depleting non-renewable energy resources at a slow enough rate so as to ensure the high probability of an orderly society transition to renewable energy sources

- *John Pezzey. "Economic Analysis of Sustainable Growth and Sustainable Development." World Bank Environment Department, Working Paper No. 15. Washington D.C. May, 1989: Our standard definition of sustainable development will be non-declining per capita utility - because of its self-evident appeal as a criterion for inter-generational equity.*

- *Mustafa Tolba. Sustainable Development - Constraints and Opportunities. London: Butterworth. 1987: Sustainable development has become an article of faith, a shibboleth: often used but little explained. Does it amount to a strategy? Does it apply only to renewable resources? What does the term actually mean? In broad terms the concept of sustainable development encompasses:*

  1. Help for the very poor because they are left with no option other than to destroy their environment;

  2. The idea of self-reliant development, within natural resource constraints;

  3. The idea of cost-effective development using differing economic criteria to the traditional approach; that is to say development should not degrade environmental quality, nor should it reduce productivity in the long run;

  4. The great issues of health control, appropriate technologies, food self-reliance, clean water and shelter for all;

  5. The notion that people-centered initiatives are needed; human beings, in other words, are the resources in the concept."(Murcott, 1997)

Appendix 4.   Links to the efforts taken in Higher Education to foster SD

- Stockholm Declaration on the Human Environment, United Nations Conference on the Human Environment, Sweden. (www.unep.org/Documents/Default.asp?documentID=97)
- The Belgrade Charter, Belgrade Conference on Environmental Education, Yugoslavia. (eelink.net/FCCSET/EndNotes.html)
- Tbilisi Declaration, Intergovernmental Conference on Environmental Education, Georgia. (www.gdrc.org/uem/ee/tbilisi.html)
- National Wildlife Federation's Campus Ecology program (formerly known as Cool It) was founded. (www.nwf.org/campusecology.index.cfm)
- Talloires Declaration, Presidents Conference, France. (www.ulsf.org/programs_talloires.html)
- National Council for Science and the Environment (originally the Committee for the National Institute for the Environment) was founded. (www.ncseonline.org)
- Halifax Declaration, Conference on University Action for Sustainable Development, Canada. (Iisd.ca/educate/declarat/halifax.htm)
- World Resources Institute's Sustainable Enterprise Program (formerly the Management Institute for the Environment and Business) was founded. (www.wri.org/wri/meb)
- Report of the United Nations Conference on Environment and Development; Chapter 36: Promoting Education, Public Awareness and Training. (www.un.or/esa/sustdev/agenda21chapter36.htm)
- Association of University Leaders for a Sustainable Future founded. (www.ulsf.org)
- Kyoto Declaration, International Association of Universities Ninth Round Table, Japan. (iisd1.iisd.ca/educate/declarat/kyoto.htm)
- Swansea Declaration, Association of Commonwealth Universities' Fifteenth Quinquennial Conference, Wales. (iisd1.iisd.ca/educate/declarat/swansea.htm)
- Copernicus University Charter, Conference of European Rectors (CRE). (www.copernicus-campus.org)
- Second Nature founded. (www.secondnature.org)
- Blueprint for a Green Campus, Yale University Campus Earth Summit. (www.princeton.edu/~rcurtis/earthsum.html)
- Workshop on Implementing Sustainable Development at the University Level in Bradford, United Kingdom. (www.fns.uniba.sk/zp/greenway/26/3.htm)
- Essex Report: Workshop on the Principles of Sustainability in Higher Education in Essex, Massachusetts. (www.secondnature.org/history/writings/articles/essex_report.html)
- The International Work Programme on Education, Public Awareness and Training for Sustainability adopted by the U.N. Commission on Sustainable Development. (www.un.org/esa/sustdev/edu.htm)
- Ball State University Greening of the Campus conference was held. Since then conferences were held in 1997, 1999, and 2001. (www.bsu.edu/provost/ceres/greening)
- Thessaloniki Declaration, International Conference on Environment and Society: Education and Public Awareness for Sustainability, Greece. (www.mio-ecsde.org/Thess/TOCThess.htm)
- World Conference on Higher Education, Paris, France. (www.unesco.org/educaiton/educprog/wche/eng.htm)
- World Conference on Science, Budapest, Hungary. (www.unesco.org/science/wcs)
- World Education Forum (Education for All), Dakar, Senegal.
- (www2.unesco.org/wef/en-conf/index.shtm)
- Lüneburg Declaration on Higher Education for Sustainable Development, Germany. (www.lueneburg-declaration.de/downloads/declaration.htm)
- World Summit on Sustainable Development in Johannesburg, South Africa (Type 1 outcome: DESD; Civil Society outcome: the Ubuntu Declaration) (www.johannesburgsummit.org/)

Source: Adapted Calder & Clugston (2003)

Appendix 5.   The Talloires Declaration

"We, the presidents, rectors, and vice chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources.

Local, regional, and global air and water pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilisation of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature.

Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible. Thus, university leaders must initiate and support mobilization of internal and external resources so that their institutions respond to this urgent challenge.

We, therefore, agree to take the following actions:

1. *Increase Awareness of Environmentally Sustainable Development: Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.*
2. *Create an Institutional Culture of Sustainability: Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.*
3. *Educate for Environmentally Responsible Citizenship: Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.*
4. *Foster Environmental Literacy For All: Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional students.*
5. *Practice Institutional Ecology: Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.*
6. *Involve All Stakeholders: Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with community and nongovernmental organizations to assist in finding solutions to environmental problems.*
7. *Collaborate for Interdisciplinary Approaches: Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.*
8. *Enhance Capacity of Primary and Secondary Schools: Establish partnerships with primary and secondary schools to help develop the capacity for interdisciplinary teaching about population, environment, and sustainable development.*
9. *Broaden Service and Outreach Nationally and Internationally: Work with national and international organizations to promote a world-wide university effort toward a sustainable future.*
10. *Maintain the Movement: Establish a Secretariat and a steering committee to continue this momentum, and to inform and support each other's efforts in carrying out this declaration."* (ULSF, 1990)

Appendix 6.   The Halifax Declaration

"Human demands upon the planet are now of a volume and kind that, unless changed substantially, threatens the future well-being of all living species. Universities are entrusted with a major responsibility to help societies shape their present and future development policies and actions into the sustainable and equitable forms necessary for an environmentally secure and civilized world.

As the international community marshals its endeavours for a sustainable future, focused upon the United Nations Conference on Environment and Development in Brazil in 1992, universities in all countries are increasingly examining their own roles and responsibilities. At Talloires, France in October, 1990, a conference of university presidents from every continent, held under the auspices of Tufts University of the United States, issued a declaration of environmental commitment that has attracted the support of more than 100 universities from dozens of countries. At Halifax, Canada, in December l991, the specific challenge of environmentally sustainable development was addressed by the presidents of universities from Brazil, Canada, Indonesia, Zimbabwe and elsewhere, as well as by the senior representatives of the International Association of Universities, the United Nations University and the Association of Universities and Colleges of Canada.

The Halifax meeting added its voice to those many others world-wide that are deeply concerned about the continuing widespread degradation of the Earth's environment, about the pervasive influence of poverty on the process, and about the unsustainable environmental practices now so widespread. The meeting expressed the belief that solutions to these problems can only be effective to the extent that the mutual vulnerability of all societies, in the South and in the North, is recognized, and the energies and skills of people everywhere be employed in a positive, co-operative fashion. Because the educational, research and public service roles of universities enable them to be competent, effective contributors to the major attitudinal and policy changes necessary for a sustainable future, the Halifax meeting invited the dedication of all universities to the following actions:

1. *To ensure that the voice of the university be clear and uncompromising in its ongoing commitment to the principle and practice of sustainable development within the university, and at the local, national and global levels.*
2. *To utilise the intellectual resources of the university to encourage a better understanding on the part of society of the inter-related physical, biological and social dangers facing the planet Earth.*
3. *To emphasise the ethical obligation of the present generation to overcome those current malpractices of resource utilization and those widespread circumstances of intolerable human disparity which lie at the root of environmental unsustainability.*
4. *To enhance the capacity of the university to teach and practise sustainable development principles, to increase environmental literacy, and to enhance the understanding of environmental ethics among faculty, students, and the public at large.*
5. *To cooperate with one another and with all segments of society in the pursuit of practical capacity-building and policy measures to achieve the effective revision and reversal of those current practices which contribute to environmental degradation, to South-North disparities and to inter-generational inequity.*
6. *To employ all channels open to the university to communicate these undertakings to UNCED, to governments and to the public at large.*
7. *Done at Dalhousie University, Halifax, Canada, the 11th day of December, 1991. "* (IISD, 2003b)

Appendix 7.   The Seven Action Points of the Swansea Declaration

1. *"To urge universities of the ACU to seek, establish and disseminate a clearer understanding of sustainable development … and encourage more appropriate sustainable development principles and practices at the local, national and global levels, in ways consistent with their missions.*

2. *To utilise resources of the university to encourage a better understanding on the part of governments and the public at large of the inter-related physical, biological and social dangers facing the planet Earth, and to recognize the significant interdependence and international dimensions of sustainable development.*

3. *To emphasise the ethical obligation of the present generation to overcome those practices of resource utilization and those widespread circumstances of intolerable human disparity which lie at the root of environmental unsustainability.*

4. *To enhance the capacity of the university to teach and undertake research in sustainable development principles, to increase environmental literacy, and to enhance the understanding of environmental ethics within the university and with the public at large.*

5. *To co-operate with one another and with all segments of society in the pursuit of practical and policy measures to achieve sustainable development and thereby safeguard the interests of future generations.*

6. *To encourage universities to review their own operations to reflect best sustainable development practices.*

7. *To request the ACU Council urgently to consider and implement the ways and means to give life to this declaration in the mission of each of its members and through the common enterprise of the ACU."* (IISD, 2003d)

Appendix 8.   The Earth Charter Principles

"I. RESPECT AND CARE FOR THE COMMUNITY OF LIFE

   1.   Respect Earth and life in all its diversity.
       a. Recognize that all beings are interdependent and every form of life has value regardless of its worth to human beings.
       b. Affirm faith in the inherent dignity of all human beings and in the intellectual, artistic, ethical, and spiritual potential of humanity.

