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Global Economy and Global Competitiveness

Processes of Globalization and Global Trading

In order to develop a clear understanding about the global economy and its interrelationship with global competitiveness—as a basic step, it would be useful to keep abreast with the concept of globalization as a process and its relevance with the global trading as a system.

Since the 1990s, globalization has become a major concept for fostering sustained economic growth, with different groups understanding it in so many different ways. Keohane and Nye are among the pioneering ones who advanced a broad understanding of globalization that encompassed four different processes of globalization (Robert O. Keohane, and Joseph S. Nye, Jr. 2000):

1. Economic Globalization
2. Social and Cultural Globalization
3. Military Globalization
4. Environmental Globalization

These various types of globalization continuously interact with each other in varying context and degrees. For example, economic globalization enhances and stimulates international trade. Shipping of traded goods can transport goods from one continent to another. Such interactions make the understanding of the process of globalization fairly complex and integrated. A deeper understanding of the above mentioned 4 elements, their interrelationship and impact on the overall business environment should serve, to a large extent, the relevance of Global competitiveness in the context of dynamic global economic environment. This chapter is devoted to help build that understanding.

Economic Globalization and Trade

Economic globalization is essentially characterized by intercontinental trading and management relationships effected through multi-national corporations

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(MNCs). Almost one-quarter of all the goods and services currently being produced in the world are exported to another country for consumption (IMF, 2002). This type of globalization has created interdependent economic systems because most national economies are greatly reliant on increased trade relations; some could encounter economic depression, as it did in the 1930's, leading to the Great Depression in Europe (David Held, Anthony McGrew, David Goldblatt, and Jonathan Perraton, 1999).

Since the establishment of the first corporations by European powers during the seventeenth century, there have been major debates about the creation of Power Transnational Corporations (TNCs) that held in the global economy and the international trade regime, as it were, directing its economic power in the future. The problems often relate to the fact that the producers, consumers, and managers live in different communities and cross-cultures in different geographic locations, and have different sets of priorities, understandings, and worldviews so much so that many goods and services that are produced on one continent, consumed on another, and managed by a corporation located yet in another continent. During the Industrial Revolution (i.e. following Renaissance in France) of the eighteenth and nineteenth centuries, improvements in communications and transportation systems greatly increased the importation and exportation of goods and services in many parts of the world. The wave of economic globalization beginning in the late twentieth century is now being characterized by the global governance of the World Trade Organization (WTO) as well as innovative trade negotiations now happening in the new areas such as intellectual property rights, genetic engineering, nanotechnology, pharma sector and in biotechnology.

As the open access to Internet has allowed traders/exporters in many nations to communicate freely and more easily, sophisticated “anti-globalization” movements of workers, environmentalists, and indigenous peoples have also sprung-up side by side. Anti-globalization movements tend to oppose economic globalization and its effects on the environment, human rights, and cultural integrity. The names “anti-globalization movement” and, in India, “living democracy movement,” have been utilized to describe the global network of organizations proposing environmentally sustainable alternatives to economic globalization.

These organizations highlight several negative aspects impacting economic globalization:

1. The World Bank, International Monetary Fund (IMF), and World Trade Organization (WTO) make decisions concerning trade and development outside of the United Nations system and with little accountability to the national governments that created them.
2. Corporations and international investors move from nation to nation to escape labor, environmental, and consumer standards. This mobility creates great financial instability and unemployment in poorer, “single-industry” regions. National and local governments must then pay

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- “corporate welfare” payments in an effort to entice corporations to relocate and remain within their jurisdictions (David C. Korten, 1999).
3. Corporations fund political parties and campaigns, often leading elected officials to make unpopular decisions that favor corporate profits over citizen safety, rights, and needs.
 4. Governments are increasingly converting various “commons”— properties historically held in common by communities of people (e.g., land, seed varieties, and water)—into private properties held by corporations.
 5. Economic planning fails to consider the effects of growth and industrialization on the ecological capital upon which human wealth relies.

In order to help reverse many of the negative effects of globalization, different sectors of the anti-globalization movement have proposed various policies. As a leading group of theorists, the International Forum on Globalization (IFG) has promoted a set of policy changes that generally fall into four categories: new measurements of economic development, stabilization of economies, local ownership, and democratic control. The International Forum on Globalization (IFG) also promotes equitable, democratic, and ecologically sustainable economies. IFG were formed in response to widespread concerns over economic globalization, a process dominated by international institutions and agreements unaccountable to democratic processes or national governments (<http://www.wiserearth.org/organization/view4de132d4eab1997ef627220ab83b94de>).

1. **New Measurements of Economic Development**

IFG promotes the implementation of new measurements to evaluate economic development in the context of ecological sustainability. Utilizing new theories in the field of ecological economics, IFG assists economists with their examination of how economic decisions impact the Earth’s life-support systems. This ideal is accomplished when measurements of economic growth reflect the manner in which economic activities are expanding or damaging opportunities for future generations (Rajaram Krishnan, Jonathan M. Harris, and Neva R. Goodwin, 1995).

2. **Stabilization of Economies**

IFG promotes the stabilization of global economic conditions by curbing international financial speculation (Fritjof Capra, 2002). Short-term investments in foreign currency markets can create havoc in the global economy by reducing the ability of national governments to maintain stable currency rates and, by extension, to keep their national economies stable.

3. **Local Ownership**

IFG promotes the increase of local business ownership in order to reduce pollution and create stable employment situations. Increasing local business ownership may help raise environmental and labor standards for two main reasons:

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- a) Local stakeholders would more than likely choose cleaner production methods because they would have a personal stake in the local release of the pollution created by the enterprise.
- b) Local stakeholders would more than likely choose better labor policies because business employees would include people (e.g., family, friends, and neighbors) from their own geographic region. Local owners would also be much less likely to relocate their factory out of their home region and therefore would help preserve local jobs, stabilize local job markets, and reduce unemployment levels (Michael Shuman, 1998).

4. Democratic Control

IFG promotes the assertion of democratic control over national governments and the global economy. Proposals for increasing democracy vary from nation to nation, depending upon what type of governmental system is currently being utilized in that country. In the United States, for example, the anti-globalization movement calls for the public financing of election campaigns, in order to reduce the influence of corporations on government decisions. At the global level, the movement has debated whether to reform or abolish the World Bank, International Monetary Fund (IMF), and World Trade Organization (WTO). The anti-globalization movement is also concerned with the effects of economic globalization on various cultures throughout the world. Indigenous cultures are particularly impacted because increases in economic globalization lead to rapid social changes that can easily eliminate much of their cultural heritage. This phenomenon is called 'social and cultural globalization'.

Social and Cultural Globalization

Economic globalization has been supported by new technologies in the communications and transportation industries. These technologies have also led to an unprecedented mixing of world cultures, which has resulted in the second type of globalization, social and cultural globalization. Although cultural inventions have been exchanged throughout history, technology is making the global exchange of ideas and inventions possible on a much larger scale than has previously occurred. The earliest globalization of technology was the spread of Chinese inventions such as paper to Africa, Europe, and the rest of Asia. More recently, new communication technology has made entertainment imports relatively inexpensive and this has increased the amount of information that is transferred among various countries. Most of the world now watches imported movies and television programs that are primarily produced in the United States. These entertainment venues have brought American cultural conventions to the rest of the world and have had the effect of influencing, if not changing traditional cultures.

Although cultural globalization may enrich the various cultures involved in these interactions, it may also function to marginalize these cultures by replacing

Environmental Globalization

Globalization in economic, social, and military affairs contributes to the fourth process, environmental globalization—the increase of movement between continents of pollutants and species. Of the many environmental challenges found around the world, two in particular are driven by environmental interactions between continents: the loss of biological diversity and the increase of global atmospheric pollution.

Erosion of Biodiversity and Global Environmental Pollution

One key aspect of environmental globalization is the decrease in biological diversity. In the past, species distribution has been influenced by three main factors: temperature, geological history, and the structure of the Earth's surface. Natural barriers have isolated certain terrestrial species in specific areas and terrestrial barriers have kept different types of marine species in specific aquatic locations. American biologist Edward O. Wilson described this type of “geographic speciation” as the process in which populations of plants and animals located in separated regions “diverge from each other in evolution because of the inevitable differences of the environments in which they find themselves” (Edward O. Wilson, 1988).

The effort to protect the ozone layer has been the most successful global environmental project in history. It has involved the cooperation of many international organizations and nearly every national government. Industrialized countries have stopped producing nearly all of the worst ozone-depleting chemicals after signing the Montreal Protocol on Substances that Deplete the Ozone Layer (UNDP, 2002).

The successful cooperation on the Montreal Protocol gave the United Nations Environmental Programme (UNEP) hope that there could be some agreement on the issue of global climate change. Global climate change has been the subject of intense negotiations since the creation in 1992 of the United Nations Framework Convention on Climate Change (UNFCCC). The 1997 Kyoto Protocol has been ratified by many developed and developing nations in Europe and Asia, but the United States and Australia have shown reluctance in complying with the various recommendations of the Protocol (*viz.* Kyoto Protocol). The lack of international progress and cooperation in slowing global climate change illustrates the difficulty of organizing global responses to globally initiated environmental degradation, caused primarily by the polluting ‘Green-House gases’.

As a concept, globalization is broad-based and comprehensive to be useful and effective. However from the angle of operational effectiveness, it is broken down into at least four interconnected trends—economic globalization, social and cultural globalization, military globalization, and environmental globalization as outlined above. These trends are interrelated. Economic globalization has increased the specialization of workers, as their employers compete in global markets. Social and cultural globalization has changed cultures through the

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increased dissemination of communication, information, and technology. Military globalization has consisted of intercontinental blocs of allied nations engaging in military conflict with terrorists and with each other. Economic, social, cultural, and military globalization has often had negative impacts upon the environment, requiring that all nations of the world cooperate in an effort to slow the process of environmental globalization. Four environmental issues in particular—biodiversity, global climate change, ozone-layer depletion, acid rains, and nitrogen loading—are either caused by globalization or have serious consequences warranting global cooperation and intervention.

Global Economy

The technology advancement in all conceivable fields of significance to overall economic growth has allowed our environment to be characterized as a global one. “The global economy” has given business the ability to market products and services all over the globe. It has also allowed them to develop partnerships and alliances throughout the world, which has become essential for success in today’s business. It is obvious how global economy helps in promoting international cooperation and peace for the nations involved in the international trade by increasing mutual-dependence (http://en.wikipedia.org/wiki/Global_economy).

With the ever-increasing Global Economy and widespread use of the internet, people and businesses are realizing that they are often competing with people around the world for contracts and business deals. The global economy has created an environment in which many large corporations are becoming transnational firms. Trade barriers (both technical and non-technical) more often hamper economic development in the Global South, as compared to the North. New technologies like the internet, along with extended regional cooperation, innovative technologies, trade negotiations etc., to a large extent, may speed up the reduction of such trade barriers.

The *World Economic Outlook* presents the IMF staff’s analysis and projections of economic developments at the global level, in major country groups (classified by region, stage of development, etc.), and in many individual countries. It focuses on major economic policy issues as well as on the analysis of economic developments and prospects. It is usually prepared twice a year, as documentation for meetings of the International Monetary and Financial Committee, and forms the main instrument of the IMF’s global surveillance activities (IMFC, 2007).

Rationale for Organizations Entering the Global Environment

The benefits of international expansion are known and include additional growth and expansion; the opportunity to increase revenues, profits and return on investment. Global companies have special requirements that are significant organizational challenges. The structures that the managers of global companies

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adopt must assist them in their efforts to exploit opportunities to achieve economies of scale by centralizing their marketing and production activities—whenever possible. At the same time, the structures of international companies must also accommodate differences in national cultures and variations in business practices. As in any organization, the structures of international companies must serve to coordinate business activities and to move information quickly and accurately across borders and around the world (Bourgeois *et al.*, 1999). Developments introduced by foreign firms can seriously affect local communities and local businesses. The international arena entails some significant challenges and risks. Language, cultural and business practices, and political and legal environments can differ greatly across national borders. Practices that are perfectly acceptable in one country can be taboo in another country. McDonald's decision to enter India meant that its menu had to change drastically in order to accommodate the culture of a country in which cattle are revered (Bourgeois *et al.*, 1999). Clark and Arbel (1993) cite several challenges, such as communication difficulties, little control over regulatory, legal and political decisions, political instabilities, different labour patterns, costs, product supplies, religions, customs, work ethics, languages, lack of codes and standards. Globalization is primarily about negative effects on the environment, culture, social values, with the imitation of the western culture in the first place, and standardization, which leads to a uniform product in tourism and disappearance of local standards (Klanènik, 2003).

