

# CHAPTER 1

## Universities, hard and soft Sciences: all key Pillars of global Sustainability

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### **PREAMBLE**

**I**magine you are an economic historian writing at the end of the 21st century about the second half of the 20th and first decade of the 21st. You will probably write that this period was characterized by an unprecedented increase in prosperity in the Western World, the rapid emergence of new, giant economic powers, an increasing interdependence due to globalization and, globally, relative peace. In brief, the well-being of the world's population increased rapidly thanks to prosperity and to global peace.

However, we cannot also exclude today the possibility that the period will — on the contrary — be described in very gloomy terms; this would certainly be the case if, for example, one or more of the following events take place in the years to come:

- the well-documented phenomenon of climate deterioration provokes famines and mass migration, as well as a great increase in natural disasters,
- fears about nuclear power generated by the dramatic consequences of the earthquake and tsunami in Japan lead to a deep energy crisis,
- the growing aspirations of populations for more freedom, equality and democracy in many developing countries lead to more instability due to ineffective political regimes,

- a global economic and financial meltdown generated by the incapacity to reverse the unprecedented measures taken by central banks and governments to prevent the 2008 financial and banking crisis turning into a global economic crisis.

These few examples remind us that the present — apparent — increase in world prosperity and positive political developments might not be sustainable because they contain destructive mechanisms.

This contribution pursues four aims: first, to demonstrate that the concept of sustainability, well established in the domain of environmental protection, exploitation of natural resources and climate deterioration, is equally powerful as a wide-ranging concept pinpointing the necessary sustainability of political, geo-political, economic, financial and social developments, which are required for world prosperity and peace. Secondly, the contribution would like to show that sustainability is closely linked to the prevention of risks and, thirdly, that universities, in particular research universities, have a great responsibility to promote global sustainability through their triple missions of research, education and engagement. Fourthly — and last, but not least — the contribution will argue that all academic disciplines, i.e. hard sciences, as well as social sciences, the arts and humanities, have to be mobilized towards global sustainability.

## **TOWARDS HARD AND SOFT SUSTAINABILITY**

### **Sustainable economic development**

Following the swift economic development of the Western World since the 1960s and the emergence of huge new economic powers over the past 20 years, as well as the explosive growth of the world's population, the need for sustainable development is rightly becoming at least as important as economic growth itself. The concept of sustainable economic development was based on the observation that economic growth has undesirable secondary effects. Basically, it became apparent that production and consumption were generating pollution, in particular air and water pollution. More than a century ago, economists developed the concept of externalities to analyse this phenomenon. The basic idea is that for many production and consumption activities, decision-makers are not required to take into account all the costs generated by their activity, therefore imposing external costs to other people, without providing compensation for this. The origins of external costs are polluted products dumped into the air or water, diminishing their quality, generating costly damages and/or requiring purification measures. In order to mitigate these market failures, economics and law propose policy instruments

to reduce the level of pollution attached to any level of production (or consumption) and/or to force polluters to internalize these costs, contributing to a reduced level of pollution.

Over time, the negative consequences of global economic growth, in particular of industrialization and increased consumption, as well as population growth, became increasingly felt at the global level. The most frequently quoted problem is the constant increase of CO<sup>2</sup> due to burning coal and oil for heating, powering vehicles and planes, and industrial processes. CO<sup>2</sup> is now considered the main cause of climate change due to the greenhouse effect, the source of rising average temperatures in the Earth's atmosphere. Climate change has considerable consequences on living conditions in many areas, in particular desertification and melting of the ice cap and glaciers, and seems to increase the violence of related natural events.

Moreover economic and population growth contributes to a rapid depletion of known available natural resources. It is becoming more and more expensive and risky to the environment to exploit new oil or gas fields and metal deposits, and there is a real danger that the world will face increased scarcity of resources, pushing up prices dramatically. The availability of clean water is at risk in many countries.