   2.   Care for the community of life with understanding, compassion, and love.
       a. Accept that with the right to own, manage, and use natural resources comes the duty to prevent environmental harm and to protect the rights of people.
       b. Affirm that with increased freedom, knowledge, and power comes increased responsibility to promote the common good.

   3.   Build democratic societies that are just, participatory, sustainable, and peaceful.
       a. Ensure that communities at all levels guarantee human rights and fundamental freedoms and provide everyone an opportunity to realize his or her full potential.
       b. Promote social and economic justice, enabling all to achieve a secure and meaningful livelihood that is ecologically responsible.

   4.   Secure Earth's bounty and beauty for present and future generations.
       a. Recognize that the freedom of action of each generation is qualified by the needs of future generations.
       b. Transmit to future generations' values, traditions, and institutions that support the long-term flourishing of Earth's human and ecological communities.

II. ECOLOGICAL INTEGRITY

   5.   Protect and restore the integrity of Earth's ecological systems, with special concern for biological diversity and the natural processes that sustain life.
       a. Adopt at all levels sustainable development plans and regulations that make environmental conservation and rehabilitation integral to all development initiatives.
       b. Establish and safeguard viable nature and biosphere reserves, including wild lands and marine areas, to protect Earth's life support systems, maintain biodiversity, and preserve our natural heritage.
       c. Promote the recovery of endangered species and ecosystems.
       d. Control and eradicate non-native or genetically modified organisms harmful to native species and the environment, and prevent introduction of such harmful organisms.
       e. Manage the use of renewable resources such as water, soil, forest products, and marine life in ways that do not exceed rates of regeneration and that protect the health of ecosystems.
       f. Manage the extraction and use of non-renewable resources such as minerals and fossil fuels in ways that minimize depletion and cause no serious environmental damage.

   6.   Prevent harm as the best method of environmental protection and, when knowledge is limited, apply a precautionary approach.
       a. Take action to avoid the possibility of serious or irreversible environmental harm even when scientific knowledge is incomplete or inconclusive.
       b. Place the burden of proof on those who argue that a proposed activity will not cause significant harm, and make the responsible parties liable for environmental harm.
       c. Ensure that decision making addresses the cumulative, long-term, indirect, long distance, and global consequences of human activities.
       d. Prevent pollution of any part of the environment and allow no build-up of radioactive, toxic, or other hazardous substances.
       e. Avoid military activities damaging to the environment.

   7.   Adopt patterns of production, consumption, and reproduction that safeguard Earth's regenerative capacities, human rights, and community well-being.
       a. Reduce, reuse, and recycle the materials used in production and consumption systems, and ensure that residual waste can be assimilated by ecological systems.
       b. Act with restraint and efficiency when using energy, and rely increasingly on renewable energy sources such as solar and wind.

       c.   *Promote the development, adoption, and equitable transfer of environmentally sound technologies.*

       d.   *Internalize the full environmental and social costs of goods and services in the selling price, and enable consumers to identify products that meet the highest social and environmental standards.*

       e.   *Ensure universal access to health care that fosters reproductive health and responsible reproduction.*

       f.   *Adopt lifestyles that emphasize the quality of life and material sufficiency in a finite world.*

8.   *Advance the study of ecological sustainability and promote the open exchange and wide application of the knowledge acquired.*

       a.   *Support international scientific and technical cooperation on sustainability, with special attention to the needs of developing nations.*

       b.   *Recognize and preserve the traditional knowledge and spiritual wisdom in all cultures that contribute to environmental protection and human well-being.*

       c.   *Ensure that information of vital importance to human health and environmental protection, including genetic information, remains available in the public domain.*

III. SOCIAL AND ECONOMIC JUSTICE

9.   *Eradicate poverty as an ethical, social, and environmental imperative.*

       a.   *Guarantee the right to potable water, clean air, food security, uncontaminated soil, shelter, and safe sanitation, allocating the national and international resources required.*

       b.   *Empower every human being with the education and resources to secure a sustainable livelihood, and provide social security and safety nets for those who are unable to support themselves.*

       c.   *Recognize the ignored, protect the vulnerable, serve those who suffer, and enable them to develop their capacities and to pursue their aspirations.*

10. *Ensure that economic activities and institutions at all levels promote human development in an equitable and sustainable manner.*

       a.   *Promote the equitable distribution of wealth within nations and among nations.*

       b.   *Enhance the intellectual, financial, technical, and social resources of developing nations, and relieve them of onerous international debt.*

       c.   *Ensure that all trade supports sustainable resource use, environmental protection, and progressive labour standards.*

       d.   *Require multinational corporations and international financial organizations to act transparently in the public good, and hold them accountable for the consequences of their activities.*

11. *Affirm gender equality and equity as prerequisites to sustainable development and ensure universal access to education, health care, and economic opportunity.*

       a.   *Secure the human rights of women and girls and end all violence against them.*

       b.   *Promote the active participation of women in all aspects of economic, political, civil, social, and cultural life as full and equal partners, decision makers, leaders, and beneficiaries.*

       c.   *Strengthen families and ensure the safety and loving nurture of all family members.*

12. *Uphold the right of all, without discrimination, to a natural and social environment supportive of human dignity, bodily health, and spiritual well-being, with special attention to the rights of indigenous peoples and minorities.*

       a.   *Eliminate discrimination in all its forms, such as that based on race, colour, sex, sexual orientation, religion, language, and national, ethnic or social origin.*

       b.   *Affirm the right of indigenous peoples to their spirituality, knowledge, lands and resources and to their related practice of sustainable livelihoods.*

       c.   *Honour and support the young people of our communities, enabling them to fulfil their essential role in creating sustainable societies.*

       d.   *Protect and restore outstanding places of cultural and spiritual significance.*

IV. DEMOCRACY, NONVIOLENCE, AND PEACE

13. *Strengthen democratic institutions at all levels, and provide transparency and accountability in governance, inclusive participation in decision making, and access to justice.*

       a.   *Uphold the right of everyone to receive clear and timely information on environmental matters and all development plans and activities which are likely to affect them or in which they have an interest.*

       b.   *Support local, regional and global civil society, and promote the meaningful participation of all interested individuals and organizations in decision making.*

  c. Protect the rights to freedom of opinion, expression, peaceful assembly, association, and dissent.

  d. Institute effective and efficient access to administrative and independent judicial procedures, including remedies and redress for environmental harm and the threat of such harm.

  e. Eliminate corruption in all public and private institutions.

  f. Strengthen local communities, enabling them to care for their environments, and assign environmental responsibilities to the levels of government where they can be carried out most effectively.

14. *Integrate into formal education and life-long learning the knowledge, values, and skills needed for a sustainable way of life.*

  a. Provide all, especially children and youth, with educational opportunities that empower them to contribute actively to sustainable development.

  b. Promote the contribution of the arts and humanities as well as the sciences in sustainability education.

  c. Enhance the role of the mass media in raising awareness of ecological and social challenges.

  d. Recognize the importance of moral and spiritual education for sustainable living.

15. *Treat all living beings with respect and consideration.*

  a. Prevent cruelty to animals kept in human societies and protect them from suffering.

  b. Protect wild animals from methods of hunting, trapping, and fishing that cause extreme, prolonged, or avoidable suffering.

  c. Avoid or eliminate to the full extent possible the taking or destruction of non-targeted species.

16. *Promote a culture of tolerance, non-violence, and peace.*

  a. Encourage and support mutual understanding, solidarity, and cooperation among all peoples and within and among nations.

  b. Implement comprehensive strategies to prevent violent conflict and use collaborative problem solving to manage and resolve environmental conflicts and other disputes.

  c. Demilitarize national security systems to the level of a non-provocative defence posture, and convert military resources to peaceful purposes, including ecological restoration.

  d. Eliminate nuclear, biological, and toxic weapons and other weapons of mass destruction.

  e. Ensure that the use of orbital and outer space supports environmental protection and peace.

  f. *Recognize that peace is the wholeness created by right relationships with oneself, other persons, other cultures, other life, Earth, and the larger whole of which all are a part."* (Earth Charter, 2003)

Appendix 9. Complete list of the courses that include SD at Tec

I. **Management and Financing**
   a. *Management: 6 courses:* Values on the professional life; Development of an enterprise vision; Management; SMEs and franchise development; Enterprise management; Strategic planning
   b. *Economy:* 9 courses: Economy; Principles of macro-economy; International economics and politics; Macroeconomic theory I and II; Theory and politics of international business; Economic development; Social evaluation of projects; Regional economy
   c. *Marketing:* 1 course: Advance seminary of marketing

II. **Electronic, Computation, Information and Communication**
   d. *Physics:* 1 course: Alternative sources of energy
   e. *Centre to foster Sustainable Development:* 1 course: Leadership for SD

III. **Engineering and Architecture**
   f. *Architecture:* 6 courses: Passive systems; Architecture workshop III; Introduction to design; Industrial design workshop II; Ergonomics I; Industrial design workshop IV
   g. *Civil Engineering:* 7 courses: Environmental engineering I; Environmental engineering II; Hydrology; Hydrological infrastructure; Environmental engineering laboratory; Water supply systems; Hazardous residues.
   h. *Agronomy and agricultural engineering:* 4 courses: Ecology and SD; Systems of vegetable productions I and II; Agropecuarian production workshop
   i. *Chemical engineering:* 7 courses: Environmental systems physic-chemistry; Environmental engineering separations; Process re-engineering; Treatment of residues; Environmental policy; Environmental systems project.
   j. *Chemistry:* 3 courses: Chemistry; Inorganic chemistry; Polymer chemistry laboratory

IV. **School of graduates in public management and policy (EGADE)**
   k. *Master in administration:* 32 courses: Decision making models; Value chains administration; Human dynamics in organisations; Strategy, structure and process in organisations; Consumer behaviour; Corporate image; Social marketing; Analysis and valuation of investment projects; Strategic alliances and redesign; 3's of success; Creation of competitive advantages of enterprises; Ideology and mentality in Latin American organisations; Global leadership program; Women in global management; Evaluation of social projects; Public policy and development of institutions; International integration; Regulations and regulated markets; Environmental strategies for the environment; Seminar of enterprise philosophy; Organisational development; New paradigms for organisational learning; Introduction to e-commerce; Abilities for negotiation in the international context; Enterprise communication; Technological development and competitiveness; Enterprise leadership for SD; Field project; Financing project; Seminar of corporate and global strategies; Seminar of business policies
   l. *Master in marketing:* 10 courses: Decision making models; Value chains administration; Human dynamics in organisations; Strategy, structure and process in organisations; Consumer behaviour; Corporate image; Introduction to e-commerce; Abilities for negotiation in the international context; Enterprise leadership for SD
   m. *Master in direction for manufacturing:* 3 courses: Decision making models; Value chains administration; Enterprise leadership for SD

Source: ITESM (2003b)

Appendix 10. Questionnaire for interviews at Tec

The purpose of this questionnaire is to gather information about Sustainable Development in Higher Education. Your opinion is requested as one of a party with some interest in the area, and the confidentiality of your answer is guaranteed.