Global Economic Trends

The term global economic trends means the way most of the world economy is behaving in a recent period of time within a set of well-defined parameters. Global economy or the world economy is largely centred on a few large or developed economies of the world, namely, the USA, UK, France, Germany and Japan, some newly emerging economies of the world such as India, China and some South East Asian economies and certain pockets of Latin America like Brazil, Mexico and Argentina (UNCTAD, 2001: <http://www.unctad.org/en/docs/pogdsm21.en.pdf>).

The economic recession in the US economy in 2001 was downplayed and a surge in inventories has not proven sufficient to lead the economy on a sustained path of investment recovery. More so, growth in the US economy seems to be driven by increased consumer spending on consumer goods such as cars and electronic appliances. Although tax cuts and other measures have provided a temporary stimulus for higher disposable incomes, employment levels have actually been falling and with decline in equity rates and a general rise in international oil prices, the USA is perceived by many to be heading to a second plunge for recession in the new millennium.

As with the case of Europe, Germany's private consumption and demand are failing to take-off and, with the appreciation of the Euro, their exports

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basis of preliminary data available for the first quarter of 2001. Based on an analysis of underlying imbalances and fragilities in the world economy, the UNCTAD secretariat argued that without a coordinated global policy response, the slowdown in the United States would produce a synchronous cyclical downturn in the world economy. Rather than a rapid rebound, the United States economy could experience a prolonged period of sluggish growth which even quick conventional policy actions might be unable to remedy.

The *Report* also suggested that even Europe could be much more vulnerable to the slowdown in the United States than was generally expected by policy makers in the region, and without a determined change in economic policy, European growth would fall substantially below the 3 per cent experienced in the previous year. Similarly, without more aggressive measures designed to reverse persistent deflation, Japan's recovery remained highly fragile. If all these risks became reality, there would be a sharp deterioration in the external trading environment of developing countries, many of which were struggling to re-establish conditions for rapid and sustained growth after recent bouts of financial crisis.

While some emerging markets were expecting to improve their performance as a result of lower United States interest rates and a weaker dollar, these benefits could be easily wiped out by reassessment of risks, rising risk spreads and falling capital inflows brought about by slowdown in global growth and a further round of uncertainty. Already on the eve of events of 11 September, global economic conditions had been deteriorating over a year. The decline in the pace of demand in the first half of 2001 had been sharper than expected and for the first time since the late 1970s much of the world economy was simultaneously experiencing slower growth. The slowdown in the major industrial countries had begun to affect the rest of the world through trade and financial linkages, and many economies in Asia and Latin America were confronting recessionary pressures. Until the events of September 11, however, policy makers in most major industrial countries were reluctant to adopt a coordinated approach to stabilizing and reviving the world economy. But the recent events that have made possible such a coordinated macroeconomic policy response have also made the world economy more fragile and unpredictable and vulnerable, especially in the wake of rampant trade distortions and some negative impacts of emerging disruptive technologies that are taking place in the hyper-competitive environment.

Shifting Paradigm in the Rapid Pace of Globalization

Management and organization studies dealing with the phenomenon of globalization have in recent years been dominated by an instrumental, rational, economic and functionalist paradigm, which can be collectively referred to as instrumentalism. The foundation of instrumental reasoning or instrumentalism is the focus on the development of means-ends chains. Argument for

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instrumentalism in explaining globalization is often legitimized with reference to the efficiency needs of multinational corporations to make profits by extending their productive facilities and goods or services to new territories or markets. Globalization or the global economy is thus viewed in terms of the existence of resources or opportunities available to organizations, and serves means for achieving corporate ends (Goliath, 2002).

As global competition escalates, learning and earning are becoming more closely aligned. “Knowledge workers,” social philosopher Peter F. Drucker observes, are becoming central to our economy and our society. They possess critical thinking skills and, importantly, an ability to continue expanding their knowledge and adapting to change. Their earnings power is increasing, and they may eventually possess rising political power and status (http://www.kltprc.net/books/leadershipchallenge/Chpt_2.htm).

The embrace of instrumental doctrine in contemporary discussion of globalization is also manifested in terms of its conceptualization as a process of internationalization of production, availability of economic opportunities and resources such as raw materials, labor, capital, markets, etc. Similarly, globalization is synonymous to economic performance through the internationalization of the means of production and access to the conventional “factors of production” long identified by economists as “factor conditions” that can impinge on competitive advantage: physical resources, human resources, infrastructure, knowledge resources, and capital resources (Porter, 1990).

Thus, in standard international management books, globalization is presented as “the tendency of firms to extend their sales or manufacturing to new markets abroad”, “characterized by networks that bind countries, institutions, and people in an interdependent global economy”, “a worldwide integration of economic systems driven by multinational corporations” (Berry, Conkling and Ray, 1997), “the production and distribution of products and services of a homogenous type on a worldwide basis” or else in Darwinian terms, as companies which are under pressure to globalize or face extinction. From the efficiency perspective, economics defines everything else and the multinational or global corporation is upheld as the driver of the global economy. In order to survive, firms must “globalize” through various forms of internationalization strategies such as export, global franchising, joint ventures, strategic alliances, etc.

By conceptualizing globalization as “the global search for bigger markets” arising from competitive pressures at MNCs’ home markets and pressures for cost reductions, instrumental rationalism becomes the pervading doctrine in the globalization discourse. In order to achieve this economic aim, it is imperative that different people and cultures of the world adopt a monolithic culture with uniform consumption patterns. Hence, different cultures and global diversity must be managed in order to produce a global mindset. Similarly, the instrumental doctrine upholds a vision of unity, characterized by unanimity of values among the global populace. As a functionalist paradigm, the doctrine of the “survival of the fittest” is explicitly embedded in the future perspective to

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drawn between these terms and “new economy” and “information economy”. These latter “economies” are subsets of the broader knowledge-based economy.

A **knowledge-based economy (KBE)** is an economy in which the production, distribution, and use of knowledge is the main driver of growth, wealth creation and employment across all industries. In this context, being a KBE means more than simply having a thriving “new economy” or “information economy” somehow separate from a stagnant “old economy”. In a truly knowledge-based economy, all sectors have become knowledge-intensive, not just those usually called “high technology”. In other words, it is not merely an “information technology issue” but very much a ‘Knowledge-based issue in totality’.

Global Economic Growth Driving Higher Emissions

Global economic growth, by choice or by default, is highly energy-intensive, and predominantly dependent on fossil fuels, that cause a substantial proportion of environmental pollution and degradation. The major polluting countries in the world are those that are members of G-8 Nations. Growth in carbon dioxide (CO₂) emissions from fossil fuel burning and industrial processes has gone up markedly in the early twenty-first century. These emissions grew at only 1.1 per cent a year on average from 1990 to 1999. They increased at 3.1 per cent per year from 2000 to 2006. This increase occurred despite the dampening effect of extraordinarily large increases in petroleum prices, and through short-term cross-substitution, prices of other fossil fuels. Global emissions from combustion of fossil fuels accelerated sharply from around 2000.

CO₂ emissions from fossil-fuel burning and industrial processes (i.e. greenhouse gases) have been accelerating at a global scale, with their growth rate increasing from 1.1% y⁻¹ for 1990–1999 to >3% y⁻¹ for 2000–2004. The emissions growth rate since 2000 was greater than for the most fossil-fuel intensive of the Intergovernmental Panel on Climate Change emissions scenarios developed in the late 1990s. Global emissions growth since 2000 was driven by a cessation or reversal of earlier declining trends in the energy intensity of gross domestic product (GDP) (energy/GDP) and the carbon intensity of energy (emissions/energy), coupled with continuing increases in population and per capita GDP. Nearly constant or slightly increasing trends in the carbon intensity of energy have been recently observed in both developed and developing regions. No region is decarbonizing its energy supply and planning to go Carbon-neutral. The growth rate in emissions is strongest in rapidly developing economies, particularly in BRIC countries viz. Brazil, Russia, India and China. Together, the developing and least-developed economies (forming 80% of the world’s population) accounted for 73% of global emissions growth in 2004 but only 41% of global emissions and only 23% of global cumulative emissions since the mid-18th century. The results have implications for global equity (Clerk, 2007).

The Global Competitiveness Report

The Global Competitiveness Report (GCR) was initially published by the World Economic Forum (WEF), based in Geneva, Switzerland, way back in 1979. The latest edition, dated 2007-2008, was edited by Michael Porter of the Harvard Business School, Xavier Sala-i-Martin of Columbia University, and Klaus Schwab, Executive Chairman of the WEF. Its Global Competitiveness Index—the Growth measure of competitiveness (GCI)—covers 131 countries, including 66 of the 89 countries in which USAID currently works.

Each edition of the recently published Global Competitiveness Report (<http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>) contains a genuine wealth of information on the countries covered. The report's cornerstone is the GCI, the construction of which is inspired by Michael Porter's analysis of national competitiveness. The index scores countries on a total of 131 variables grouped under twelve "pillars." The pillars are institutions (public and private), infrastructure, macroeconomic stability, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, market share, business sophistication and innovation etc. (<http://www.businessgrowthinitiative.org/KeyPracticeAreas/Pages/GlobalCompetitivenessIndex.aspx>).

Global Competitiveness Index—Definition and Criteria

The Global Competitiveness Index is the accepted tool for evaluating a country's potential for growth. By comparing most of the world's countries, it provides insight into the comparative advantages of each of the competing countries in the global scene (<http://reut-institute.org/Publication.aspx?PublicationId=1312>).

World Economic Forum's Global Competitiveness Index supplies information regarding an economy's competitiveness for a large set of countries (125 in 2006). The rankings are drawn from a combination of publicly available hard data and the results of the Executive Opinion Survey. The latter is a comprehensive survey conducted on an annual basis by the World Economic Forum, together with its network of partner institutes (leading research institutes and business organizations) in the countries covered by the report. There are four variables in the IPRI Ranking for which data had been obtained from the 2006 WEF Global Competitiveness Index: "Judicial Independence", "Physical Property Rights Protection", "Intellectual Property Rights Protection", and "Access to Loans". The respective questions that survey participants were asked to answer are displayed in Appendix II. For more detailed information on the Global Competitiveness Index (www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm).

Composition of the Global Competitiveness Index

This appendix of the Global Competitive Index provides details on how the

3rd Pillar: Macro economy

- 2.13 Government surplus/deficit (hard data)
- 2.14 National savings rate (hard data)
- 2.16 Inflation (hard data)
- 2.17 Interest rate spread (hard data)
- 2.20 Government debt/GDP ratio (hard data)
- 2.15 Real effective exchange rate (hard data)

4th Pillar: Health and primary education***A. Health***

- 4.04 Medium-term business impact of malaria
- 4.05 Medium-term business impact of tuberculosis
- 4.06 Medium-term business impact of HIV/AIDS
- 4.10 Infant mortality (hard data)
- 4.11 Life expectancy at birth (hard data)
- 4.12 Tuberculosis prevalence (hard data)
- 4.13 Malaria prevalence (hard data)
- 4.14 HIV/AIDS prevalence (hard data)

B. Primary education

- 4.15 Gross primary enrollment (hard data)

5th Pillar: Higher education and training***A. Quantity of education***

- 4.16 Gross secondary enrollment (hard data)
- 4.17 Gross tertiary enrollment (hard data)

B. Quality of education system

- 4.01 Quality of the educational system
- 4.03 Quality of math and science education
- 8.15 Quality of management schools

C. On-the-job training

- 7.09 Local availability of specialized research and training services
- 8.11 Extent of staff training

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6th Pillar: Market efficiency

A. Goods markets: distortions, competition and size

1. Distortions
 - 2.12 Agricultural policy costs
 - 6.02 Efficiency of legal framework
 - 6.11 Extent and effect of taxation
 - 7.10 Number of procedures to start business (hard data)
 - 7.11 Time required starting a business (hard data)
2. Competition

Domestic competition

- 7.01 Intensity of local competition
- 7.02 Effectiveness of anti-trust policy

Foreign competition

- 2.19 Imports (hard data)
- 2.09 Prevalence of trade barriers
- 8.22 Foreign ownership restrictions
3. Size

Local markets

GDP – exports + imports (hard data)

Foreign markets (exports)

- 2.18 Exports (hard data)

B. Labor markets: flexibility and efficiency

1. Flexibility
 - 8.17 Hiring and firing practices
 - 8.18 Flexibility of wage determination
 - 8.19 Cooperation in labor/employer relations
2. Efficiency
 - 8.14 Reliance on professional management
 - 8.20 Pay and productivity
 - 4.08 Brain drain
 - 4.09 Private sector employment of women