As awareness of the need to control pollution has grown since the 1960s, the depletion of non-renewable natural resources and, in particular, the consequences of human activities on the climate have become some of the hottest political issues at world level. They are the focus of both intensive scientific research and important scientific and ideological disputes, as well as of heated political debates, particularly between environmentalists and business leaders who want to maximize short-term productivity and profit. These disputes make it all the more difficult to reach a consensus on policies which look restrictive in the short term, but might well be very positive in the long run. This is not really surprising, considering that the world is composed of 200 nations with different interests and levels of development, with many active international organizations, but no real supra-national government or powerful world body. There is little agreement on the degree of priority that should be given to sustainable development. The question of how to proceed is forever in dispute. The very fact that increased economic prosperity implies not only quantitative, but also qualitative growth, shows why it is so important that development be sustainable.

### **Sustainable societies**

Is the concept of sustainability confined to qualify economic development in relation to the environment, the exploitation of natural resources and the climate? Certainly not! It has become clear today that it can be applied with

great benefits to “softer” aspects of sustainability, related to politics and geopolitics, economic, financial and social issues.

The history of political organizations, “clans”, feudalism, kingdoms and nations shows again and again that many leaders have been able to build up such enormous power that their regime is not only able to severely restrict the freedom of individuals, but also to impose a transfer of income and wealth in favour of a privileged few who become richer and richer at the expense of the majority. History demonstrates also that such situations cannot last forever. Desperate populations unable to escape poverty are prepared to fight injustice and oppression, and, if an opportunity arises, will rise up to overturn the situation. The same happens to those regimes that aim to extend their sovereignty over other countries and populations. This too generates reactions that generally bring about the defeat of the invader. The history of mankind is littered with examples, and recent events in North Africa and the Middle East demonstrate once more the fragility of political regimes that are unsustainable because the faction in power seeks personal enrichment and authority to the detriment of the rest of the population. These situations explain why authentic democracy, according to which citizens can choose their leaders and openly express disagreement with government, is considered the best, if not the perfect, political system.

The innate weakness of some political regimes demonstrates quite clearly that the problem of sustainability is not limited to natural elements, but can profitably be applied to human and societal questions. The 2008 financial crisis and the deficit/public debt crisis that continues today are also striking examples of the consequences of unsustainable. Let us look, at least superficially, at the 2008 (and on-going) banking and public finance crisis to highlight the fact that they too are the result of unsustainable development. The main factors that generated the banking and finance crisis are:

- The development of new investment instruments supposed to better spread risk, but which eventually allowed a dramatic increase in the leverage of bank assets.
- The development of new remuneration practices — at least in magnitude if not in concept — by which traders and top bank executives receive huge bonuses, encouraging them to take bigger risks and, in some cases, to behave dishonestly.
- The political strategy, in particular in the U.S., to encourage everyone to become a home-owner, even people with no income, no job and no assets — the so-called NINJNA — thanks to a policy of low interest rates, with the result that many families fell into the trap of buying a house they could not afford.

As soon as the crisis broke out, it became obvious that if one bank failed, many others would follow. This is why both central banks and ministries of

finance (treasuries) intervened massively to lend liquidity to banks, take over their bad debts and even nationalize them.

The amounts of money committed to this task, both by the central banks and governments, were unprecedented. In conformity with well-established economic theory, this prevented the financial crisis from spreading deeply into the real economy. Today, the financial markets are still flooded with liquidity, particularly as countries like the U.S. printed money to support the economy.

One consequence of the measures taken to save the bank and finance system is an explosion of the public deficit and, consequently, an enormous increase of the public debt in most developed countries. Many specialists consider that the public deficit should not exceed 3% of GNP. Yet, today, it is more than 10% in many Western countries. Many countries — in particular the U.S. and several European Union countries that have adopted the Euro — are having great difficulties financing their debt at an affordable cost and have to rely on the support of other countries to buy their public bonds.

The disequilibrium in public finance is particularly acute today because many countries had not previously managed their public finances carefully. The simple reason is that democratic regimes create a tendency to spend: it is easier for politicians to win elections if they promise additional programmes than if they threaten tax increases!

And it is impossible to predict how the world will escape from this crisis. The liquidity created to support the economy and the huge disequilibrium between creditors and debtor countries could well bring about many very negative developments, in particular a rapid acceleration of inflation, a currency war, increased protectionism and, finally, an explosion of unemployment.