The gathered information will be used in a Master Thesis for completion for the M.Sc. course in Environmental Management and Policy in the International Institute of Industrial Environmental Economics at Lund University, Sweden.

1. How long have you been employed in your current position?
2. What does SD mean for you? (please explain in a brief manner)
3. How do you think your position relates to Sustainable Development?
4. Are you familiar with the Sustainable Campus Program?
5. Who do you think should be the key actors or SD in Universities?
6. Who do you think should be involved in SD in Universities? Why?
7. How do you measure your SD performance? Which indicators do you use?
8. Do you consider it to be important that SD be taught in universities? Why?
9. With regard to Sustainable Development, what do you think should be the role of:
    a. Students
    b. Professors
    c. Academic directors
    d. Staff
    e. External agents
    f. Community
    g. Researchers
    h. Alumni
2. If you would be in a top management position in your University, what would you change and why? What types of challenges and opportunities would you anticipate in seeking to make these changes?
10. Have you heard about the Decade of Education for Sustainable Development of UNESCO? If so, what do you think it means for you, for your university and for your community?
11. How do you perceive the future with and without SD?

Note: The original questionnaire was made in Spanish, the version presented here is the translation.

Appendix 11. Questionnaire for interviews performed at Lund University

The purpose of this questionnaire is to gather information about Sustainable Development in Higher Education. Your opinion is requested as one of a party with some interest in the area, and the confidentiality of your answer is guaranteed.

The gathered information will be used in a Master Thesis for completion for the M.Sc. course in Environmental Management and Policy in the International Institute of Industrial Environmental Economics at Lund University, Sweden.

Any inquiries and comments are very welcome at: rodrigo.lozano@student.iiiee.lu.se

Thank you for your collaboration and your time.

1. What is the name of your University and where is it located?
    _____
    _____
    _____

2. Which position do you hold in the University?
    A   How long have you been employed in the position?
    B   How do you think your position relates to Sustainable Development?
    _____
    _____
    _____
    _____

3. Can you give a brief definition of what Sustainable Development means to you?
    _____
    _____
    _____

4. Do you consider universities important to the diffusion of Sustainable Development? Why?
    _____
    _____
    _____

5. Do you think it is important that Sustainable Development is taught in the Universities? Why?
    _____
    _____
    _____

6. Who do you think should be involved and who should be the key actors for Sustainable Development in Universities?
    _____
    _____
    _____

7. What do you think are the main barriers in the University that affect the integration of Sustainable Development?
    _____
    _____
    _____

8. What is your University doing for Sustainable Development?
    _____
    _____
    _____

9. Does your University have specific programs towards SD? If so which departments are involved? If so,

    A   Who is responsible of the program and why?

_____

    B   Who is involved in the program?

_____

10. How do you measure your Sustainable Development performance?

    C   Which indicators do you use?

_____

    D   Do you do any reporting? If so, what do you report?

_____

11. With regard to Sustainable Development, what do you think should be the role of?

    E   Academic Directors including deans, provosts, rectors and presidents?

_____

    F   Professors?

_____

    G   Researchers?

_____

    H   Academic Directors including deans, provosts, rectors and presidents?

_____

    I   Staff?

_____

    J   Students?

_____

    K   External Sustainability Experts?

_____

    L   Community?

_____

    M   Alumni?

_____

12. If you would be in a top management position in your University, what would you change and why? What types of challenges and opportunities would you anticipate in seeking to make these changes?

_____
_____
_____

13. Have you heard about the Decade of Education for Sustainable Development of UNESCO? If so, what do you think it means for you, for your university and for your community?

_____
_____
_____

14. What other issues do you wish to address with regard to the roles of Universities in promoting the transition to Sustainable Development globally?

_____
_____
_____

Thank you for your collaboration and time.

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Appendix 12. Tables with hypothetical data used by this thesis author proposed worksheet

Category	Aspect	Core indicator	Grade	Additional indicator	Grade	ASPECT TOTAL	ASPECT RELATIVE
Direct economic impacts	Customers	EC1. Net sales	4			**6**	**75%**
		EC2. Geographic breakdown of markets	2				
	Suppliers	EC3. Cost of all goods, materials, and services purchased	1	Supplier breakdown by organisation and country	0	**3**	**43%**
		EC4. Percentage of contracts that were paid in accordance with agreed terms, excluding agreed penalty arrangements	3				
	Employees	EC5. Total payroll and benefits	1			**1**	**25%**
	Providers of capital	EC6. Distributions to providers of capital broken down by interest on debt and borrowings, and dividends on all classes of shares, with any arrears of preferred dividends to be disclosed	3			**5**	**63%**
		EC7. Increase/decrease in retained earning at end of period	2				
	Public sector	EC8. Total sum of taxes of all types paid broken down by country	0			**2.25**	**19%**
		EC9. Subsidies received broken down	1				

Category	Aspect	Core indicator	Grade	Additional indicator	Grade	ASPECT TOTAL	ASPECT RELATIVE
		by country or region					
		EC10. Donations to community, civil society, and other groups broken down in terms of cash and in-kind donations per type of groups	2				
Indirect economic impacts	Indirect economic impacts			Total spent on non-core business infrastructure development	2	**5**	**63%**
				The organisation's indirect economic impacts	3		

	TOTAL	22.25	50.57%
	Max	44	100%

Category	Aspect	Core indicator	Grade	Additional indicator	Grade	ASPECT TOTAL	ASPECT RELATIVE
Environmental	Materials	EN1 Total materials use other than water, by type	2			**3**	**38%**
		EN2 Percentage of materials used that are wastes (processed or unprocessed) from sources external to the reporting organisation	1				
	Energy	EN3 Direct energy use segmented by primary source	0	EN17 Initiatives to use renewable energy sources and to increase energy efficiency	2	**4**	**44%**
		EN4 indirect energy use	3	EN18 Energy consumption footprint of major products	1		

					EN19 Other indirect energy use and implications, such as organisational travel, product lifecycle management, and use of energy-intensive materials	4		
Water	EN5 Total water use	2			EN20 Water sources and related ecosystems/habitats significantly affected by use of water	1	3	50%
					EN21 Annual withdrawals of ground and surface water as a percent of annual renewable quantity of water available from the sources	1		
					EN22 Total recycling and reuse of water	4		
Biodiversity	EN6 Location and size of land owned, leased, or managed in biodiversity-rich habitats	0			EN23 Total amount of land owned, leased, or managed for production activities or extractive use	2	3.25	25%
	EN7 Description of the major impacts on biodiversity associated with activities and/or products and services in terrestrial, freshwater, and marine environments	0			EN24 Amount of impermeable surface as a percentage of land purchased or leased	2		
					EN25 Impacts of activities and operations on protected land sensitive areas	2		
					EN26 Changes to natural habitats resulting from activities and operations and percentage of habitat	2		

				protected or restored		
				EN27 Objectives, programmes, and targets for protecting and restoring native ecosystems and species in degraded areas	1	
				EN28 Number of IUCN Red List species with habitats in areas affected by operations	3	
				EN29 Business units currently operating or planning operations in or around protected or sensitive areas	1	
Emissions, effluents, and waste	EN8 Greenhouse gas emissions	4		EN30 Other relevant indirect greenhouse gas emissions	1	**12.75** **61%**
	EN 9Use and emissions of ozone-depleting substances	4		EN31 All production, transport, import, or export of any waste deemed "hazardous" under the terms of the Basel Convention	2	
	EN10 NOx, SOx, and other significant air emissions by type	4		EN32 Water sources and related ecosystems/habitats significantly affected by discharges of water and runoff	3	
	EN11 Total amount of waste by type and destination	2				
	EN12 Significant discharges to water by type	1				
	EN13Significant spills of chemicals, oils, and fuels in terms of total	0				

		number an total volume					
	Suppliers				EN33 Performance of suppliers relative to environmental components of programmes and procedures described in response to Governance Structure and Management Systems section	4	4	100%
	Products and services	EN14 Significant environmental impacts of principal products and services	2				5	63%
		EN15 Percentage of the weight of products sold that is reclaimable at the end of the products' useful life and percentage that is actually reclaimed	3				
	Compliance	EN16 Incidents of and fines for non-compliance with all applicable international declarations/conventions/treaties, and national, sub-national, regional, and local regulations associated with environmental issues	1				1	25%
	Transport				EN34 Significant environmental impacts of transportation used for logistical purposes	2	2	50%
	Overall				EN25 Total environmental expenditures by type	1	1	25%