C. Financial markets: sophistication and openness

- 2.03 Financial market sophistication

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technology as well as management theory and practice, the concept and techniques of productivity have undergone a change over time, thereby creating a need for devising fresh approaches, coining new message and adopting a new idiom to spread the message to the stakeholders. Since 2001, the World Economic Forum has been using the Growth Competitiveness Index (Growth CI) developed by Jeffery Sachs and John McArthur to assess the competitiveness of nations. Although it was cutting-edge at the time it was developed, more recent advances in economic research and the rising importance of the international dimension, as well as the increasing diversity of countries covered by the report, call for adjustment of methodology. The new Global Competitiveness Index (GCI) and a full description of its main methodological underpinnings were presented in the Global Competitiveness Report 2004-2005. A set of scores and rankings was again published in the Global Competitiveness Report 2005-06. With this year's (2007-2008) Global Competitiveness Index Report it has been considered as the main indicator to be used by the forum. The Global Competitiveness Index provides holistic overview of factors that are critical to driving productivity and competitiveness and group them into nine pillars (Nayak, 2008):

1. Institutions
2. Infrastructure
3. Macro economy
4. Health and Primary Education
5. Higher Education and Training
6. Market Efficiency
7. Technological Readiness
8. Business Sophistication
9. Innovation

It is important to note that none of these factors alone can ensure competitiveness. Therefore, the most competitive economies in the world will typically be those where concerted efforts have been made to frame policies in a comprehensive way, that is, those which recognize the importance of a broad array of factors, their interconnections and need to address the underlying weakness they reveal in a proactive way. By institution they mean the system of rules that shapes incentives and defines the way economic agents interact in an economy. The concept of competitiveness developed by the Forum explicitly incorporates notions of public sector accountability, efficiency, transparency and, more generally, the various ways in which the government interacts with economic agents in the domestic economy, particularly the business sector. The justifications for doing so are varied, sometimes reflecting reasonably well-established findings in empirical research. There are strong indications that differences in institutions explain much of the growth differential between countries, and therefore have an influence upon countries' growth performance well beyond simply getting inflation right or addressing other

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macroeconomic weaknesses. More specifically, to assess the effectiveness of public institutions, the GCI uses five criteria:

1. Respect for property rights
2. Ethics of government behaviour and the prevalence of corruption
3. Independence of the judiciary and the extent to which the government gives the private sector freedom to operate or engages in interventionist discretionary practices (concepts captured under the heading “undue influence”)
4. Government inefficiency reflected in the waste of public resources and a heavy regulatory burden
5. The ability to provide an environment for economic activity characterized by adequate levels of public safety.

The Global Competitiveness Report ranks the world’s nations according to the *Global Competitiveness Index*. The report states that it is based on the latest theoretical and empirical research. It is made up of over 90 variables, of which two thirds come from the Executive Opinion Survey, and one third comes from publicly available sources such as the United Nations. The variables are organized into nine pillars, with each pillar representing an area considered as an important determinant of competitiveness.

The report notes that as a nation develops, wages tend to increase, and that in order to sustain this higher income, labor productivity must improve in order for the nation to be competitive. In addition, what creates productivity in Sweden is necessarily different from what drives it in Ghana. Thus, the GCI separates countries into three specific stages: factor-driven, efficiency-driven, and innovation-driven, each implying a growing degree of complexity in the operation of the economy.

In the factor-driven stage countries compete based on their factor endowments, primarily unskilled labor and natural resources. Companies compete on the basis of prices and sell basic products or commodities, with their low productivity reflected in low wages. To maintain competitiveness at this stage of development, competitiveness hinges mainly on well-functioning public and private institutions (pillar 1), appropriate infrastructure (pillar 2), a stable macroeconomic framework (pillar 3), and good health and primary education (pillar 4).

As wages rise with advancing development, countries move into the efficiency-driven stage of development, when they must begin to develop more efficient production processes and increase product quality. At this point, competitiveness becomes increasingly driven by higher education and training (pillar 5), efficient markets (pillar 6), and the ability to harness the benefits of existing technologies (pillar 7).

Finally, as countries move into the innovation-driven stage, they are only able to sustain higher wages and the associated standard of living if their businesses are able to compete with new and unique products. At this stage,

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Here is the list of competitive countries based on global competitiveness index (GCI):

Table 2: Ranking of countries based on Global Competitiveness Index (GCI)

No.	Country	Rank (out of 125 countries)
1.	Switzerland	1
2.	Sweden	3
3.	United States	6
4.	India	43
5.	China	54
6.	Russian Federation	62
7.	Brazil	66
8.	Sri Lanka	79
9.	Pakistan	91
10.	Bangladesh	99
11.	Nepal	110
12.	Angola	121
13.	Burundi	122
14.	Chad	123
15.	Timor-East	124
16.	Mozambique	125

India is at good place in **Innovation factor** (26) and in **Business Sophistication category** (25). However, in the Basic Requirements category, India is ranked at 60. However, China is at 44th place and the US is at 27th place. Here is the list of **Factors responsible for driving productivity and competitiveness**. It describes India's performance on different categories on which the final list has come out.

Table 3: India's ranking according to different factors

No.	Factors	Ranking
1.	Market efficiency	21
2.	Business sophistication category	25
3.	Innovation factor	26
4.	Institutions factors	34
5.	Efficiency enhancers	41
6.	Higher education and training	49
7.	Technological readiness	55
8.	Infrastructure category	60
9.	Macro-economy	88
10.	Health and primary education	93

Produced in collaboration with a distinguished group of international scholars and a global network of over 130 leading national research institutes and business organizations, the Report also showcases the latest thinking and research on issues of immediate relevance for business leaders and policy-makers (<http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>). The Country-wise ranking position reflected in the Global Competitiveness Index of 2007-08 vis-à-vis 2006-07 is shown below in Table 4.

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Country/Economy	GCI 2007-2008		GCI 2007-2008 rank (among 2006 countries)*	GCI 2006-2007 rank
	Rank	Score		
Turkey	53	4.25	50	58
Indonesia	54	4.24	51	54
Cyprus	55	4.23	52	49
Malta	56	4.21	53	51
Croatia	57	4.20	54	56
Russia	58	4.19	55	59
Panama	59	4.18	56	60
Mauritius	60	4.16	57	55
Kazakhstan	61	4.14	58	50
Uzbekistan	62	4.13	n/a	n/a
Costa Rica	63	4.11	59	68
Morocco	64	4.08	60	65
Greece	65	4.08	61	61
Azerbaijan	66	4.07	62	62
El Salvador	67	4.05	63	53
Vietnam	68	4.04	64	64
Colombia	69	4.04	65	63
Sri Lanka	70	3.99	66	81
Philippines	71	3.99	67	75
Brazil	72	3.99	68	66
Ukraine	73	3.98	69	69
Romania	74	3.97	70	73
Uruguay	75	3.97	71	79
Botswana	76	3.96	72	57
Egypt	77	3.96	73	71
Jamaica	78	3.95	75	67
Bulgaria	79	3.93	75	74
Syria	80	3.91	n/a	n/a
Algeria	81	3.91	76	77
Montenegro	82	3.91	n/a	n/a
Honduras	83	3.89	77	90
Trinidad and Tobago	84	3.88	78	76
Argentina	85	3.87	79	70
Peru	86	3.87	80	78
Guatemala	87	3.86	81	91
Libya	88	3.85	n/a	n/a
Namibia	89	3.85	82	72
Georgia	90	3.83	83	87
Serbia	91	3.78	n/a	n/a
Pakistan	92	3.77	84	83
Armenia	93	3.76	85	90
Macedonia, FYR	94	3.73	86	84
Nigeria	95	3.69	87	95
Dominican Republic	96	3.65	88	93
Moldova	97	3.64	89	96
Venezuela	98	3.63	90	95
Kenya	99	3.61	91	98
Senegal	100	3.61	n/a	n/a
Mongolia	101	3.60	92	89
Gambia, The	102	3.59	93	103
Ecuador	103	3.57	94	94

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Another strong performer this year is Malaysia, ranked 26th overall, just behind the Republic of Korea which was ranked 24th. Malaysia exhibits one of the most efficient economies in the region; flexible labour market, relatively undistorted goods markets, and public institutions which in many areas. India ranked 43rd overall and, as the leading country in the GCI's first stage of development, scores remarkably high in capacity for innovation and sophistication of firm operations. This is especially true of the quality of scientific research and the number of scientists and engineers, which are increasingly supplying highly skilled profession to the private sector. Indian enterprises tend to utilize sophisticated production processes and use numerous high-quality local suppliers, thus lowering input costs.

Additionally, successive Indian governments have proven to be remarkably ineffective in reducing the public sector deficit, one of the highest in the world. China's ranking has fallen from 48 to 54. Its performance is highly uneven and this raises a number of concerns consistent with the cautious macro-economic management of its authorities and extremely high GDP growth rates, the macroeconomy pillar of the GCI shows a very high rank, 6th overall in the world. This reflects China's low inflation, one of the highest savings rates in the world, and manageable levels of public debt. Perhaps more than any other country in the world, China's large and rapidly growing market has attracted large volumes of FDI in recent years.

The banking sector is largely state-controlled and the capacity to price risk is limited. Levels of financial intermediation are low and the state has had to intervene from time to time to mitigate the adverse effects of a large nonperforming loan portfolio. Like India, China has low penetration rates for the latest technologies (mobile telephones, internet, and personal computers) and because these are expanding more quickly in other countries, China's ranks in these indicators are actually falling behind. Secondary and tertiary school enrollment rates are better than they are in India, but still low by international standards.

India's Position in Global Competitive Index

India has fallen five notches in the latest annual rankings of the Global Competitiveness Report released by the World Economic Forum. India was placed 48 in the list of 131 economies covered under the Global Competitiveness Index (GCI) which tracks twelve parameters to come out with the rankings. Among the top emerging markets, India is second this year behind China. Last year India ranked 43 and was ahead of other BRIC markets. This year China, at 34, is the top ranked BRIC market. Russia at 58 and Brazil at 72 are behind India. Among the three sub-indices under GCI, India improved its ranking from 41 to 31 in 'efficiency enhancers' but dropped from 60 to 74 in 'basic requirements'. Its ranking on 'innovation factors' remained unchanged this year at 26.

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The United States tops the overall ranking followed by Switzerland, Denmark, Sweden and Germany in that order. Last year Switzerland topped the charts followed by Finland, Sweden, Denmark and Singapore.

Chile is the highest ranked country from Latin America this year, followed by Mexico and Costa Rica. Several countries from the Middle East and the North Africa region are in the upper half of the rankings, led by Israel, Kuwait, Qatar, Tunisia, Saudi Arabia and the UAE. In sub-Saharan Africa, only South Africa and Mauritius feature in the top half of the rankings. Nine Asia-Pacific countries are among the top 30 in the GCI rankings, led by Singapore, Japan, Korea and Hong Kong SAR.

“The quality of the business environment in India has improved tangibly in recent years, with increased efficiency of goods, labour and financial markets and greater innovation and sophistication of firm operations. However, a number of weaknesses persist that need to be addressed especially in the area of infrastructure quality. Moreover, dealing with shortcomings in the provision of health services and education will ensure that the benefits of economic growth are more broadly distributed,” said World Economic Forum’s head of strategic insight teams, Fiona Papua. The rankings are based on publicly available data and the executive opinion survey, which is a business leader’s poll, conducted by the World Economic Forum. The survey is designed to capture a broad range of factors affecting the economy’s business climate.

India in a Global and Regional Context

India Poised to Become a Global Player

India, a country of sub-continental dimensions, has a share of total world trade of less than 1%. This amazingly small share of world trade is a reflection of India’s inward looking mindset of the late 20th century. However, it is equally a measure of the vast opportunities that lie ahead as we move forward in the 21st century. This issue needs to be addressed.

The first point to note from this forward looking perspective is that, though small, India’s manufacturing export base is already remarkably diversified, ranging from traditional exports like textiles, garments, leather products, gems and jewellery, through chemicals and pharmaceuticals to metals, metal products and machinery. Estimates of Revealed Comparative Advantage show that India’s manufacturing exports across this entire range are globally competitive. In some of these products, the country already has a significant share of the global market, while in other products the share is rapidly rising. Especially interesting in this context is the rapid growth in exports of automotive parts and components, and the future export potential of biotechnology products.