## **Global sustainability**

These examples highlight the fact that the concept of sustainability is as relevant for human and societal questions as it is for natural ones. It is in this comprehensive, wider sense that we understand the concept of **global** sustainability. In other words, the concept of sustainability has two distinct dimensions: first a natural one, focusing on planet Earth, the environment, the exploitation of natural resources, including air and water, and the climate; second a human and societal one, referring to the well-being of human beings and the economic, political and social organization and development of society. Both “hard” and “soft” sustainability are indispensable for prosperity and resilience to crisis.

In view of the two distinctive natures of global sustainability, it is not surprising that we need different scientific approaches (scholarship) to study them and to make policy recommendations. If the domain of environmental

protection, exploitation of natural resources and climate borrows a lot — although by far not exclusively — from natural or “hard” sciences, the other dimension calls mainly for “soft” sciences, that is social sciences, arts and humanities. Therefore, the traditional approximate distinction between **hard** and **soft** sciences has a close correspondence with the two dimensions of sustainability.

## RISKS AND SUSTAINABILITY

An organization or a development can perform reasonably well, but there is always a risk that, one day, it will seriously dysfunction, causing a disruption, becoming a source of pain and resulting in the loss of years of progress. This is why the study of sustainability requires the study of all the risks that could challenge it in order to imagine measures to mitigate them, therefore securing a greater sustainability.

A couple of years ago the World Economic Forum (WEF) launched a series of initiatives on the question of risks, using its close relations with heads of government and high-profile business leaders, as well as its capacity to attract academics (See *Global Risks*, WEF, 2011a, and *The Global Agenda for business government and supra-national governmental organizations*, WEF, 2011b). *Global Risks* divides risks into five categories — economic, environmental, societal, geopolitical and technological — and estimates their likelihood and perceived impact if they occur. An effort has also been made to identify the interconnection between the different risks. A few comments drawn from the report show the importance of identifying risks in relation with global sustainability.

- The increasing economic disparity within countries and between countries is identified as one of the biggest risks threatening sustainability. An important characteristic of economic development over the past 20 years is that the rich have become even richer in all developing countries, despite robust economic growth in some emerging countries; many people in many countries remain trapped in a poverty circle. This is a serious problem as economic disparity is tightly interconnected with corruption, demographic challenges, fragile states and global imbalances, all serious factors affecting sustainability.
- Macroeconomic imbalances that include savings and trade imbalances within and between countries, currency volatility, fiscal crises, asset price collapse arising from the tension between the increasing wealth and influence of emerging economies and huge debts in advanced economies, create increasing risks of unsustainability.
- The rapidly rising global population and growing prosperity are putting unsustainable pressures on resources. Demand for water, food

and energy is expected to rise by 30%-50% in the next two decades. Shortages could cause social and political instability.

- A networked world and governance failures, combined with economic disparity, create opportunities for illegal activity to flourish.
- The increased interconnections among risks due to globalization mean a higher level of systemic risk than ever before. Thus there is a greater need for an integrated and more systemic approach to risk management.
- The failure of global governance creates and exacerbates systemic global risks.

These examples drawn from intensive and wide-ranging risk analysis put forward by the WEF reveal the great number and extreme variety of risks and the necessity to identify them and analyse them in order to develop and implement policies capable of mitigating them to secure greater sustainability. This requires a lot of research at a high level and the involvement of all stakeholders, academics, politicians and business leaders.

## **ROLE OF UNIVERSITIES**

The description of the two distinctive dimensions of global sustainability and of the multiple risks that are threatening sustainability reveals the immense complexity of the mechanisms at play and the close interaction between them. It is therefore not surprising that universities and other research or teaching institutions have a key role to play because they offer the right environment for analysing the necessary conditions for sustainability, allowing therefore the formulation of adequate policies. They have at their disposal the research infrastructure and staff with the necessary knowledge, and they are training and educating generations of students.

The ways that universities have been implementing their multiple responsibilities have changed considerably over recent decades. The days when universities served only the elite are over. Now they are a key driver of the knowledge society, having to train and retrain masses of students and to do more and better research to serve the needs of the economy and society. Moreover, they are expected to serve their community and to engage in public debate. This changing position (status) has had a profound impact on their strategy and attitude. The expectation and needs of society force them to be more responsive, that is adapt their output to satisfy the changing demand. However, it is at the same time crucial that universities, in particular research universities, remain responsible institutions (Grin, Harayama & Weber, 2000; and Weber, 2002). The high professional competence of their academic staff and advanced students, their repository of world knowledge, the concentration of

sophisticated equipment and the large autonomy they enjoy place them in a unique position to look at events with distance and objectivity, and to analyse them with the most up-to-date methods available. In other words “our institutions are now the leading sources of all three of the most important ingredients for progress and prosperity in modern societies: new discoveries, expert knowledge and highly trained people.” (Bok, 2010). Not surprisingly, this is exactly why universities have been given a large degree of autonomy in open and democratic countries.