TOTAL	**25.75**	**57.22%**
Max	45	100%

Category	Aspect	Core indicator	Grade	Additional indicator	Grade	ASPECT TOTAL	ASPECT RELATIVE
Labour Practices and Decent Work	Employment	LA1 Breakdown of workforce, where possible, by region/country, status, employment type, and by employment contract	4	LA12 Employment benefits beyond those legally mandated	1	**4.75**	**68%**
		LA2 Net employment creation and average turnover segmented by region/country	2				
	Labour/management relations	LA3 Percentage of employees represented by independent trade union organisations	3	LA13 Provision for formal worker representation in decision-making or management, including corporate governance	2	**5**	**71%**
		LA4 Policy and procedures involving information, consultation, and negotiation with employees over changes in the reporting organisation's operations	3				
	Health and safety	LA5 Practices on recording and notification of occupational accidents and diseases	4	LA14 Evidence of substantial compliance with the ILO	0	**7.5**	**54%**
		LA6 Description of formal joint health and safety committees comprising management and worker representatives and proportion of workforce covered by any such committees	3	LA15 Description of formal agreements with trade unions or other bona fide employee representatives covering health and safety at work and proportions of the workforce covered by any such agreements	0		
		LA7 Standard injury, lost day, and absentee rates and number of work-related fatalities	1				
		LA8 Description of policies or programmes	2				

		on HIV/AIDS						
	Training and education	LA9 Average hours of training per year per employee by category of employee	3		LA16 Description of programmes to support the continued employability of employees and to manage career endings	1	**2.75**	**55%**
					LA17 Specific policies and programmes for skills management or for lifelong learning	1		
	Diversity and opportunity	LA10 Description of equal opportunity policies or programmes	1				**4**	**50%**
		LA11 Composition of senior management and corporate governance bodies, including female/male ratio and other indicators of diversity	3					

Labour Practices and Decent Work	**TOTAL**	**24**	**58.54%**	
	Max	41	100%	

Human Rights	Strategy and management	HR1 Description of policies, guidelines, corporate structure, and procedures to deal with all aspects of human rights relevant to operations	3		HR8 Employee training on policies and practices concerning all aspects of human rights relevant to operations	2	**7.25**	**73%**
		HR2 Evidence of consideration of human rights impacts as part of investment and procurement decisions, including selection of suppliers/contractors	3					

	HR3 Description of policies and procedures to evaluate and address human rights performance within the supply chain and contractors	3					
Non-discrimination	HR4 Description of global policy and procedures/programmes preventing all forms of discrimination in operations	2				2	50%
Freedom of association and collective bargaining	HR5 Description of freedom of association policy and extent to which this policy is universally applied independent of local laws	2				2	50%
Child Labour	HR6 Description of policy excluding child labour	3				3	75%
Forced and compulsory labour	HR7 Description of policy to prevent forced and compulsory labour and extent to which this policy is visibly stated and applied	3				3	75%
Disciplinary practices				HR9 Description of appeal practices, including, but not limited to, human rights issues	1	3	38%
				HR10 Description of non-retaliation policy and effective confidential employee grievance system	2		
Security practices				HR11 Human rights training for security personnel	4	4	100%
Indigenous rights				HR12 Description of policies, guidelines, and procedures to address the needs of indigenous	1	4	33%

				people			
				HR13 Description of jointly managed community grievance mechanisms/authority	3		
				HR14 Share of operating revenues from the area of operations that are redistributed to local communities	0		

		Human Rights	**TOTAL**	**28.25**	**56.50%**
			Max	50	100%

Society	Community	SO1 Description of policies to manage impacts on communities in areas affected by activities, as well as a description of procedures/programmes to address this issue	4	SO4 Awards received relevant to social, ethical, and environmental performance	2	**3.5**	**88%**
	Bribery and corruption	SO2 Description of the policy, procedures/management systems, and compliance mechanisms for organisations and employees addressing bribery and corruption	4			**4**	**100%**
	Political contributions	SO3 Description of policy, procedures/management systems, and compliance mechanisms for managing political lobbying and contributions	4	SO5 Amount of money paid to political parties and institutions whose prime function is to fund parties or their candidates	0	**3**	**75%**
	Competition and pricing			SO6 Court decisions regarding cases pertaining to anti-trust and monopoly regulations	0	**0**	**0%**

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				SO7 Description of the policy, procedures/management systems, and compliance mechanisms for preventing anti-competitive behaviour	0		

			Society	TOTAL	10.5	52.50%
				Max	20	100%

Product Responsibility	Customer health and safety	PR1 Description of policy for preserving customer health and safety during use of products and services, and extent to which this policy is visibly stated and applied	3		PR4 Number and type of instances of non-compliance with regulations concerning customer health and safety	1	3	50%
					PR5 Number of complaints upheld by regulatory or similar official bodies to oversee or regulate the health and safety of products and services	1		
					PR6 Voluntary code compliance, product labels or awards with respect to social and/or environmental responsibility	1		
	Products and services	PR2 Description of policy, procedures/management systems, and compliance mechanisms related to product information and labelling	2		PR7 Number and type of instances of non-compliance with regulations concerning product information and labelling	3	3.25	65%
					PR8 Description of policy, procedures/management systems, and compliance mechanisms related to	4		

					customer satisfaction		
	Advertising				PR9 Description of policy, procedures/management systems, and compliance mechanisms for adherence to standards and voluntary codes related to advertising	0	**0** **0%**
					PR10 Number and types of breaches of advertising and marketing regulations	0	
	Respect for privacy	PR3 Description of policy, procedures/management systems, and compliance mechanisms for consumer privacy	1		PR11 Number of substantiated complaints regarding breaches of consumer privacy	3	**1.5** **38%**

Product Responsibility	**TOTAL**	**7.75**	**33.70%**
	Max	23	100%
	TOTAL of social	**70.5**	**53%**
	Max	134	100%

Category	Aspect	Core indicator	Grade	Additional indicator	Grade	ASPECT TOTAL	ASPECT RELATIVE
Curriculum	SD incorporation in the curricula	CU1 Number and percent relative to total of courses taught each year related to sustainability concepts	2	CU6 List with courses' titles and content	2	**4.5**	**41%**
		CU2 Number of courses whose content has SD themes	2	CU7 List with courses' titles and SD theme contained	1		

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		CU3 Number of students enrolled in sustainability-related courses	1				
	SD capacity building	CU4 Specific course to "Educate the Educators in SD"	0		CU8 Course structure, goals and duration	4	**1**	**25%**
	SD monitoring in curricula	CU5 Management procedures to monitor SD themes incorporation in Curricula	1		CU9 Management structure, incorporation follow up procedures, continuous improvement methods, etc.	3	**1.5**	**38%**
	Administrative Support				CU10 Administrative support	2	**3**	**25%**
					CU11 Number and percent of departments and colleges including sustainability curriculum	1		
					CU12 Sustainability courses included in general education requirement	0		

Research	Research in general	RE1 Research in the area of sustainability	3		RE6 List issues addressed: Renewable energies, ecological economics, urban planning, etc	0	**9.75**	**49%**
		RE2 Percentage of graduate students doing research in sustainability	3		RE7 List of knowledge field involved.	0		
		RE3 Percentage of faculty that does research in sustainability issues	4		RE8 List of faculty members and Department or Centre they belong to.	0		
		RE4 Institutional support and management procedures for multidisciplinary and	2		RE9 Type of support provided: budget allocation, office and	0		

	interdisciplinary research in sustainability			personnel especially dedicated, etc.				
	RE5 Number of research projects that are multidisciplinary and interdisciplinary in the area of sustainability.	1		RE10 List of Departments and Centres involved	0			
	Grants			RE11 Total revenues from grants and contracts specifying sustainability-related research	2		**2**	**50%**
	Publications and products			RE12 Published research with focus on sustainability-related issues	2		**2**	**50%**
	Programs and centres			RE13 Number and function of centres on campus providing sustainability-related research or services	1		**1**	**25%**

Service	Community activity and service			SE1 Student, faculty, and staff contributions to community development and service	1		**4**	**33%**
				SE2 Partnerships for sustainability with educational, business, and government entities at the local level	1			
				SE3 Quantity and composition of student groups focusing on one aspect of sustainability	2			
	Service learning			SE4 Existence and strength of service	3		**4**	**50%**

		learning programs		
		SE5 Total faculty, staff, students, involved in service learning projects	1	