The other exciting aspect of India’s recent export performance is the dramatic growth in export of services. The share of services has risen from about 1/5th to 1/3rd of India’s total exports in the past 10 years, especially

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Other Attendance
 Physical Preparations
 Notes
 Earlier Versions

The following is the Text of G-8 Summit held at Heligendamm on 7 June, 2007 (http://www.g-8.de/Content/EN/Artikel/_g8-summit/anlagen/2007-06-07-gipfeldokument-wirtschaft-eng, property=publicationFile.pdf):

1. We have agreed on a policy agenda to promote a smooth adjustment of global imbalances which should take place in the context of sustained robust global economic growth. We have taken stock of the progress made to date and discussed further challenges lying ahead. Our agenda builds on discussions at the IMF and other international fora. Open markets and competition are crucial elements, as are our efforts to promote freedom of investment and the dynamics of innovation described hereafter.
2. We note that the world economy is in good condition and economic developments are now more conducive to an adjustment than in the past, not least because we have made progress in implementing our joint strategy. However, further efforts will be required to better rebalance global demand. Global imbalances took a long time to build. Likewise, their unwinding is likely to be a gradual process, entailing a medium-term rebalancing of demand growth across countries.
3. The economic environment has developed in a direction which favours the adjustment of global imbalances. Growth is now more balanced across regions, as it has moderated to a more sustainable pace in the US, while domestic demand has strengthened in Europe and remains supported by robust investment in Japan. We have made progress in implementing our joint policy strategy:
 - The United States has lent support to national savings by quickly and substantially reducing the federal budget deficit.
 - In Canada, domestic demand has been strong, supported by robust employment growth. Governments have significant ongoing budget surpluses.
 - In Europe, domestic demand has strengthened and the recent growth performance reflects prudent macroeconomic policies and a pay-off from structural reforms, including an improved labour market.
 - In Japan, as strenuous structural reform efforts continue, the upswing has proceeded and is becoming broader based. Fiscal consolidation is progressing, which is indispensable to reinforce confidence in the economy and to ensure sustainable, solid growth.
 - Russia has been enjoying seven consecutive years of robust economic

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growth based on strong domestic consumption, a take-off in investment and a disciplined macroeconomic and financial management.

4. Outside of our group, a number of countries in emerging Asia have taken first steps on the road towards a more flexible exchange rate regime and a strengthening of the financial sector, a move which would support this adjustment. Oil producing countries have increased investment in oil production capacity and many have made prudent use of their additional export revenues to promote the diversification of their economies and employment. Their import growth has accelerated substantially.
5. Global imbalances have been showing some signs of stabilization more recently and deficits have been relatively easily financed. An orderly adjustment, which is in the interest of the world economy, will take time. We are committed to implementing domestic policies to promote this. They are first and foremost in each of our own best interests:
 - The United States is targeting the elimination of its federal budget deficit by 2012. Policies also have been proposed to strengthen long-term fiscal sustainability through entitlement and health care reform, tax incentives to promote private saving, and proposals have been made to boost the use of alternative fuels and enhance energy efficiency. The United States will continue to follow pro-growth economic policies.
 - Europe will continue its structural reform efforts guided by the Lisbon strategy to promote growth and employment.
 - Japan will continue its effort to enhance growth potential by implementing the comprehensive program for boosting productivity growth announced in this April. Fiscal reform will be steadily implemented to meet the targets committed by the government, namely achieving surplus in the primary balance of the combined central and local governments by 2011 as a first step for reducing the debt-to-GDP ratio in a stable manner by the mid-2010s.
 - Russia is committed to pursue a sound macroeconomic policy framework and prudent financial policies along with a range of structural reforms facilitating its transition to self-sustaining, investment- and innovation-led growth.
 - Canada is committed to continuing to reduce government debt and has set an objective of eliminating total government net debt in a generation. Canada is also committed to continuing to lower taxes on persons and business and to reducing regulatory burdens, as well as promoting knowledge creation and investing in infrastructure.
6. We encourage a contribution from the emerging market countries towards reducing imbalances. Continued reforms to rebalance growth

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- promoting an open investment environment in industrialized countries and emerging economies,
- enabling greater benefits from and sustainability of foreign direct investments (FDI) for developing countries,
- promoting and strengthening corporate and other forms of social responsibility.

Freedom of Investment

10. We will work together to strengthen open and transparent investment regimes and to fight against tendencies to restrict them. Erecting barriers and supporting protectionism would result in a loss of prosperity. We therefore agree on the central role of free and open markets for the world economy, respecting sustainability concerns, and the need to maintain open markets to facilitate global capital movements. We reaffirm that freedom of investment is a crucial pillar of economic growth, prosperity and employment.

We call on all developed countries, major emerging economies and others to critically assess their investment policies, the potential costs incurred from unnecessarily restrictive or arbitrary policies and the economic benefits of open investment regimes.

11. Against this background we remain committed to minimize any national restrictions on foreign investment. Such restrictions should apply to very limited cases which primarily concern national security. The general principles to be followed in such cases are non-discrimination, transparency and predictability. In any case, restrictive measures should not exceed the necessary scope, intensity and duration. Applicable treaties relating to investment remain unaffected. We encourage the OECD to continue its work on these issues, especially by identifying best practices and by further developing general principles. We will work with the OECD and other fora to develop further our common understanding of transparency principles for market-driven cross border investment of both private and state-owned enterprises.

The Global Investment Environment

12. Emerging economies benefit considerably from inward FDI while acting increasingly as countries of origin of FDI. We see the need and the opportunity to work towards a level playing field for all investors. Companies from G8 countries investing in emerging economies expect to find the same open investment environment as companies from such countries investing in G8 countries. Openness to investment is beneficial for all parties involved.
13. We underscore that market-driven technology transfer is an important globalization catalyst. Governments have a role in establishing and

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maintaining the appropriate institutions and legal regulatory policy frameworks necessary to enable technology flows on a commercial basis and assuring the respect of intellectual property rights.

14. Open and transparent procurement markets are an important precondition for cross-border investments. We invite all our partners, in particular the major emerging economies, to create a level playing field for national and foreign tenderness. This may include considerations to join the WTO's Government Procurement Agreement (GPA).
15. We call on the emerging economies to adopt the OECD Declaration on International Investment and Multinational Enterprises. We invite the major emerging economies to participate in a structured High Level Dialogue on investment conditions in industrialized countries and emerging economies as part of the Heiligendamm Process. A stocktaking exercise, an examination of best practices and the implementation of peer review mechanisms to promote an open, efficient investment environment that aims to remove remaining barriers to investment should be a good start. We ask the OECD to provide a platform for such a dialogue.

Investment in Developing Countries

16. Unlike industrialized and emerging economies, many less advanced developing countries often reap only inadequate benefits from FDI. In shared responsibility with our developing country partners we want to enable quality FDI inflows to grow, inflows that help local infrastructure facilitate the operations of national and foreign investors that improve the skills of the local labour force and the advantages of transfers of management skills and technology that accrue from FDI increase, and that support the ability of domestic firms to supply inputs to foreign-invested companies or strengthen international value chains. Economic, social and environmental aspects of sustainability are crucial in order to maximize the FDI benefits for all developing countries, including least developed countries.
17. We support the regional and multilateral development banks (MDBs), including the International Finance Corporation (IFC) and the Multilateral Investment Guarantee Agency (MIGA), in addressing the problem of poor business environments in their borrowing members and urge them to integrate efforts to address these impediments to investment in their country strategies and budgets.
18. We support the initiative of G8 Finance Ministers to foster the development of deeper, more liquid local bond markets in emerging economies. This can make an important contribution to reducing the vulnerability of individual countries to crises and to enhancing the financial stability of emerging countries as a whole.
19. We support the OECD Policy Framework for Investment and UNCTAD Investment Policy Reviews as valuable mechanisms in defining a shared

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understanding of healthy investment climates in emerging economies and developing countries. The OECD Policy Framework for Investment could be translated into national practices and development strategies, especially for countries under the New Partnership for African Development (NEPAD) and Asia-Pacific Economic Cooperation (APEC) framework. We invite the OECD, UNCTAD and other organizations such as the World Bank to consider providing the necessary support for this purpose.

20. We invite UNCTAD and the OECD to jointly engage industrialized countries, emerging economies and developing countries in the development of best practices for creating an institutional environment conducive to increased foreign investment and sustainable development. Such a comprehensive process should be closely connected with the twelfth UN Conference on Trade and Development (UNCTAD XII) planned for 20th to 25th April 2008 in Accra (Ghana).

Investment and Responsibility — The Social Dimension of Globalization

21. Globalization and technological progress have resulted in rapid structural change in many regions and economic sectors. We acknowledge that structural change is the inevitable result of progress and that it brings dislocations along with opportunities. Open markets rest on political acceptance, social inclusion, gender equality and the integration of traditionally under-represented groups such as older workers, youth, immigrants and persons with disabilities. In order to address the social dimension of the globalization process, we identify the four following areas of action.
22. Promoting and further developing social standards: We are convinced that a globalization that is complemented with social progress will bring sustainable benefits to both industrial and developing countries. We recognize our responsibility for an active contribution towards this objective. Therefore, we support the International Labour Organization's (ILO) Decent Work Agenda with its four pillars of equal importance: the effective implementation of labour standards, especially the ILO core labour standards, the creation of more productive employment, further development of inclusive social protection systems and the support of social dialogue between the different stakeholders.
23. While stressing that labour standards should not be used for protectionist purposes, we invite the WTO members and interested international organizations, in close collaboration with the ILO, to promote the observance of internationally recognized core labour standards as reflected in the ILO declaration on Fundamental Principles and Rights and its follow-up. We also commit to promoting decent work and respect for the fundamental principles in the ILO Declaration in bilateral trade agreements and multilateral fora.

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24. **Strengthening the principles of Corporate Social Responsibility:** In this respect, we commit ourselves to promote actively internationally agreed corporate social responsibility and labour standards (such as the OECD Guidelines for Multinational Enterprises and the ILO Tripartite Declaration), high environmental standards and better governance through OECD Guidelines' National Contact Points. We call on private corporations and business organizations to adhere to the principles in the OECD Guidelines for Multinational Enterprises. We encourage the emerging economies as well as developing countries to associate themselves with the values and standards contained in these guidelines and we will invite major emerging economies to a High Level Dialogue on corporate social responsibility issues using the OECD as a platform.
25. We stress in particular the UN Global Compact as an important CSR initiative; we invite corporations from the G8 countries, emerging nations and developing countries to participate actively in the Global Compact and to support the worldwide dissemination of this initiative.
26. In order to strengthen the voluntary approach of CSR, we encourage the improvement of the transparency of private companies' performances with respect to CSR, and clarification of the numerous standards and principles issued in this area by many different public and private actors. We invite the companies listed on our Stock Markets to assess, in their annual reports, the way they comply with CSR standards and principles. We ask the OECD, in cooperation with the Global Compact and the ILO, to compile the most relevant CSR standards in order to give more visibility and more clarity to the various standards and principles.
27. **Reinforcing Corporate Governance:** Corporate governance is a key element in improving economic efficiency and growth as well as enhancing investor confidence. Good corporate governance provides proper incentives for the board and management to pursue objectives that are in the interests of the company and its shareholders and facilitates effective monitoring and surveillance. While corporate governance challenges are present everywhere, they are particularly acute in emerging economies. We encourage the widest adherence to the OECD Corporate Governance Principles and support the continuation of the work of the OECD/World Bank Regional Corporate Governance Roundtables.
28. **Investing in social protection systems:** Social protection is an investment in a country's economic future and a cost-effective way of fighting poverty. It includes appropriate protection against life's major risks and appropriate coverage for everyone, aiming at improved education and health. Social protection has the capacity to contribute to individual employability and to ensure that those who can work obtain adequate support to find employment and to obtain skills demanded by the labour market.

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33. In this respect we support the engagement of the OECD to work on proposals for topical international collaborative efforts. Based on the work of the Global Science Forum (GSF), we recognize the value that the GSF will bring as the moderator of this process. We also support the sharing of information among the G8 and emerging economies on national research endeavours in order to identify priorities that could be enhanced by collaborative research efforts, joint initiatives and programmes on areas of common interest. Possible areas of cooperation could be sustainable use of water and land and research in the field of energy efficiency as well as the promotion of environmentally-related innovations both in the public and in the business sector. We will work together to achieve more effective coordination and cooperation in our research efforts in these fields.