But, the next question should be: are universities fulfilling their missions in the best way possible? Obviously, like international organizations, governments, firms and not-for-profit organizations, they could do better! The following weaknesses should be addressed with determination:

- Universities are conservative institutions so that it is extremely difficult for the leaders to bring about change.
- Universities are often more a collection of loosely organized individuals rather than an institution pursuing a common goal. They also have an academic organization inherited from the past which is not favourable to the development of interdisciplinary approaches indispensable to study today’s societal problems.
- Universities, and in particular public universities, are characterized by a complex web of partly contradictory constraints and incentives set up by governments, parliaments and funding agencies, which makes it more difficult for them to be efficient.
- Most high potential researchers are primarily — if not exclusively — interested in basic, curiosity-driven research. The challenge is, therefore, to persuade them to give part of their attention to research more immediately useful to solving societal problems.
- Teaching programmes do not escape criticism either. The programmes — in particular in research-intensive universities — tend to be conceived on the basis of what the various teachers like to offer. This is perfectly acceptable and even beneficial with regard to the basic intellectual exercise and training of students in ways to learn, but it is not sufficient for preparing students for lifelong learning and for the adaptability needed in fast-developing societies, as well as becoming engaged citizens with strong values.
- The lack of engagement by academics in solving societal problems and in participating in public and political debate is another issue. As members of an institution or beneficiaries of a grant from a research-funding institution, they have also a responsibility to communicate their knowledge and to collaborate with other disciplines and with applied scientists.



The weaknesses identified are not limited to universities, but extend to organizations providing financial supporting to them. Founding agencies are not neutral, first of all because their policy is strongly determined by the scientists themselves. Scientific journals are also a distorting element as they reflect the allocation of resources observed at funding bodies' level. As their policy is also fixed by their reading committees, the same distortions can be observed as in funding bodies. In particular, there is a bias against multidisciplinary, due mainly to the criteria applied to recruit new professors.

## **ROLE OF SOCIAL SCIENCES, ARTS AND HUMANITIES**

In today's world, largely dominated by markets and performance, the trust put in the capacity of new technologies to solve societal problems is strong, probably too strong. Take the example of energy. No doubt that new technology developed thanks to research in hard sciences and in engineering allows more efficient production of energy and increasing proportions of renewable energies. But what about energy consumption? Again, the demand for energy can be reduced thanks to new technologies allowing for more efficient engines or better insulation. However, consumer behaviour with regard to living, transport, leisure, etc. also plays a very important role; this is clearly observable in the important differences in energy consumption between different world regions with approximately the same standard of living and climate. Therefore, any serious energy policy should also focus on human behaviour in relation to energy consumption and should develop efficient policies in order to bring about a reduction in energy consumption.

The truth is that both hard — that is natural sciences — and soft — that is social sciences, arts and humanities — are equally necessary to contribute to global sustainability. Natural sciences and technology obviously have huge capacity to provide solutions for global sustainability. In addition to the energy question raised above, they offer today numerous new possibilities and great potential for the future. Just a few examples can demonstrate this: bacteria to fight pollution, new technologies to desalinate salty water, new species of corn to secure agriculture production in difficult environments, new vaccines or drugs to fight bacteria immune to antibiotics, etc.

But social sciences, arts and humanities are equally important to better understand the conditions for global sustainability, to support thinking differently and to imagine new policies. The following selective list of a few serious problems for human beings and society puts in evidence the importance of soft sciences and the urgent need to develop them in order to arrive at better solutions and policies:

- What are the causes of the diverging demographic trends, globally and in different regions, and the consequences on the environment, economic development and migration?