TOTAL	**32.75**	**39.46%**
Max	83	100%

Appendix 13. The nine charts generated by the work sheet of GRI for universities

This appendix presents the nine charts generated by the work sheet that this author proposes in Section 8.5 and with the data presented in Appendix 12.
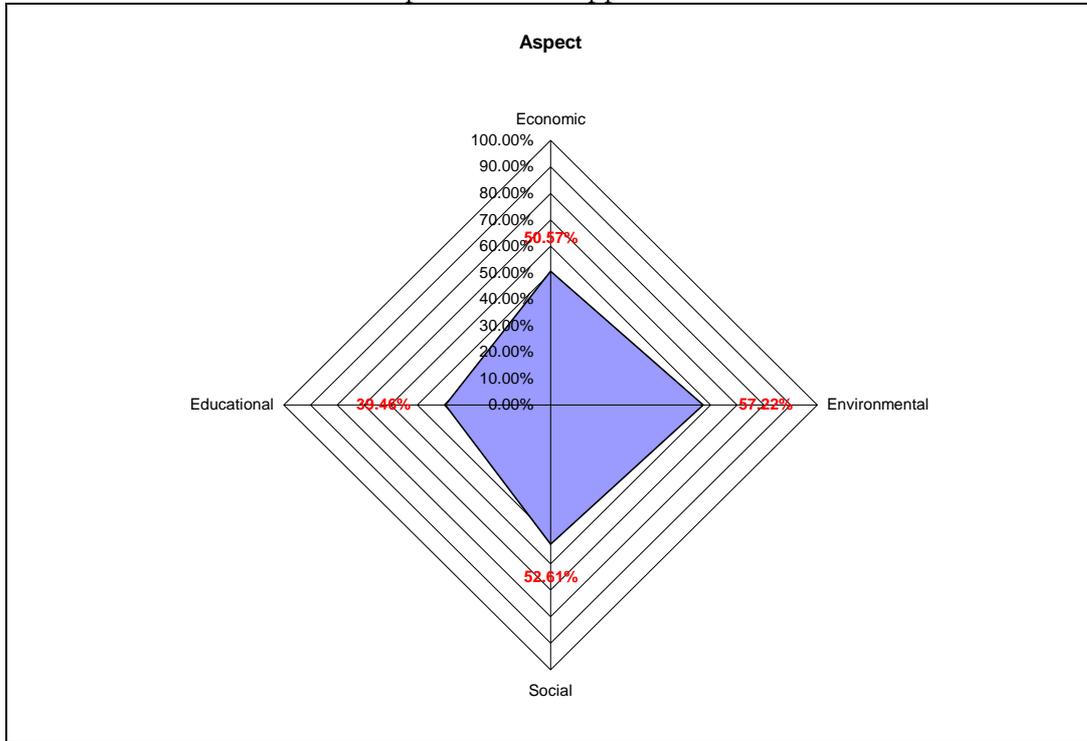
*Figure 13-1 Overall performance in the four aspects*
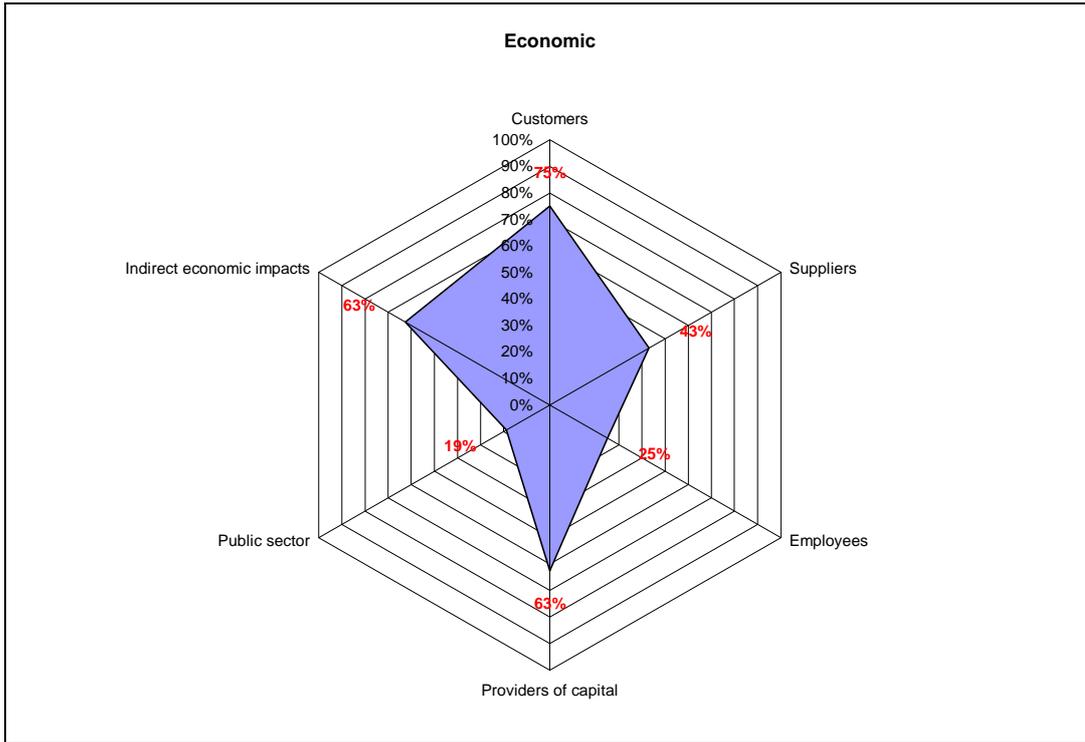
Figure 13-2 Economic performance
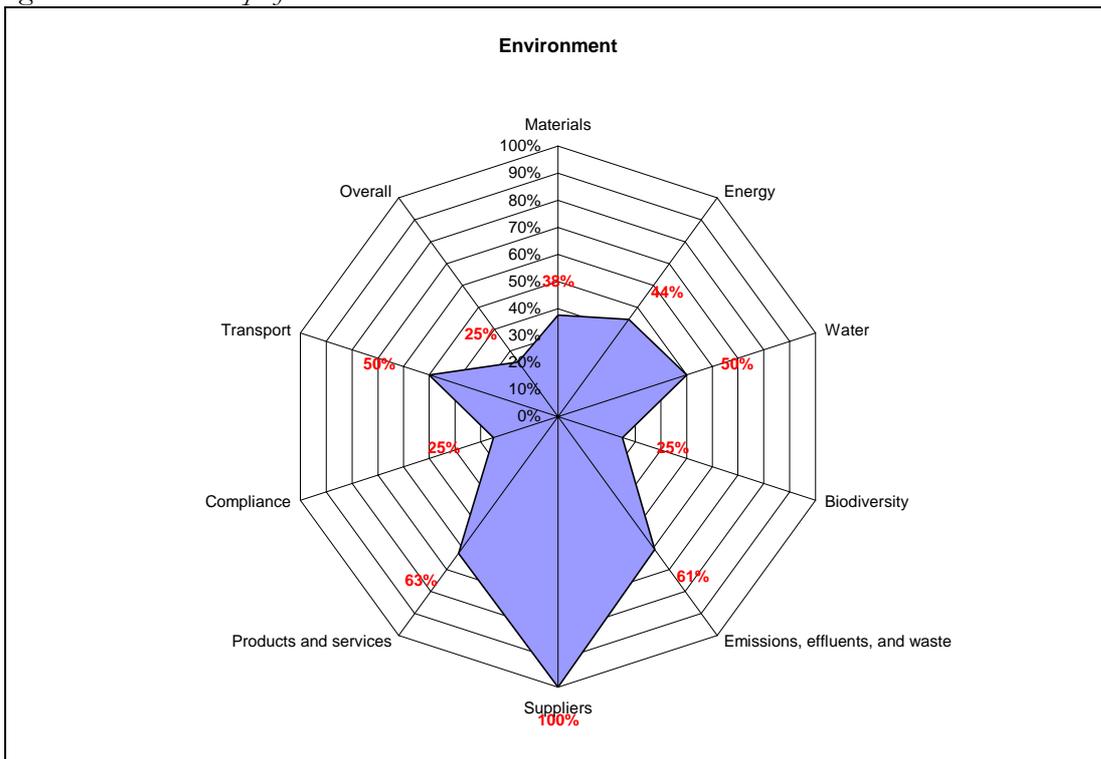
Figure 13-3 Environmental performance