Intellectual Property Protection as the Backbone of Innovation

34. A fully functioning intellectual property system is an essential factor for the sustainable development of the global economy through promoting innovation. We recognize the importance of streamlining and harmonizing the international patent system in order to improve the acquisition and protection of patent rights worldwide.
35. The benefits of innovation for economic growth and development are increasingly threatened by infringements of intellectual property rights worldwide. We therefore strongly reaffirm our commitment to combat piracy and counterfeiting. Trade in pirated and counterfeit goods threatens health, safety and security of consumers worldwide, particularly in poorer countries. In this regard we welcome work on the WHO initiative to implement the International Medicinal Products Anti-Counterfeit Taskforce (IMPACT). Our common efforts in this combat are therefore in the interest of all countries at all levels of development.
36. We commit to strengthen cooperation in this critical area among the G8 and other countries, particularly the major emerging economies, as well as competent international organizations, notably the World Intellectual Property Organization (WIPO), WTO, the World Customs Organization (WCO), Interpol, the World Health Organization (WHO), the OECD, APEC, and the Council of Europe. We invite these organizations to reinforce their action in this field.
37. We welcome the joint Declaration of the business communities of all G8 countries on “Strategies of G8 Industry and Business to Promote Intellectual Property Protection and to Prevent Counterfeiting and Piracy” which highlights actions companies are taking to secure their intellectual property rights at home and abroad and to keep their global supply chains free of pirated and counterfeit goods – from producers and distributors, retailers and merchandisers. Industry and business have an

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essential role to play in protecting innovation, and we will engage our respective private sectors on effective solutions with regard to both the supply and the demand side of piracy and counterfeiting. We also welcome educational campaigns with the help of business communities in our countries directed at raising awareness of consumers with regards to the negative effects of counterfeiting and piracy.

38. In light of the urgency to implement concrete measures which will improve and deepen cooperation among G8 partners and deliver real enforcement results, we decide to undertake the following:
- (a) We endorse the Guidelines for Customs and Border Enforcement Cooperation designed to strengthen cooperation and coordination among our national customs and law enforcement administrations. In this context we especially welcome the development of an effective information exchange system – where appropriate - in close association with the WCO which will lead to improved cooperation among the relevant enforcement authorities worldwide.
 - (b) We endorse new Guidelines for Technical Assistance on intellectual property rights protection to interested developing countries, as well as a mechanism to better coordinate and leverage existing G8 assistance to such countries with a view to building the capacity necessary to combat trade in counterfeited and pirated goods to strengthen intellectual property enforcement. In partnership with certain developing countries we agree to launch technical assistance pilot plans with a view to building the capacity necessary to combat trade in counterfeited and pirated goods to strengthen intellectual property enforcement. The progress on these pilot plans will be reviewed by the G8 in 2008.
 - (c) We endorse the recommendations aimed at improving G8 member countries cooperative actions to combat serious and organized intellectual property rights crimes and the further work on their basis to facilitate structured international cooperation regarding the investigation and prosecution of those crimes.
 - (d) While appreciating the information contained in the OECD report estimating the economic impacts of counterfeiting and piracy on national economies and right holders, as well as public health and safety, we will encourage the OECD to work with member states to further identify and target in its report specific areas for concrete actions.
 - (e) We recognize the need for continued study by national experts of the possibilities of strengthening the international legal framework pertaining to IPR enforcement.
 - (f) We consider the establishment of an IPR Task Force focusing on anti-counterfeiting and piracy to look together at how best to improve the working of the international IPR protection and

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enforcement, and produce recommendations for action including improved peer review. The issue will also be considered in the Heiligendamm Process.

A New Dialogue on Innovation and Intellectual Property Protection

39. Lively interaction between science and business, strong protection and enforcement of intellectual property rights, and the combination of market-based entrepreneurship and science-based research are increasingly decisive factors in promoting economic growth and development around the world. We invite the major emerging economies to a follow up process using the OECD as a platform with the aim of establishing a new international dialogue on innovation and intellectual property protection as part of the Heiligendamm Process. Such a dialogue will provide a forum for the positive exchange on topics critical for growth of successful knowledge economies and the promotion of an innovation-friendly business environment also taking into account the needs of small and medium sized enterprises, including: (a) the crucial role and economic value of intellectual property protection and implementation as a central framework condition for the development of a future-oriented economy based on technological progress and innovation; (b) effective market incentives for innovation and the diffusion of knowledge at the national level taking into account recent developments in technology markets; and (c) the crucial importance of efficient innovation value chains that promote business commercialization of patented research results and exploit licensing as a major driver for the international transfer of technology. The dialogue could furthermore ascertain measures the industrialized countries and major emerging economies can take to achieve fully effective implementation and protection of intellectual property rights within their own territory. Fully respecting the mandate, function and role of the competent multilateral organizations, in particular the WTO and the WIPO, participants in the dialogue may also discuss initiatives aimed at strengthening intellectual property rights protection which should then be addressed in the appropriate international fora. The G8 Summit 2009 will take stock of the progress made by that date.

Climate Change, Energy Efficiency and Energy Security

40. Humanity today faces the key interlinked challenges of avoiding dangerous climate change and ensuring secure and stable supplies of energy. Since we met in Gleneagles, science has more clearly demonstrated that climate change is a long-term challenge that has the potential to seriously damage our natural environment and the global economy. We firmly agree that resolute and concerted international action is urgently needed in order

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ensure the security of critical energy infrastructure, reduce energy poverty and address climate change. To maintain the momentum of those achievements we herewith strongly reaffirm our commitment to Global Energy Security Principles, including our commitment to enhance dialogue on relevant shareholders' perspectives on growing interdependence, security of supply and demand issues, facilitate diversification of different types of contracts, including market-based long-term and spot contracts, promote investment in upstream and downstream assets internationally, support the principles of the Energy Charter and the efforts of the participating countries to improve international energy co-operation.

45. To maintain the momentum of that groundbreaking achievement, we invite China, Brazil, India, Mexico and South Africa and other major emerging economies to adopt these Global Energy Security Principles, will prepare national reports, with the assistance of the IEA, evaluating G8 member states' efforts to adhere to those principles, for delivery at the 2008 G8 summit, and note the importance of government-controlled strategic oil reserves, to lessen the impact of sudden and severe natural or man-made disruptions to oil supplies, and encourage the IEA to further assist major emerging oil consuming countries to adopt best practices with regard to building, maintaining and coordination the release of strategic oil reserves.
46. This year we have focused our discussions on energy efficiency in order to make an effective contribution towards meeting global climate and energy security challenges. Improving energy efficiency worldwide is the fastest, the most sustainable and the cheapest way to reduce greenhouse gas emissions and enhance energy security.
47. We welcome the progress made so far at the meetings of the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development, held in the United Kingdom in 2005 and Mexico in 2006. We also welcome the intentions of Germany and Japan to host the Dialogue meetings during their G8 Presidencies. We look forward to receiving a report of the Dialogue at the G8 Summit next year under the Japanese G8 Presidency.

Climate Change

48. We take note of and are concerned about the recent UN Intergovernmental Panel on Climate Change (IPCC) reports. The most recent report concluded both, that global temperatures are rising, that this is caused largely by human activities and, in addition, that for increases in global average temperature, there are projected to be major changes in ecosystem structure and function with predominantly negative consequences for biodiversity and ecosystems, e.g. water and food supply.

Fighting Climate Change

49. We are therefore committed to taking strong and early action to tackle climate change in order to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. Taking into account the scientific knowledge as represented in the recent IPCC reports, global greenhouse gas emissions must stop rising, followed by substantial global emission reductions. In setting a global goal for emissions reductions in the process we have agreed today involving all major emitters; we will consider seriously the decisions made by the European Union, Canada and Japan which include at least a halving of global emissions by 2050. We commit to achieving these goals and invite the major emerging economies to join us in this endeavour.
50. As climate change is a global problem, the response to it needs to be international. We welcome the wide range of existing activities both in industrialized and developing countries. We share a long-term vision and agree on the need for frameworks that will accelerate action over the next decade. Complementary national, regional and global policy frameworks that co-ordinate rather than compete with each other will strengthen the effectiveness of the measures. Such frameworks must address not only climate change but also energy security, economic growth, and sustainable development objectives in an integrated approach. They will provide important orientation for the necessary future investment decisions.
51. We stress that further action should be based on the UNFCCC principle of common but differentiated responsibilities and respective capabilities. We reaffirm, as G8 leaders, our responsibility to act. We acknowledge the continuing leadership role that developed economies have to play in any future climate change efforts to reduce global emissions, so that all countries undertake effective climate commitments tailored to their particular situations. We recognize, however, that the efforts of developed economies will not be sufficient and that new approaches for contributions by other countries are needed. Against this background, we invite notably the emerging economies to address the increase in their emissions by reducing the carbon intensity of their economic development.
Action of emerging economies could take several forms, such as sustainable development policies and measures, an improved and strengthened clean development mechanism, the setting up of plans for the sectors that generate most pollution so as to reduce their greenhouse gas emissions compared with a business as usual scenario.
52. We acknowledge that the UN climate process is the appropriate forum for negotiating future global action on climate change. We are committed

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to moving forward in that forum and call on all parties to actively and constructively participate in the UN Climate Change Conference in Indonesia in December 2007 with a view to achieving a comprehensive post 2012-agreement (post Kyoto-agreement) that should include all major emitters.

53. To address the urgent challenge of climate change, it is vital that major economies that use the most energy and generate the majority of greenhouse gas emissions agree on a detailed contribution for a new global framework by the end of 2008 which would contribute to a global agreement under the UNFCCC by 2009. We therefore reiterate the need to engage major emitting economies on how best to address the challenge of climate change. We embrace efforts to work with these countries on long-term strategies. To this end, our representatives have already met with the representatives of Brazil, China, India, Mexico and South Africa in Berlin on 4 May 2007. We will continue to meet with high representatives of these and other major energy consuming and greenhouse gas emitting countries to consider the necessary components for successfully combating climate change. We welcome the offer of the United States to host such a meeting later this year. This major emitters' process should include, inter alia, national, regional and international policies, targets and plans, in line with national circumstances, an ambitious work program within the UNFCCC, and the development and deployment of climate-friendly technology. This dialogue will support the UN climate process and report back to the UNFCCC.

Technology

54. Technology is a key to mastering climate change as well as enhancing energy security. We have urgently to develop, deploy and foster the use of sustainable, less carbon intensive, clean energy and climate-friendly technologies in all areas of energy production and use. We have to develop and create supportive market conditions for accelerating commercialization of new less carbon intensive, clean-energy and climate-friendly technologies. Furthermore, to ensure sustainable investment decisions worldwide, we need an expanded approach to collaboratively accelerate the widespread adoption of clean-energy and climate-friendly technologies in emerging and developing economies.

Therefore, we will:

- stimulate global development, commercialization, deployment and access to technologies;
- promote major emerging and developing economies' participation in international technology partnerships and collaborations;

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- scale up national, regional and international research and innovation activities; and
- undertake strategic planning and develop technology roadmaps to strengthen the role of advanced technology in addressing climate change.

Market Mechanisms

55. Private sector investment is and will remain the primary means of technology deployment and diffusion. Strong economies and a wide range of policy instruments are required to develop, deploy and foster climate-friendly technologies. Market mechanisms, such as emissions-trading within and between countries, tax incentives, performance-based regulation, fees or taxes, and consumer labelling can provide pricing signals and have the potential to deliver economic incentives to the private sector. Fostering the use of clean technologies, setting up emissions-trading systems and, as many of us are doing, linking them are complementary and mutually reinforcing approaches.

Therefore, we will share experience on the effectiveness of the different policy instruments in order to:

- better provide the international business community with a predictable and long-term perspective, and
- strengthen and extend market mechanisms by, inter alia, developing and extending existing programmes, taking into account the appropriate metrics for such systems.

Reducing Emissions by Curbing Deforestation

56. We are determined to assist in reducing emissions from deforestation, especially in developing countries. Reducing, and in the long term halting deforestation provides a significant and cost-effective contribution toward mitigating greenhouse gas emissions and toward conserving biological diversity, promoting sustainable forest management and enhancing security of livelihoods. To this end, we will:

- encourage the establishment of a pilot project dedicated to building capacity, creating and testing performance-based instruments to reduce emissions from deforestation in developing countries, in support of and without prejudice to ongoing UN climate change discussions. We therefore encourage the World Bank, in close cooperation with the G8, developing countries, the private sector, NGOs and other partners, to develop and implement such a forest carbon partnership as soon as possible;
- continue to support existing processes to combat illegal logging. Illegal logging is one of the most difficult obstacles to further progress in realizing sustainable forest management and thereof, in protecting forests worldwide;

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of ozone-depleting substances. We will continue to exercise leadership in the development of the Global Earth Observation System of Systems (GEOSS).

60. We will report on the progress achieved in the areas mentioned above at the G8 Summit in 2008.

Biodiversity

61. We emphasize the crucial importance of the conservation and the sustainable use of biodiversity as an indispensable basis for the provision of vital ecosystem services and the long-term provision of natural resources for the global economy. We acknowledge the “Potsdam Initiative – Biological Diversity 2010” presented at the G8 Environmental Ministerial meeting in March 2007 and will increase our efforts for the protection and sustainable use of biological diversity to achieve our agreed goal of significantly reducing the rate of loss of biodiversity by 2010.