- Can our society tolerate an ever-increasing income and wealth inequality between countries, as well as within countries, and, if not, how can income and wealth be redistributed without impacting negatively on economic development?
- Globalization is without doubt contributing to the prosperity of the majority of people on the planet; but should it be pushed to the limit considering the social cost in “old” countries which, for demographic, as well as political and business structural reasons, are slower to adapt?
- How should countries be governed? Is democracy, which took more than 2,000 years to take hold in Europe and North America, necessarily the best political system for all countries, whatever their history, culture, level of education and development?
- What explains the fact that religions can become sources of political power and not simply remain a source of personal faith?
- What is the origin of terrorism and what can be done to eradicate it?
- What can be done to prevent business interests from influencing democratic processes in their favour even when it’s against the general interest?

An improved response to such “old” questions and many others would no doubt boost the prosperity of nations and the sustainability of their organization and development. No doubt also that the disciplines most capable of throwing light on these questions in order to better understand the mechanisms and to imagine policies to improve the situation belong to the soft sciences: **the arts and the humanities** which study the human condition and **the social sciences** which study society. Although the arts are not primarily founded on scientific methods, they are complementary to humanities and social sciences, in particular by pursuing beauty, they are contributing to seeing and arranging things differently and to imagining new ways to see reality.

In summary, social sciences, arts and humanities are crucial for two totally different reasons. First, they bring important knowledge about the human condition and society, including its successes and failures, and, second, they develop the capacity of human beings to judge, criticize, argue and envisage things differently, which is essential in complex societies and to ensure sustainability. A society with a poor culture in sciences, social sciences, arts and humanities, lacks the knowledge, aptitude, capacity of critical judgment and intellectual vigour necessary to address challenges with intelligence, rigour, honesty and independence of thoughts. Thus, it risks becoming the victim of unilateral thinking, in particular the sirens of populist/nationalist political movements or religious movements like creationism. The cost of ignorance is huge. There is a great risk today that the power attained by a few states, many corporations and populist political parties in many countries exceeds the pro-

fessional competences of those who lead them, as well as of their stakeholders who exercise indirect influence. The costs, in terms of prosperity of bad governments, ill-conceived policies and absurd conflicts, are also enormous. With better knowledge and education, better systems, better institutions, etc., the money wasted could be invested in constructive, long-term projects.

Considering the importance of social sciences, arts and humanities for the sustainable development of society, funding agencies and universities should ask themselves why they do not attach a higher priority to these disciplines. It probably has much to do with the methods of investigation and the applicability of results. In hard sciences, the methodologies of investigation, although in general very complex, are better established and more transparent than in soft sciences. The same is true for research results whose applicability to developing practical solutions is generally more immediately visible. On the other hand, soft sciences tackle questions that are often even more complex with research methodologies that are not standardized and do not offer the possibility of creating laboratory conditions. It is therefore not very surprising that hard sciences appear to contribute more to society, in particular thanks to their direct contribution to the country's competitiveness, defence system or energy supply; these are indeed all important in today's world, but nevertheless not sufficient in themselves to secure durable increased prosperity and peace.

The diverging performances between hard and soft sciences are obviously real, but the perspective that leads to such a conclusion can be considered short or medium term. However, if we look at the long term, the contribution of soft sciences is much greater.

## **NOT TO CONCLUDE: IS GLOBAL SUSTAINABILITY AN ILLUSION?**

The message of this chapter is that global sustainability is not only desirable, but should be a high priority for all nations and for society in general. But, is this realistic? All forms of societal organizations from communities to nations, even grouping of nations, have gone through an alternation of successful and difficult periods. Some have even disappeared, which also means that, for whatever reasons, their system was not sustainable or that they were overcome by other, more powerful communities/nations. Does this mean that the fate of our societies is already written or that that the powers at play can lead to an uncontrollable decline, and that, therefore, it is an illusion to be "committed to improving the state of the world", as stated in the World Economic Forum motto? (2011c). Perhaps. Who knows? However, even if this were the case, in any society nobody knows when a downturn is beginning or will begin. As much as most inhabitants of this planet are trying to improve their personal

and family situation, it is the responsibility of all political, business and academic leaders to do their utmost to increase the prosperity and peace of the nation, to contribute to the prosperity of other nations and, therefore, to mitigate risks to assure the sustainability of organizations and development. Universities, as well as other research and teaching organizations, social sciences, arts and humanities have more than ever a particular role to play.

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