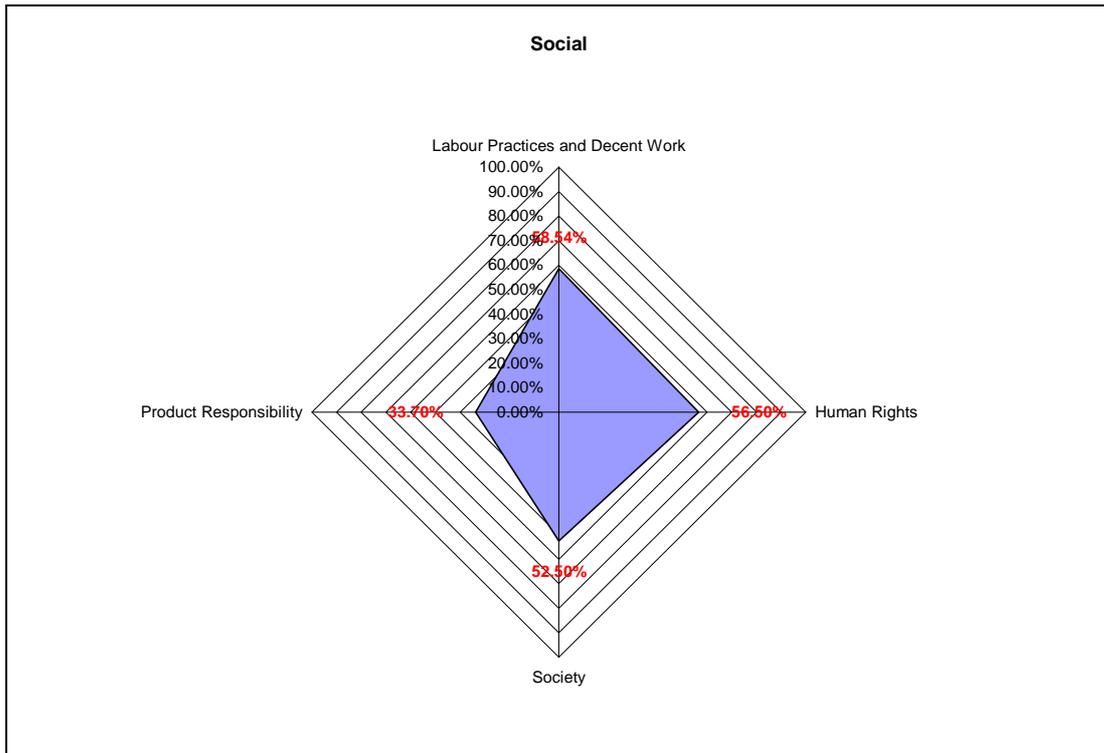
Figure 13-4 Social overall performance
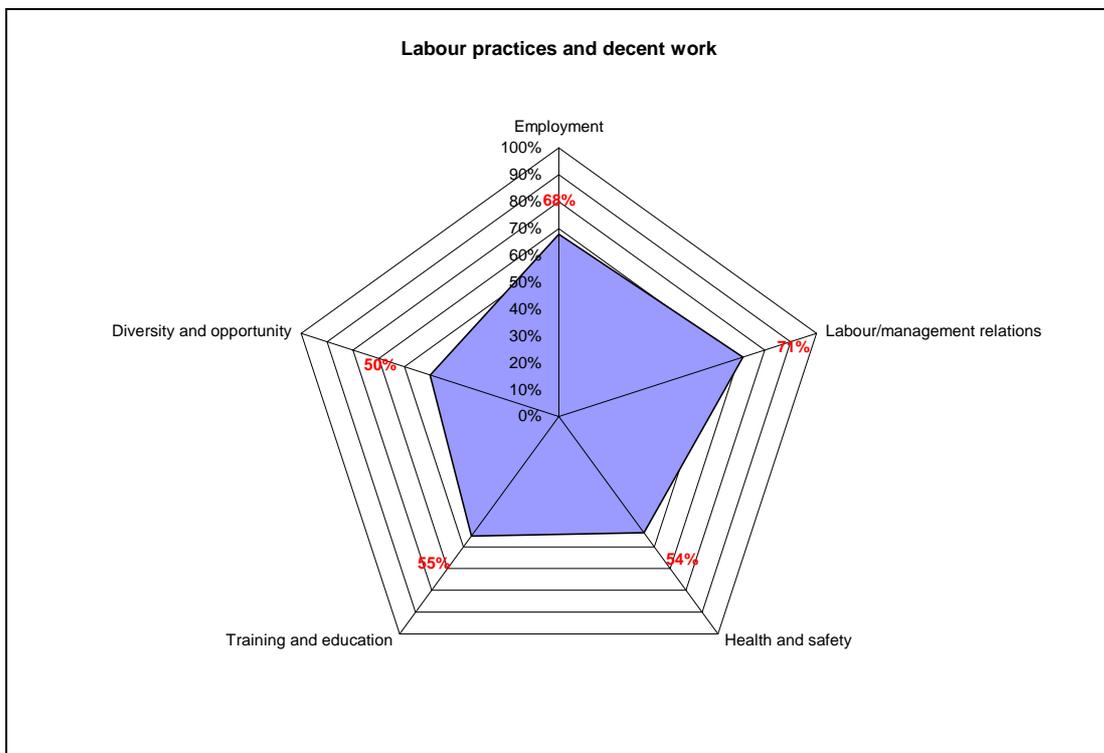
Figure 13-5 Labour practices and decent work performance
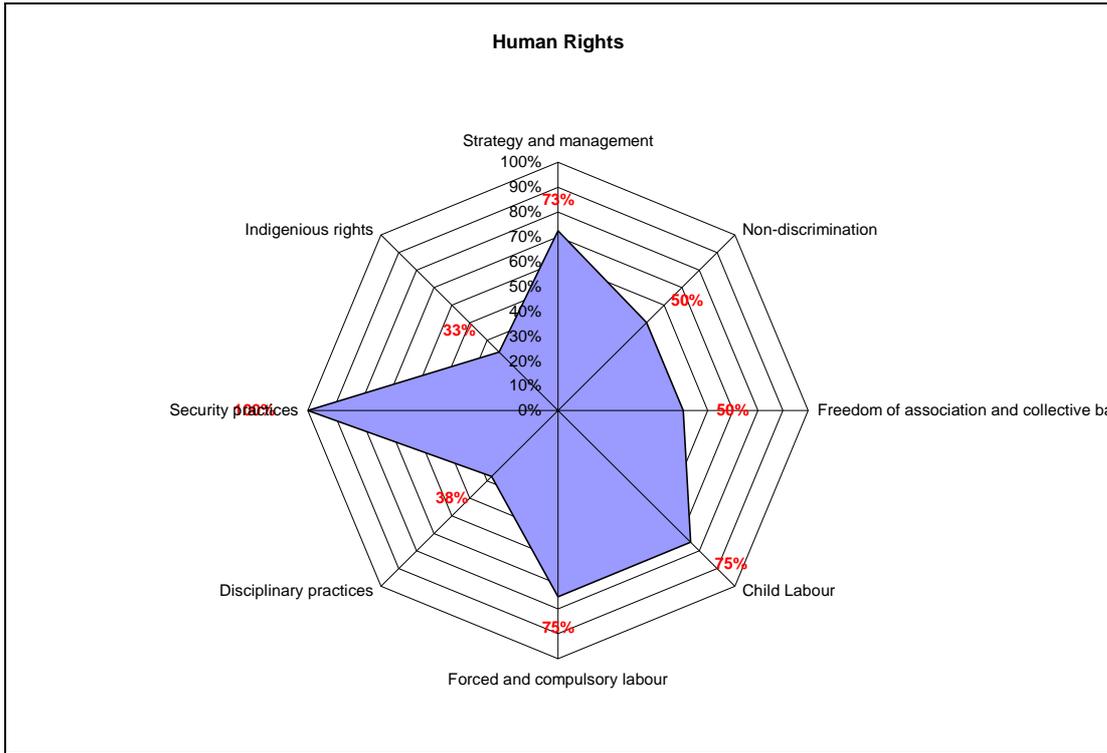
Figure 13-6 Human Rights performance
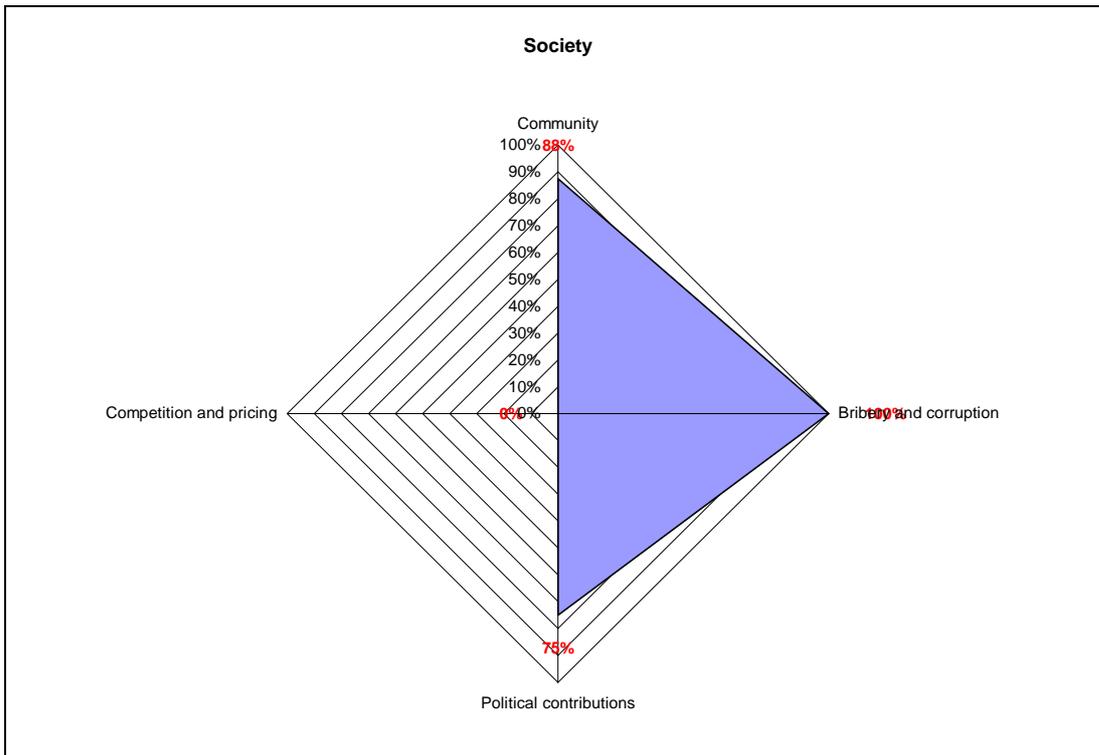
Figure 13-7 Society performance
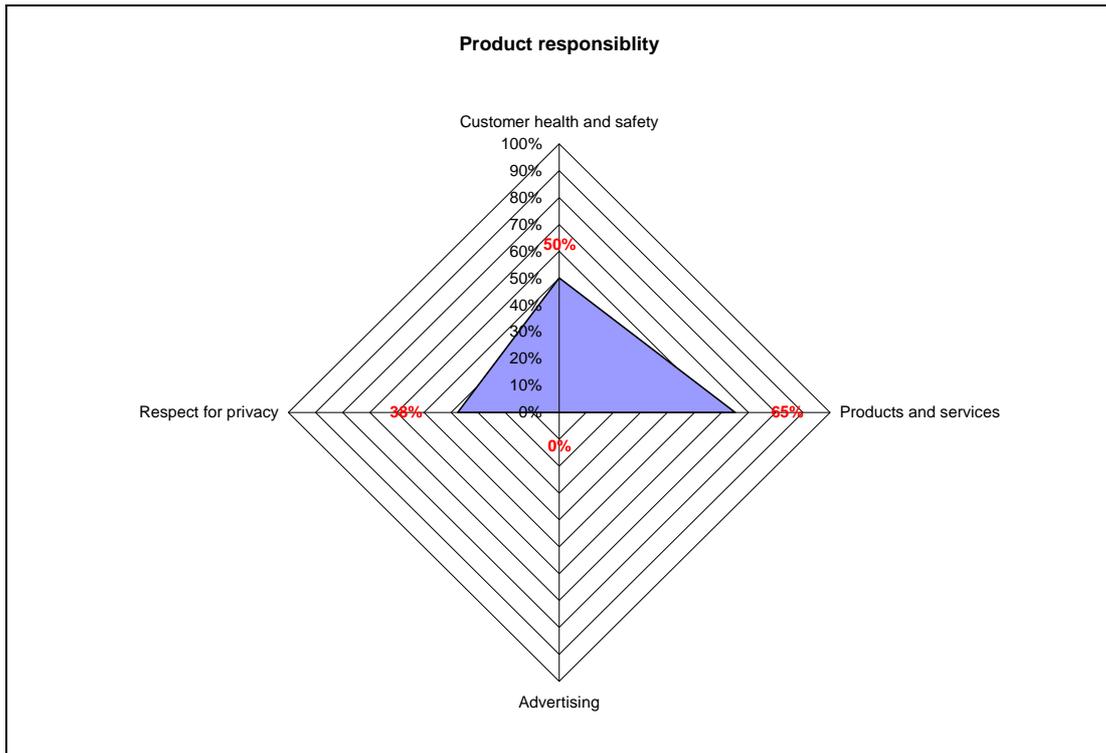
Figure 13-8 Product responsibility performance
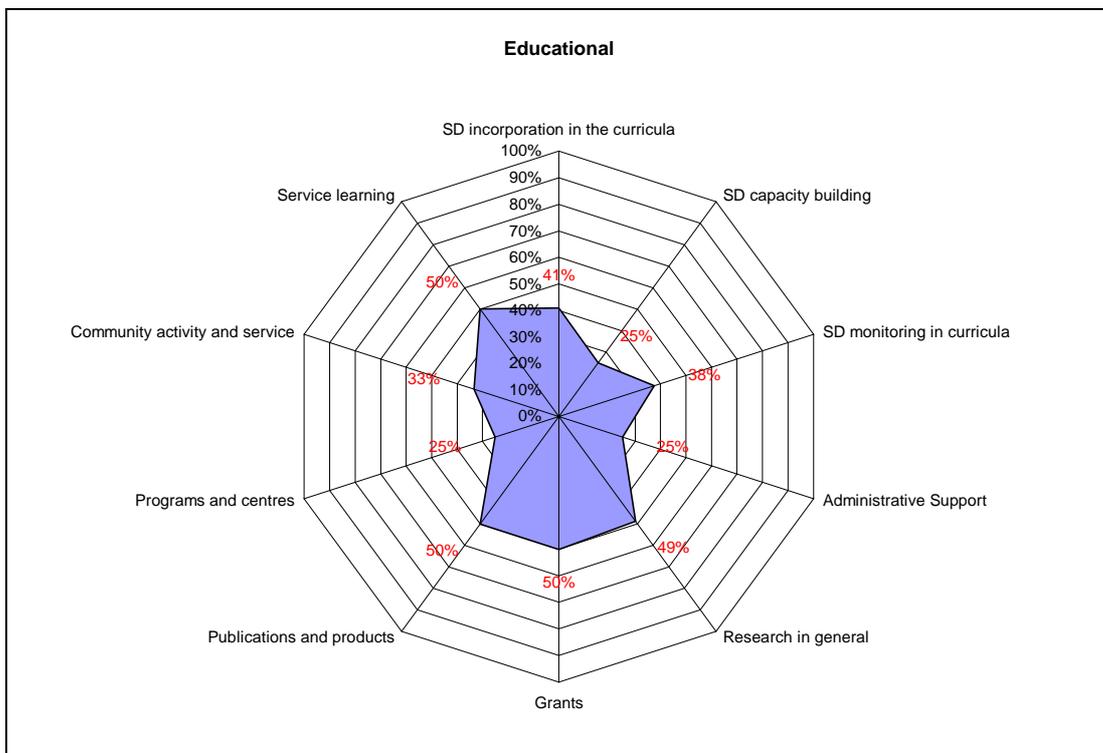
Figure 13-9 Educational performance