Energy Efficiency

62. The global potential for saving energy is huge. According to the International Energy Agency, successfully implemented energy efficiency policies could contribute to 80% of avoided greenhouse gases while substantially increasing security of supply.
63. We recognize that enhanced international cooperation offers enormous opportunities. Against this background we are committed to further strengthening and increasing our efforts of co-operation, both at inter-state level as well as within the framework of the respective international fora and organizations.

To this end, we will:

- continue and further substantiate our energy-efficiency dialogue begun at Evian;
- move forward with implementing the Gleneagles and St. Petersburg Action Plans, thereby retaining and supporting the IEA’s close involvement;
- take forward the concrete recommendations on energy efficiency presented by the IEA and consider drawing on these when preparing national energy efficiency plans;
- encourage the World Bank and other IFIs to further broaden and improve their financial framework for energy efficiency and clean energy;
- note the EU’s proposal for an international agreement on energy efficiency and ask the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development and the IEA to explore the most effective means to promote energy efficiency internationally, including through the exchange of best practices, sharing

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- methodologies and further cooperation and by inviting other countries with significant energy needs to join;
- promote international research, encourage investment and development cooperation aimed at energy efficient technologies and other greenhouse gas mitigation options;
 - report on progress in the policies and measures on energy efficiency outlined below at the G8 summit in 2008.
64. We note that, in view of their high energy needs, industrialized and emerging economies have a fundamental joint interest in taking measures to encourage the most effective use of their energy.
65. Against this background we commit ourselves to a model of efficient energy systems and call on other countries with high energy demand, including the major emerging economies, to join us in this endeavour. Our goal of building less energy intensive economies will also advance economic growth and competitiveness. To this end, we will promote the appropriate policy approaches and instruments, including inter alia economic incentives and sound fiscal policies, minimum standards for energy efficiency, sound and ambitious energy performance labelling, information campaigns aimed at consumers and industry that enhance national awareness, sector-based voluntary commitments agreed with industry, investment in research and development and guidelines for public procurement. We will develop and implement national energy efficiency programmes and advance international cooperation on energy efficiency, notably on efficiency standards. We ask the IEA to continue to support our national efforts by appropriate advice and make proposals for effective international co-operation.
66. We will furthermore work together with the major emerging economies towards a reduction in energy consumption in priority sectors. To this end we will invite the IEA, its members and their respective industries to increase the dialogue with the major emerging economies on more efficient energy policies and develop guidance mechanisms.

Sustainable Buildings Network

67. The opportunities for making buildings more efficient are enormous. Following the EU/G8 conference on energy efficiency, held in Berlin in April 2007, we will:
- set up a “Sustainable Buildings Network”, involving the G8 and open for participation of the major emerging economies. The network will develop practical instruments for assessing and advising on the implementation of energy efficiency in buildings and the use of renewable energies, especially for cooling and heating, taking into due consideration the different situations of new and existing buildings, and development and deployment of low and zero-carbon buildings.

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- introduce energy efficiency labels for new cars along the lines of those already on some white goods.

Power Generation

69. Over the next 25 years, fossil fuels will remain the world's dominant source of energy. Making power generation more efficient, climate friendly and sustainable is therefore crucial.
70. Current innovations in power station design bear significant saving potential. Therefore, we will:
 - stimulate investments in high efficient power plants and grids and promote refurbishment of existing ones by an appropriate national policy framework. By this we aim to increase average power plant efficiencies in each of our countries,
 - continue and expand national and international research and development efforts to further advance modern power station technologies, with the aim of achieving higher efficiency levels,
 - adopt instruments and measures to significantly increase the share of combined heat and power (CHP) in the generation of electricity.
71. The centre of gravity of global energy demand is continuously shifting towards the emerging economies. We will:
 - enhance energy co-operation with those countries as a priority issue, including by actively supporting co-operative research, voluntary technology partnerships and private investment in clean technologies,
 - work in close partnership with industry, science and with governments of other industrialized countries and, in particular, of major emerging economies in order to foster the diffusion and adoption of best practices along the entire fossil fuel process chain with a focus on fuel treatment as well as new and existing power plants. We particularly underline the need to promote capacity building and technology transfer on plant renovation and modernization. To achieve these goals we will invite the IEA to take a central role in guiding our joint efforts.
72. In recognition of the increasingly urgent needs to achieve longer term greenhouse gas abatement, we will work on accelerating development and deployment of carbon capture and storage (CCS), including by
 - prioritizing national and international research and development efforts and encouraging international research and technology cooperation, to minimize efficiency losses of the different carbon capture technologies and to clarify geotechnical conditions for secure CO₂ storage,
 - encourage research, development and deployment of clean coal technologies in both developed and emerging economies with the highest energy needs,

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- supporting national and international geo-scientific and political efforts in the field of CCS on ensuring security of storage and the provision of necessary legal frameworks to create a stable investment climate, thereby working in cooperation with industry as well as national and international research programmes,
 - reinforcing our commitment made under the Gleneagles and St. Petersburg Plans of Action to support the initiatives taken by IEA and Carbon Sequestration Leadership Forum (CSLF), encouraging our governments to design mechanisms to stimulate the construction and operation of a growing number of large-scale demonstrations of sustainable fossil fuels technologies in commercial power generation,
 - encouraging industry to consider the concept of capture ready when developing new fossil fuel power plant.
73. We reaffirm our support of the efforts of the Global Gas Flaring Reduction Partnership (GGFR) and we commit ourselves to reduce to minimal levels natural gas flaring, and to encourage all oil producing states and private sector stakeholders to do likewise.

Industry

74. Over the next 25 years, global energy consumption in the industrial sector is projected to increase significantly. There is a considerable potential for improving energy efficiency. Therefore, we will:
- cooperate more closely with major emerging economies and leading industries on improving energy efficiency in energy intensive industries utilizing on-going work of the IEA for developing sector energy efficiency indicators and combining good practices,
 - encourage the introduction of cost-effective technology as well as promote research and development for further innovation for breakthrough of the technology in such areas as iron, steel and cement.

Energy Diversification

75. Diversification of energy sources, markets, transportation routes and means of transport and types of energy is essential to energy security and to a low-carbon energy path. Increasing and varying our sources of energy helps to defuse the risks of disruption from any one source. Increasing the use of alternative sources of energy can over time greatly relieve pressure on markets for conventional fossil fuels and reduce the adverse environmental impacts of energy use.
76. Underlining the importance of energy diversification, and recognizing that G8 members will choose different ways to achieve their energy diversity goals, we

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- will continue to develop and implement the policy frameworks needed to support our intensive commitment to the global use of all clean fuels, including clean coal, renewable energy sources (wind, solar, geothermal, bio-energy, hydro power). We will make efforts to integrate renewable into the power grid,
 - reaffirm our pledge at former summits regarding the peaceful use of nuclear energy. Those of us who have or are considering plans relating to the use and/or development of safe and secure nuclear energy believe that its development will contribute to global energy security, while simultaneously reducing harmful air pollution and addressing the climate change challenge,
 - reaffirm our commitment to work towards the reduction or, where appropriate, the elimination of tariff and non-tariff barriers to environmental goods and services through the WTO Doha negotiations, which will also help us to address our shared energy security and climate goals,
 - welcome concerted global action to promote renewable energy and the support of interested parties for initiatives and partnerships such as the Renewable Energy Policy Network for the 21st Century (REN21), the Renewable Energy and Energy Efficiency Program (REEEP), the Global Bio-Energy Partnership (GBEP) and the Mediterranean Renewable Energy Partnership (MEDREP),
 - take note of national and international initiatives to go along with the further development of a peaceful use of nuclear energy including the Global Nuclear Energy Partnership (GNEP), the Russian initiative on multinational centres to provide nuclear fuel cycle services, the Six party proposal of a standing mechanism for reliable access to nuclear fuel, the Japanese initiative on IAEA standby arrangements system for the assurance of nuclear fuel supply, and the German initiative for an enrichment centre under the exclusive control of the IAEA as well as ongoing debate on other multilateral approaches to a nuclear fuel cycle for a reliable fuel supply program, the work of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), and advanced nuclear energy research under the Generation IV International Forum (GIF).
77. We are committed to the paramount importance of safety, security and non-proliferation in using nuclear power. We reiterate common interest to continuously improve nuclear safety, radiation protection, waste management, nuclear security and nuclear liability in our respective countries, and we call upon all other states to do the same. IAEA standards and recommendations form a good basis for the continuous improvement of nuclear safety and security, as well as national nuclear regulatory systems. We underline the need for effective national

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- call on our trading partners to refrain from restraints on trade and distortion of competition in contravention of WTO rules and to observe market economy principles.
82. Mineral resources have a great potential to contribute to poverty alleviation and sustainable development. In some cases, nonetheless, extraction and processing of resources are associated with misuse of revenues, environmental destruction, armed conflict and state fragility. We firmly agree on the need to further enhancing the contribution of mineral resources to sustainable growth and will continue to support resource rich countries in their efforts to further expand their resource potential while promoting sustainable development and good governance. To this end we will build capacity for good governance of mineral resources consistent with social and environmental standards and sound commercial practices by reducing barriers to investment and trade, through the provision of financial, technical and capacity building support to developing countries for the mining, processing and trading of minerals. Based on sound life cycle analyses, we will also encourage conservation, recycling and substitution of raw materials, including rare metals, for sustainable growth.
83. Increased transparency in the extractive sector is of crucial importance for achieving accountability, good governance and sustainable economic growth worldwide. We welcome the proposal of the G8-Presidency to convene in 2007 a global conference on transparency in the extractive sector with the participation of governments, business, civil society and science from industrialized, emerging and developing economies.
84. The development of a consolidated set of principles and guidelines that apply to the international mining sector in developing countries would help ensure that the sector contributes to development while at the same time providing a clear and more predictable set of expectations for investors. It is important that all stakeholders be involved in a process to build consensus around a set of recognized principles and guidelines in the mining sector. In order to encourage such a consensus among key stakeholders we:
- reaffirm our support of the OECD Guidelines for Multinational Enterprises as important international benchmark for corporate social responsibility, will promote wider understanding of and support for the following standards, tools and best practices for the mining sector: the OECD Risk Awareness Tool for Multinational Enterprises in Weak Governance Zones, the Voluntary Principles on Security and Human Rights and the International Finance Corporation (IFC) Performance Standards,
 - encourage active engagement of mining sector companies with the UN Global Compact, encourage mining sector companies to undertake regular reporting using inter alia the Global Reporting

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Initiative (GRI) framework, and welcome the adaptation of this instrument for small and medium enterprises as well as to the specific needs of the mining sector,

- will support the work of the UN Special Representative of the Secretary General for Business and Human Rights.
85. Certification systems can be a suitable instrument in appropriate cases for increasing transparency and good governance in the extraction and processing of mineral raw materials and to reduce environmental impacts, support the compliance with minimum social standards and resolutely counter illegal resource extraction. Therefore, we reaffirm our support for existing initiatives such as the Kimberley Process, Green Lead, the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, the International Council on Mining and Metals or the International Cyanide Management Code, and encourage the adaptation of the respective principles of corporate social responsibility by those involved in the extraction and processing of mineral resources.
86. The artisan and small-scale mining sector provides important livelihoods to many people in developing countries, and also contributes to global production of minerals. We are concerned that these activities often are conducted in an informal manner and do not meet minimum social and environmental standards which apply to the extractive sector. In order to better support the development of sustainable livelihoods and positive developmental impacts associated with artisan and small-scale mineral production, we
- encourage collaborative partnerships between public, civil society and private actors in the mining sector in order to develop systems for the transparent use of funds for local development from mining companies and donors, consistent with aid effectiveness principles,
 - support a pilot study, in co-operation with the World Bank and its initiatives, concerning the feasibility of a designed certification system for selected raw materials. In taking this initiative we will focus on the artisan and small-scale mining sector and work in close partnership with governments from mineral resource rich developing countries as well as industry on the basis of their voluntary commitments. The pilot study shall strive on the basis of the existing principles and guidelines, in order to comply with internationally recognized minimum standards by verifying the process of mineral resource extraction and trading. We invite major emerging economies to work with us on this issue,
 - encourage support for the Communities and Small-scale Mining (CASM) initiative, housed at the World Bank, and for the multi-stakeholder Diamond Development Initiative (DDI), which emerged from the Kimberley Process to strengthen the developmental impacts associated with artisan diamond mining in Africa,

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- support efforts to develop techniques to limit pollution associated with artisan mining, such as education and training to encourage the use for example of safer retorts for gold extraction.