Appendix 14. GRI indicators and the proposed Educational aspect with its indicators

Section	Category	Aspect	Detail/Core indicator	Additional indicator	Ok for univ. as written	Note from ULSF	Note from thesis author
1. Vision and strategy			1.1 Statement of the organisation's vision and strategy regarding its contribution to sustainable development		Yes		
			1.2 Statement of the CEO (or equivalent senior manager) describing key elements of the report		Yes		
2. Profile		Organisational profile	2.1 Name of reporting organisation		Yes		
			2.2 Major products and/or services, including brands if appropriate			Yes: distinction of education as 'goods and service' and the service value of educational institution	
			2.3 Operational structure of the organisation		Yes		
			2.4 Description of major divisions, operating companies, subsidiaries, and joint ventures			Yes: inclusion of university holdings, campuses, colleges, degrees granted	
			2.5 Countries in which the organisation's operations are located			?	In place of countries, states or regions use different campuses
			2.6 Nature of ownership; legal form			?	
			2.7 Nature of markets served		Yes		
			2.8 Scale of reporting organisation		Yes		
			2.9 List of stakeholders, key attributes of each, and relationship to the reporting organisation		Yes		
		Report scope	2.10 Contact person(s) for the report, including e-mail and web addresses		Yes		
			2.11 Reporting period for information provided		Yes	Academic year	

			2.12 Date of the most recent report (if any)		Yes	
			2.13 Boundaries of report (countries/regions, products/services, divisions/facilities/joint ventures/subsidiaries) and any specific limitations on the scope		Yes	
			2.14 Significant changes in size, structure, ownership, or product/services that have occurred since the previous report		Yes	
			2.15 Basis for reporting on joint ventures, partially owned subsidiaries, leased facilities, outsourced operations, and other situations that can significantly affect comparability from period to period and/or between reporting organisations			?	
			2.16 Explanation of the nature and effect of any re-statements of information provided in earlier reports and the reasons for such re-statements		Yes	
		Report profile	2.17 Decisions not to apply GRI principles or protocols in the preparation of the report		Yes	
			2.18 Criteria/definitions used in the accounting for economic, environmental, and social costs and benefits		Yes		With the inclusion of Educational too
			2.19 Significant changes from previous years in the measurement methods applied to key economic, environmental and social information		Yes		With the inclusion of Educational too
			2.20 Policies and internal practices to enhance and provide assurance about the accuracy, completeness, and reliability that can be place on the sustainability report		Yes	
			2.21 Policy and current practice with regard to providing independent assurance for the full report		Yes	
			2.22 Means by which report users can obtain additional information and reports about economic,		Yes		With the inclusion of Educational too

			environmental, and social aspects of the organisation's activities, including facility-specific information				
3. Governance structure and management systems		Structure and governance	3.1 Governance structure of the organisation, including major committees under the board of directors that are responsible for setting the strategy and for oversight of the organisation		Yes	With breakdown between Board of Regents, Board of Trustees, President, etc.	
			3.2 Percentage of the board of directors that are independent, non-executive directors			?	
			3.3 Process for determining the expertise board members need to guide the strategic direction of the organisation, including issues related to environmental and social risks and opportunities				
			3.4 Board-level processes for overseeing the organisation's identification and management of economic, environmental and social risks and opportunities				With the inclusion of Educational too
			3.5 Linkage between executive compensation and achievement of the organisation's financial and non-financial goals		Yes		
			3.6 Organisational structure and key individuals responsible for oversight, implementation and audit of economic, environmental, social and related policies		Yes		With the inclusion of Educational too
			3.7 Mission and values statements, internally developed codes of conduct or principles, and policies relevant to economic, environmental, and social performance and the status of implementation		Yes		With the inclusion of Educational too
			3.8 Mechanisms for shareholders to provide recommendations or direction to the board of directors		Yes		
		Stakeholder	3.9 Basis for identification and selection of major		Yes		

		engagement	stakeholders			
			3.10 Approaches to stakeholder consultation reported in terms of frequency of consultations by type and by stakeholder group		Yes	
			3.11 Type of information generated by stakeholder consultation		Yes	
			3.12 Use of information resulting from stakeholder engagements		Yes	
		Overarching policies and management systems	3.13 Explanation of whether and how the precautionary approach or principle is address by the organisation		Yes	
			3.14 Externally developed, voluntary economic, environmental, and social charters, set of principles, or other initiatives to which the organisation subscribes or which it endorses		Yes	
			3.15 Principal memberships in industry and business associations, and/or national/international advocacy organisations			Instead of industry and business association, university associations or charters
			3.16 Policies and/or systems for managing upstream and downstream impacts			Include purchasing policies, recycling/waste contract, etc
			3.17 Reporting organisation's approach to managing indirect economic, environmental, and social impacts resulting from its activities			With the inclusion of Educational too
			3.18 Major decisions during the reporting period regarding the location of, or changes in, operations		Yes	
			3.19 Programmes and procedures pertaining to economic, environmental, and social performance			
			3.20 Status of certification pertaining to economic, environmental, and social management systems			With the inclusion of Educational too

4. GRI Content Index			4.1 A table identifying location of each element of the GRI Report Content, by section and indicator		Yes		
5. Performance indicators							
Economic Performance indicators	Direct economic impacts	Customers	EC1. Net sales		No	Yes, report as total income	
			EC2. Geographic breakdown of markets		No	Yes, report in-state vs. out-of-state tuition, development support	
		Suppliers	EC3. Cost of all goods, materials, and services purchased		Yes		
				EC11. Supplier breakdown by organisation and country	Yes		
			EC4. Percentage of contracts that were paid in accordance with agreed terms, excluding agreed penalty arrangements		Yes		
		Employees	EC5. Total payroll and benefits		Yes		
		Providers of capital	EC6. Distributions to providers of capital broken down by interest on debt and borrowings, and dividends on all classes of shares, with any arrears of preferred dividends to be disclosed		No	Yes, by limiting report to debt service, noting inapplicability of stock dividends, etc.	
			EC7. Increase/decrease in retained earning at end of period		No		
		Public sector	EC8. Total sum of taxes of all types paid broken down by country		No	Yes, noting that public institution may not pay many taxes in their local jurisdiction	
			EC9. Subsidies received broken down by country or region		No	Yes, perhaps this is where to detail public support, private support, grants, endowments, etc	

			EC10. Donations to community, civil society, and other groups broken down in terms of cash and in-kind donations per type of groups		No		
		Indirect economic impacts		EC12. Total spent on non-core business infrastructure development	No		
				EC13. The organisation's indirect economic impacts	Yes	Difficult to quantify	
Environmental		Materials	EN1. Total materials use other than water, by type		Yes	With notes to designate research and educational material	
			EN2. Percentage of materials used that are wastes (processed or unprocessed) from sources external to the reporting organisation		Yes		
		Energy	EN3. Direct energy use segmented by primary source		No		
			EN4. Indirect energy use		Yes		
				EN17. Initiatives to use renewable energy sources and to increase energy efficiency	Yes		
				EN18. Energy consumption footprint of major products	No		
				EN19. Other indirect energy use and implications, such as organisational travel, product lifecycle management, and use of energy-intensive materials	No	Yes, need clarification for HE	
		Water	EN5. Total water use				YES
				EN20. Water sources and related ecosystems/habitats significantly affected by use of water	Yes		
				EN21. Annual withdrawals of ground and surface water as a percent of annual renewable quantity of water available from the sources	Yes		

				EN22. Total recycling and reuse of water	Yes		
		Biodiversity	EN6. Location and size of land owned, leased, or managed in biodiversity-rich habitats		No	Perhaps, with notes on land-grant vs. non-land-grant univs	Yes, if the university owns or leases lands such as recreational centres outside the campus
			EN7. Description of the major impacts on biodiversity associated with activities and/or products and services in terrestrial, freshwater, and marine environments		Yes		
				EN23. Total amount of land owned, leased, or managed for production activities or extractive use	No		
				EN24. Amount of impermeable surface as a percentage of land purchased or leased	Yes		
				EN25. Impacts of activities and operations on protected land sensitive areas	No		
				EN26. Changes to natural habitats resulting from activities and operations and percentage of habitat protected or restored	Yes		
				EN27. Objectives, programmes, and targets for protecting and restoring native ecosystems and species in degraded areas	Yes		
				EN28. Number of IUCN Red List species with habitats in areas affected by operations	Yes		
				EN29. Business units currently operating or planning operations in or around protected or sensitive areas	Yes		
		Emissions, effluents, and waste	EN8. Greenhouse gas emissions		Yes		
			EN9. Use and emissions of ozone-depleting		Yes		

			substances				
			EN10. NOx, SOx, and other significant air emissions by type		Yes		
			EN11. Total amount of waste by type and destination		Yes		
			EN12. Significant discharges to water by type				
			EN13. Significant spills of chemicals, oils, and fuels in terms of total number an total volume		Yes		
				EN30. Other relevant indirect greenhouse gas emissions	Yes		
				EN31. All production, transport, import, or export of any waste deemed "hazardous" under the terms of the Basel Convention	No	Yes, with notes on chemical use	
				EN32. Water sources and related ecosystems/habitats significantly affected by discharges of water and runoff	Yes		
		Suppliers		EN33. Performance of suppliers relative to environmental components of programmes and procedures described in response to Governance Structure and Management Systems section	Yes		
		Products and services	EN14. Significant environmental impacts of principal products and services		No		
			EN15. Percentage of the weight of products sold that is reclaimable at the end of the products' useful life and percentage that is actually reclaimed		No		
		Compliance	EN16. Incidents of and fines for non-compliance with all applicable international declarations/conventions/treaties, and national, sub-national, regional, and local regulations associated with environmental issues		Yes		
		Transport		EN34. Significant environmental impacts of	Yes		

				transportation used for logistical purposes			
		Overall		EN35. Total environmental expenditures by type	Yes		
Social	Labour Practices and Decent Work	Employment	LA1. Breakdown of workforce, where possible, by region/country, status, employment type, and by employment contract		Yes		
			LA2. Net employment creation and average turnover segmented by region/country		Yes		
				LA12. Employment benefits beyond those legally mandated	Yes		
		Labour/ management relations	LA3. Percentage of employees represented by independent trade union organisations		Yes		
			LA4. Policy and procedures involving information, consultation, and negotiation with employees over changes in the reporting organisation's operations		Yes		
				LA13. Provision for formal worker representation in decision-making or management, including corporate governance	Yes		
		Health and safety	LA5. Practices on recording and notification of occupational accidents and diseases		Yes		
			LA6. Description of formal joint health and safety committees comprising management and worker representatives and proportion of workforce covered by any such committees		Yes		
			LA7. Standard injury, lost day, and absentee rates and number of work-related fatalities		Yes		
			LA8. Description of policies or programmes on HIV/AIDS		Yes		
				LA14. Evidence of substantial compliance with the ILO	Yes		

				LA15. Description of formal agreements with trade unions or other bona fide employee representatives covering health and safety at work and proportions of the workforce covered by any such agreements	Yes		
		Training and education	LA9. Average hours of training per year per employee by category of employee		Yes		
				LA16. Description of programmes to support the continued employability of employees and to manage career endings	Yes		
				LA17. Specific policies and programmes for skills management or for lifelong learning	Yes		
		Diversity and opportunity	LA10. Description of equal opportunity policies or programmes		Yes	With breakdown for faculty, staff and students	
			LA11. Composition of senior management and corporate governance bodies, including female/male ratio and other indicators of diversity		Yes	With notes on external authority	
	Human Rights	Strategy and management	HR1. Description of policies, guidelines, corporate structure, and procedures to deal with all aspects of human rights relevant to operations		Yes		
			HR2. Evidence of consideration of human rights impacts as part of investment and procurement decisions, including selection of suppliers/contractors		Yes		
			HR3. Description of policies and procedures to evaluate and address human rights performance within the supply chain and contractors		Yes		
				HR8. Employee training on policies and practices concerning all aspects of human rights relevant to operations	Yes		
		Non-discrimination	HR4. Description of global policy and procedures/programmes preventing all forms of		Yes		

			discrimination in operations				
		Freedom of association and collective bargaining	HR5. Description of freedom of association policy and extent to which this policy is universally applied independent of local laws		Yes		
		Child Labour	HR6. Description of policy excluding child labour		Yes		
		Forced and compulsory labour	HR7. Description of policy to prevent forced and compulsory labour and extent to which this policy is visibly stated and applied		Yes		
		Disciplinary practices		HR9. Description of appeal practices, including, but not limited to, human rights issues	Yes		
				HR10. Description of non-retaliation policy and effective confidential employee grievance system	Yes		
		Security practices		HR11. Human rights training for security personnel	Yes		
		Indigenous rights		HR12. Description of policies, guidelines, and procedures to address the needs of indigenous people	Yes		
				HR13. Description of jointly managed community grievance mechanisms/authority	Yes		
				HR14. Share of operating revenues from the area of operations that are redistributed to local communities	No	Yes, with notes on sources of income	
	Society	Community	SO1. Description of policies to manage impacts on communities in areas affected by activities, as well as a description of procedures/programmes to address this issue		Yes		
				SO4. Awards received relevant to social, ethical, and environmental performance	Yes		
		Bribery and	SO2. Description of the policy,		Yes		

		corruption	procedures/management systems, and compliance mechanisms for organisations and employees addressing bribery and corruption				
		Political contributions	SO3. Description of policy, procedures/management systems, and compliance mechanisms for managing political lobbying and contributions		Yes		
				SO5. Amount of money paid to political parties and institutions whose prime function is to fund parties or their candidates	Yes		
		Competition and pricing		SO6. Court decisions regarding cases pertaining to anti-trust and monopoly regulations	Yes		
				SO7. Description of the policy, procedures/management systems, and compliance mechanisms for preventing anti-competitive behaviour	Yes		
	Product Responsibility	Customer health and safety	PR1. Description of policy for preserving customer health and safety during use of products and services, and extent to which this policy is visibly stated and applied		No	Yes, with notes on campus crime, student health and related student welfare programs	
				PR4. Number and type of instances of non-compliance with regulations concerning customer health and safety	No	Yes, related to the one before	
				PR5. Number of complaints upheld by regulatory or similar official bodies to oversee or regulate the health and safety of products and services	No	Maybe	
				PR6. Voluntary code compliance, product labels or awards with respect to social and/or environmental responsibility	No	Maybe	
		Products and	PR2. Description of policy,		No		

		services	procedures/management systems, and compliance mechanisms related to product information and labelling				
				PR7. Number and type of instances of non-compliance with regulations concerning product information and labelling	No		
				PR8. Description of policy, procedures/management systems, and compliance mechanisms related to customer satisfaction	Yes		
		Advertising		PR9. Description of policy, procedures/management systems, and compliance mechanisms for adherence to standards and voluntary codes related to advertising	Yes		
				PR10. Number and types of breaches of advertising and marketing regulations	Yes		
		Respect for privacy	PR3. Description of policy, procedures/management systems, and compliance mechanisms for consumer privacy		Yes		
				PR11. Number of substantiated complaints regarding breaches of consumer privacy	Yes		
Educational Performance	Curriculum	SD incorporation in the curricula	CU1 Number and percent relative to total of courses taught each year related to sustainability concepts		Proposed		
			CU2 Number of courses whose content has SD themes		Proposed		
			CU3 Number of students enrolled in sustainability-related courses		Proposed		
			CU6 List with courses' titles and content		Proposed		
			CU7 List with courses' titles and SD theme contained		Proposed		
		SD capacity	CU4 Specific course to "Educate the Educators in		Proposed		

		building	SD"				
				CU8 Course structure, goals and duration	Proposed		
		SD monitoring in curricula	CU5 Management procedures to monitor SD themes incorporation in Curricula		Proposed		
				CU9 Management structure, incorporation follow up procedures, continuous improvement methods, etc.	Proposed		
		Administrative Support		CU10 Administrative support	Proposed		
				CU11 Number and percent of departments and colleges including sustainability curriculum	Proposed		
				CU12 Sustainability courses included in general education requirement	Proposed		
	Research	Research in general	RE1 Research in the area of sustainability		Proposed		
			RE2 Percentage of graduate students doing research in sustainability		Proposed		
			RE3 Percentage of faculty that does research in sustainability issues		Proposed		
			RE4 Institutional support and management procedures for multidisciplinary and interdisciplinary research in sustainability		Proposed		
			RE5 Number of research projects that are multidisciplinary and interdisciplinary in the area of sustainability.		Proposed		
				RE6 List issues addressed: Renewable energies, ecological economics, urban planning, etc	Proposed		
				RE7 List of knowledge field involved.	Proposed		
				RE8 List of faculty members and Department or Centre they belong to.	Proposed		
				RE9 Type of support provided: budget	Proposed		

				allocation, office and personnel especially dedicated, etc.			
				RE10 List of Departments and Centres involved	Proposed		
		Grants		RE11 Total revenues from grants and contracts specifying sustainability-related research	Proposed		
		Publications and products		RE12 Published research with focus on sustainability-related issues	Proposed		
		Programs and centres		RE13 Number and function of centres on campus providing sustainability-related research or services	Proposed		
	Service	Community activity and service		SE1 Student, faculty, and staff contributions to community development and service	Proposed		
				SE2 Partnerships for sustainability with educational, business, and government entities at the local level	Proposed		
				SE3 Quantity and composition of student groups focusing on one aspect of sustainability	Proposed		
		Service learning		SE4 Existence and strength of service learning programs	Proposed		
				SE5 Total faculty, staff, students, involved in service learning projects	Proposed		