The Heiligendamm Process with Major Emerging Economies

87. At the Heiligendamm Summit we discussed with the leaders of Brazil, China, India, Mexico and South Africa the major challenges that have arisen in the world economy. Neither the G8 countries nor major emerging economies will be able to cope with these challenges individually. Against the background of our respective responsibilities, common solutions need to be developed. Both the G8 countries and the major emerging economies have the chance to define a new partnership responding to these world economic challenges.
88. Building on our discussions, we decided to launch a new form of specific cooperation with major emerging economies in order to discuss substantive topics in a comprehensive follow-up process with the aim of reaching tangible results in two years.
89. We will initiate a new form of a topic-driven Dialogue in a structured manner based on this new partnership. We agreed to address four issues:
 - Promoting and protecting innovation,
 - Enhancing freedom of investment through an open investment environment including strengthening corporate social responsibility principles,
 - Defining common responsibilities for development with special regard to Africa,
 - Sharing knowledge for improving energy efficiency and technology cooperation with the aim to contribute to reducing CO₂-emissions, consistent with the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development, and the St. Petersburg Plan of Action on Global Energy Security.
90. We ask the OECD to provide a platform for this new dialogue process, with the IEA being the relevant organization in the field of energy efficiency. The dialogue process will begin in the second half of 2007. The G8 Summit in Japan in 2008 will receive an interim report on the progress made and at the G8 Summit in Italy in 2009 a final report on the outcomes of the Dialogue Process will be presented.

Energy's Role in Economic Growth and Job Creation

The energy and power sector creates and sustains millions of jobs—and the potential for good-paying jobs in the future is great. According to the Bureau of Labor Statistics, the gross domestic product (GDP) of the energy industry itself (including electric and gas utilities, nuclear power generation, mining, and oil and gas extraction) was \$ 352 billion in 2003, a 3.2% share of the

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Firms and States in Global Competition

A tendency since the late 1980s and the early 1990s in international business and political economy has been the growing interdependence between the state and the transnational corporation (TNC). The relation between the state and the firm is no longer a one-way process. It has grown into triangular relationships and diplomacy along the state-TNC nexus: (1) state-state; (2) state-TNC; and (3) TNC-TNC. The increasingly complex relationships between the state and the TNC have prompted many host governments to reconsider their concerns when negotiating with TNCs. The concern of governments varies with the type of TNCs with which they are negotiating. In general, there are two trends that draw growing attention from government authorities. The first trend is *increasing global interdependence*: Governments are particularly concerned whether they will lose their competitiveness and power in the interdependent global economy. Their main concerns are, namely, (1) the equity and efficiency of adjustment processes in declining industries; (2) the development of new industries for strategic reasons; and (3) the specialization of national economies.

In today's interdependent global economy, the fate and prospect of industries in one country or region is often intertwined with industries in another country or region. Technological development in advanced industrialized economies, for example, has reduced the need for primary products in the production processes. This results in the decline of traditional industries such as mining and plantations in many Southeast Asian countries. Many of these Southeast Asian countries have since learnt to adjust to this process of global shift in production processes and consumption patterns. Their main concern is to remain competitive in the global economy and, yet, to capture value-added activities mainly through the local presence of foreign investments. Malaysia and Thailand are good examples as reform-minded governments have been consciously attracting foreign investors and TNCs, particularly those in electronics sector, to pull the economy out of declining industries. Another concern for many natural resources-poor countries is to develop new industries for strategic reasons.

To capture greater value-added activities and to share the success of the global economy, many countries begin to develop strategic plans for their industrialization processes. Singapore is well-known for its consistent drive towards high-tech and information-intensive industrialization. Today, the clustering of many leading world-class electronics, chemicals, and biomedical science manufacturers and their research and development facilities in the city-state testifies the success of such a strategy in attracting TNCs. A final concern of governments is related to specialization and hence trade. Countries in the Asia-Pacific region, in particular those newly industrialized economies (NIEs), have long realized that import-substitution is not an ultimate solution to economic underdevelopment. They instead have relied on export-oriented platform to economic growth and development.

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To be a successful export-oriented economy, one must specialize in order to capture comparative advantages that maximize the skill and resource endowments of a particular country. Singapore, for instance, offers a strong comparative advantage in human resources, whereas natural resources sustain the comparative advantage of Indonesia. Both countries specialize in different industries to gain from international trade and, more recently, foreign direct investment. On the other hand, governments are also driven by the second structural trend – *growing global competition*. Their response varies according to the nature of TNCs. If they are concerned with global competition without the presence of TNCs, the tendency is to regulate the extent and speed of exposing national producers and markets to international competition (e.g. Taiwan and South Korea). If multi-domestic TNCs are preferred and discrete subsidiaries are maintained by these TNCs, a minimum regulation is enforced (e.g. Singapore). Sometimes, host country governments are overpowered by global TNCs having worldwide operations. Integrated TNCs are likely to have substantial bargaining power so that there is a transition from regulation to negotiation in the attitude of government authorities (<http://courses.nus.edu.sg/course/geoywc/teaching/GE4202%20Outline%2007-08.htm>).

Value-Chain in Global Competitiveness

Global value chains are radically altering how goods and services are produced: parts made in one country, for instance, are increasingly assembled in another and sold in a third. The globalization of production has changed the industrial structure within OECD countries, and in some sectors blunted their competitiveness. Another major consequence has been fears of job losses, due to outsourcing and off-shoring—not only in manufacturing but also in services. The rapid integration of China and India, with their large pool of educated people, further reinforces these concerns. How should OECD countries respond?

To address this issue, the OECD Report (OECD, 2007: http://www.oecd.org/document/54/0,3343,en_2649_34173_38726774_1_1_1_37461,00.html) on ‘Staying Competitive in the Global Economy: Moving up the Value Chain’ brings together OECD data on the globalization of value chains, including the rise of outsourcing/off-shoring. It first examines how OECD countries are affected by the globalization of production, on both the macroeconomic and sector-specific levels. The costs and benefits of globalization are then discussed, with an emphasis on employment and productivity. Finally, this report analyses how globalization impacts the competitiveness of OECD countries, highlighting the need for an effective innovation strategy. The report discusses not only the moving up the value chain that takes place in OECD countries but also in China, as R&D is increasingly going to emerging countries.

Competitive Strategy in International Business

Any effort to formulate a competitive strategy has to be preceded by a clear

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understanding of competition. Competition in an industry is determined by customers, suppliers, potential entrants, existing competitors and substitute products. Once a firm understands the forces driving competition in the marketplace, it can understand its strengths and weaknesses in the context of the industry. After identification, it can concentrate on formulating strategies to take on the competitive forces. A firm can follow three approaches to design a competitive strategy. It can position the firm to defend itself against existing competitive forces, change the balance of forces to the firm's advantage through strategic moves, so that the firm's relative position improves, or respond to changes in the factors that underlie competitive forces, before competitors do so.

Firms operating in international markets operate in a highly competitive marketplace. To succeed, they need a strategy that sets them apart from competitors. These strategies include transfer of core competencies. Multinational strategy concentrates on customization of products, which increases the cost of production. The system for transferring core competencies from headquarters to subsidiaries, and the system for sharing skills, technology and know-how among subsidiaries are not yet well developed or utilized.

This frequently creates problems for MNCs. Companies that increased overseas expansion after World War II adopted this strategy. The top management of the parent company takes full control of the subsidiary with the help of sophisticated management information systems and corporate staff, who are often specialists in the area. The top management maintains a continuous flow of information to guide subsidiaries. Global strategy was adopted by companies that expanded worldwide after World War II. The diminishing trade and tariff barriers and converging global markets encouraged these companies to implement this strategy (<http://www.icmrindia.org/courseware/International%20Business%20&%20International%20Marketing/IBIM-DS5.htm>).

Competitive Strategy: Porter's Three Axes of Competition

A decisive advance in understanding competition took place in 1980 with the publication of Michael Porter's *Competitive Strategy*. Porter's model of how companies compete had three dimensions:

- Price
- Differentiation of the product or service from its competitors
- Customer focus-concentrating upon meeting the needs of specific groups of customers.

Companies are naturally not restricted to employing only one of these modes of competing, shown in diagrammatic form in Figure 1. They may mix a couple or even all three of them and firms with a wide range of products often use a different competitive mode for various parts of their portfolio.

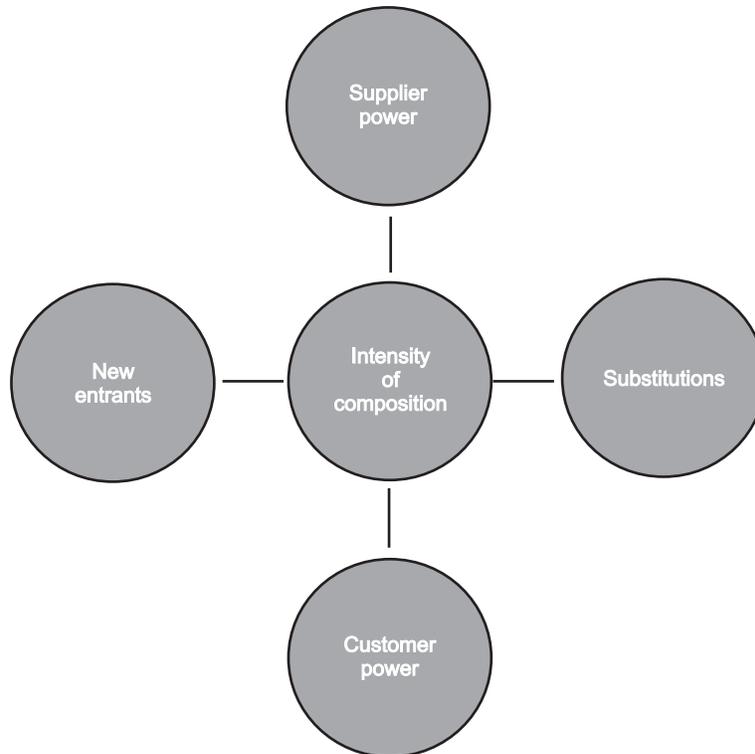
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Fig. 2: Porter's 'Five forces' model

of China. Because of better telecommunications, financial firms can be located anywhere and global banking is commonplace. For your business, it means that competition can come from any country. Competitive intelligence can help identify new and emerging competitors. In Asia, most of the large Japanese companies have been actively conducting research on their domestic, regional and international markets, and thorough competitive landscape reviews are undertaken before any major corporate decisions are made. Although the commercial intelligence community in Japan remains small and closed to most foreigners, the Japanese have developed the most advanced competitive intelligence processes in Asia (<http://www.fastcompany.com/blog/damien-duhamel/marketing-strategy-asia/competitive-intelligence-asia-strategic-edge-corporate-a>).

Kim and Mauborgne's 'Blue ocean strategy' metaphor elegantly summarizes their vision of the kind of expanding, competitor-free markets that innovative companies can navigate. As W. Chan Kim puts it 'Blue ocean strategy' is all about "How to create an uncontested market space and market competition irrelevant". Unlike "red oceans," which are well explored and crowded with competitors, "blue oceans" represent "untapped market space" and the

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“opportunity for highly profitable growth.” The only reason more big companies don’t set sail for them, they suggest, is that “the dominant focus of strategy work over the past twenty-five years has been on competition-based red ocean strategies” i.e., finding new ways to cut costs and grow revenue by taking away market share from the competition. With this groundbreaking book, Kim and Mauborgne—both professors at France’s INSEAD, the second largest business school in the world—aim to repair that bias. Using dozens of examples—from Southwest Airlines and the Cirque du Soleil to Curves and Starbucks—they present the tools and frameworks they’ve developed specifically for the task of analyzing blue oceans. They urge companies to “value innovation” that focuses on “utility, price, and cost positions,” to “create and capture new demand” and to “focus on the big picture, not the numbers” (http://www.amazon.com/gp/product/product-description/1591396190/ref=dp_proddesc_0? i.e. =UTF8&n=283155&s=books).

Case on Competitive Intelligence Strategy

Southwest Airlines created a unique and exceptional value curve to unlock a blue ocean. As shown in the strategy canvas, Southwest Airlines’ value curve has *focus*; the company does not diffuse its efforts across all key factors of competition. The shape of its value curve *diverges* from the other players’, a result of not benchmarking competitors but instead looking across alternatives. The *tagline* of Southwest Airlines’ strategic profile is clear: a fun and simple wine to be enjoyed every day.

When expressed through a value curve, then, an effective blue ocean strategy like Southwest Airlines has three complementary qualities: focus, divergence, and a compelling tagline. Without these qualities, a company’s strategy will likely be muddled, undifferentiated, and hard to communicate with a high cost structure. The four actions of creating a new value curve should be well-guided toward building a company’s strategic profile with these characteristics. These three characteristics serve as an initial litmus test of the commercial viability of blue ocean ideas (Kim and Renée Mauborgne, 2005).

Six Principles of Blue Ocean Strategy

Formulation Principles attenuates	Risk factor each principle
Reconstruct market boundaries	↓ Search risk
Focus on the big picture, not the numbers	↓ Planning risk
Reach beyond existing demand	↓ Scale risk
Get the strategic sequence right	↓ Business model risk
Execution principles attenuates	Risk factor each principle
Overcome key organizational hurdles	↓ Organisational risk
Build execution into strategy	↓ Management risk

A look at Southwest Airlines’ strategic profile illustrates how these three qualities underlie the company’s effective strategy in reinventing the short-haul airline industry via value innovation (Fig. 3).

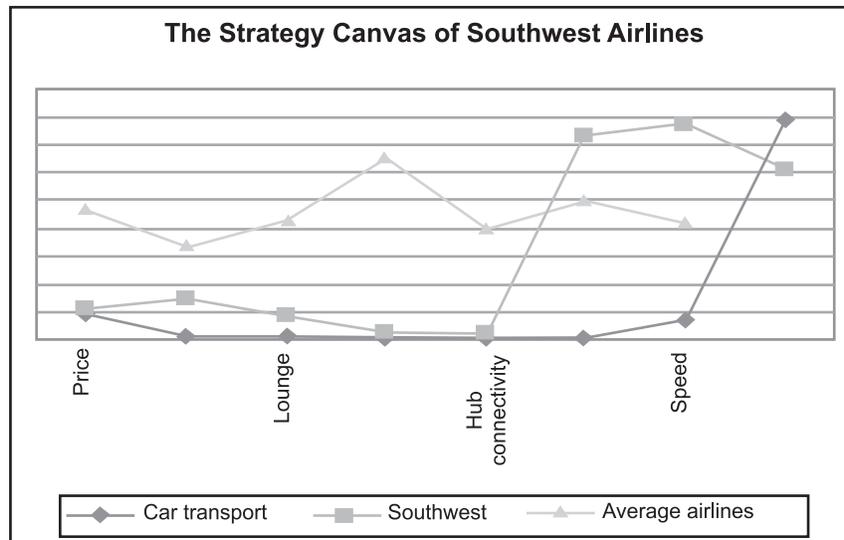
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Fig. 3: The Strategy Canvas of Southwest Airlines

Southwest Airlines created a blue ocean by breaking the trade-offs customers had to make between the speed of airplanes and the economy and flexibility of car transport. To achieve this, Southwest offered high-speed transport with frequent and flexible departures at prices attractive to the mass of buyers. By eliminating and reducing certain factors of competition and raising others in the traditional airline industry, as well as by creating new factors drawn from the alternative industry of car transport, Southwest Airlines was able to offer unprecedented utility for air travellers and achieve a leap in value with a low-cost business model. The value curve of Southwest Airlines differs distinctively from those of its competitors in the strategy canvas. Its strategic profile is a typical example of a compelling blue ocean strategy.

Every great strategy has focus, and a company's strategic profile, or value curve, should clearly show it. Looking at Southwest's profile, we can see at once that the company emphasizes only three factors: friendly service, speed, and frequent point-to-point departures. By focusing in this way, Southwest has been able to price against car transportation; it doesn't make extra investments in meals, lounges, and seating choices. By contrast, Southwest's traditional competitors invest in all the airline industry's competitive factors, making it much more difficult for them to match Southwest's prices. Investing across the board, these companies let their competitors' moves set their own agendas. Costly business models result.

When a company's strategy is formed reactively as it tries to keep up with the competition, it loses its uniqueness. Consider the similarities in most airlines' meals and business-class lounges. On the strategy canvas, therefore,

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reactive strategists tend to share the same strategic profile. Indeed, in the case of Southwest, the value curves of the company's competitors are virtually identical and therefore can be summarized on the strategy canvas with a single value curve.

In contrast, the value curves of blue ocean strategists always stand apart. By applying the four actions of eliminating, reducing, raising, and creating, they differentiate their profiles from the industry's average profile. Southwest, for example, pioneered point to point travel between midsize cities; previously, the industry operated through hub-and-spoke systems.

A good strategy has a clear-cut and compelling tagline: "The speed of a plane at the price of a car - whenever you need it." That's the tagline of Southwest Airlines, or at least it could be. What could Southwest's competitors say? Even the most proficient ad agency would have difficulty reducing the conventional offering of lunches, seat choices, lounges, and hub links, with standard service, slower speeds, and higher prices into a memorable tagline. A good tagline not only delivers a clear message but also advertise an offering truthfully to reinforce and win over customers' sustained interests, trust and loyalty. In fact, a good way to test the effectiveness and strength of a strategy is to look at whether it contains a strong and authentic tagline to complement its strong Branding strategy.

Six-Sigma for Global Competitiveness

Sigma is defined as "a statistical unit of measurement that describes the distribution about the mean of any process or procedure" (Motorola, 1998). As the sigma value is raised, the variation around the mean value decreases eventually approaches zero variation, mythically known as "zero defects". Theoretically, Six-Sigma equates to a variation about the mean of no more than .002 dpmo (defects per million opportunities) outside allowable standards. However, in industry terms, achieving Six-Sigma Quality means that the defects in a given process or procedure do not exceed 3.4 dpmo. Most of today's successful businesses, including GE, operate at a 3.5 sigma level. This produces approximately 33,000 dpmo.

The Six-Sigma process was introduced by Motorola on their way to winning the 1988 Malcolm Baldrige National Quality Award. The process is more than a quality definition applied to statistical tools — it is an identifiable and achievable means to reach the allusive goal of continuous improvement in all business areas. Six-Sigma quality is important to world-class organizations such as GE and Motorola because quality and customer satisfaction are assumed to be proportionate.

Six-Sigma is a fundamental approach to delivering very high levels of customer satisfaction through disciplined use of data and statistical analysis for maximizing and sustaining business success. It will energize your organization and will bring about a strategic shift in thinking and participation by all employees. It is an absolute must for your organization, regardless of what

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data is processed using Minitab, an extremely powerful statistical data analysis program (<http://www.theleibys.com/susandocs/sixsigma.html>).

Lessons Learnt: Experiences gained by General Electric

At the General Electric, implementation of Six-Sigma Programme resulted in the following pattern of return on investment over the years:

- In 1996, costs of \$ 200 million and returns of \$ 150 million
- In 1997, costs of \$ 400 million and return of \$ 600 million
- In 1998, cost of \$ 400 million and return of more than \$ 1 billion

GE's former CEO, Jack Welch, wrote in the annual report that in just 3 years, Six-Sigma had saved the company more than \$ 2 billion. His following statement summarizes the lesson learnt by embracing Six-Sigma principles for GE:

“We did not invent Six-Sigma – we learnt it. The cumulative impact on the company's numbers is not an anecdotal, nor a product of charts. It is the product of 276000 people executing and delivering the result of Six-Sigma to our bottom line.”
— Jack Welch, 1997

Vince Fayad, Director of value-based sigma for ITT industries, Inc. attributes the success of the programme primarily to observance of the following code of Six Best Practices, which are value-based and result-oriented:

- Link projects to the strategic plan. Decide where you want a part of the organization to be in the future and then pick projects that will help it get there,
- Go for quick wins. Select projects that can succeed in little time. Quick success generates enthusiasm for the initiative and energizes people,
- Match projects and resources. Don't yield to the natural tendency to try to do a lot of projects at one time,
- Secure support from management. Senior managers must be committed to the DFSS initiative and to facilitating work on projects,
- Provide training for top managers. When executives understand what the DFSS players are doing, they're likely to take their own responsibilities for the initiative more seriously,
- Recognize, reward, and share successes.

Sustaining Design for Six-Sigma

Six-Sigma is basically a methodology that needs to continue indefinitely and in an uninterrupted manner since there is always a room for improvement in designs, approaches and processes involved.

The first and the most effective means of sustaining gains achieved through Six-Sigma is use it diligently to improve the processes designed through DFSS; that is to say maintaining the capability of the design. Second sustaining factor is to continue to focus on customers in specific context of customer demand,

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complaints, feed-back information, focus group, one-to-one interview, contextual enquiry etc. Third crucial aspect relates to efficient knowledge management involving maintaining a database of the 'lesson learned', followed by continuous knowledge transfer.

A good communication system enabling knowledge sharing with Six-Sigma Group, combined with good leadership quality of the CEO/Champion, can ensure sustenance. Combined with this, a high quality of infrastructure, reinforcement and control can considerably help the organization to promote and sustain DFSS. Last, but not the least, Organizational culture can influence and stimulate the process of designing and redesigning of Six-Sigma to see through not only its successful conclusion but also its long-term sustainability perspective.

Non-Manufacturing Six-Sigma Solutions

Transactional Six-Sigma, Six-Sigma for Soft Processes, Six-Sigma for Services Call it what you will, Six-Sigma is a methodology for success in all processes. Only two per cent of all processes in the United States are manufacturing processes. Numerous corporations have benefited from the increased efficiency, higher quality, and improved customer relationships delivered by Six-Sigma. Most of these corporations have reaped these benefits through implementation of Six-Sigma in the manufacturing environment. As consumers, we see the results of Six-Sigma in products that meet our needs, last longer, are priced affordably, and are available where and when we want them. Most people enjoy the benefits of Six-Sigma when using pagers, cars, cell phones, and printers and never even realize it.

Today, the world class corporations that implemented Six-Sigma for manufacturing processes are implementing Six-Sigma in the non-manufacturing environment on soft processes such as Order to Cash, Customer Acquisition, After Sales Service and Support, etc. They are doing this because they realize that no matter how good your manufacturing processes are, if soft processes are of poor quality, the company and its customers will suffer.

Why is Six-Sigma Important for Soft Processes?

- Soft processes are the ones that touch customers and suppliers,
- Soft processes initiate manufacturing and distribute the products of manufacturing,
- Soft processes often have fewer transactions and these transactions are of greater value,
- Soft processes are human centric and are full of variation and special cases, science must be applied to reduce and manage this variation,
- In non-manufacturing industries, there are only soft processes,
- Soft processes manage your money.

In most corporations, the quality of soft processes is critical to success. Yet implementation of Six-Sigma in such environments is no easy task and you typically only get one shot at it. This is why organizations should focus

on the implementation of Six-Sigma in soft processes, and the automation of such processes.

Leverage the Best of Six-Sigma Tailored for Application on Non-Manufacturing Processes

First, a process is a process and every process can benefit from Six-Sigma. Second, non-manufacturing/soft processes and manufacturing processes present very unique challenges when implementing Six-Sigma. Third, all modern Six-Sigma or process engineering projects must leverage well designed information technology to be successful and fourth, nearly all information system projects involve process automation which should be engineered properly (http://www.streetdirectory.com/travel_guide/21777/corporate_matters/six_sigma_for_the_non_manufacturing_sector.html).

Experience shows that soft processes can be substantially more difficult to get into a Six-Sigma project. The challenges lie in the difficulty to clearly identify process variables, the difficulty to find process variables that can be measured without undue burden, and cultural resistance to changing white collar processes. The Six-Sigma program should eliminate concerns by moving to the improvement of key processes, integration of horizontal process centric application design, and reducing the training and analysis traditionally associated with Six-Sigma. Traditional DMAIC Six-Sigma, some of the fundamental differences between traditional Six-Sigma as found in manufacturing, and the Six-Sigma for transactional processes are described below.

- Places more emphasis on the big picture – whole process optimization,
- Emphasizes use of information systems for process automation,
- Emphasizes greater use of technological and procedural benchmarking,
- Specifically addresses evolution as a phase and places emphasis on continuous improvement, seeking to deal with the greater degree of random variation and special case situations inherent to human driven processes.

However, Six-Sigma has proven significantly more difficult to implement off the shop floor. The reasons are many, but lie within a few root causes. Two of these root causes are: (1) data and (2) human behaviour.

The use of the Six-Sigma techniques for obtaining data, applying quantitative measures to seemingly un-quantifiable information, identifying significant measures, data collection techniques, and meaningful reports has seen resistance. For example, Six-Sigma should use a key decision point approach for collecting data on human behaviour and integrates techniques that identify process variables differentiating control variables from others and building relationships between process and output variables. Working with Six-Sigma in this area has proven to drive cost savings, increased effectiveness, and increases customer satisfaction.

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Further, the use of information technology such as BPM enables businesses to collect and analyze process data with accuracy and ease. By using a process excellence centric approach to “system” engineering processes traditionally considered an un-manageable art are engineered to efficient and effective science. By system, it means all elements of the system including, people, processes, and technology.

Some of the techniques in this area include:

- Collection, segmentation, analysis, and reporting of existing data volumes,
- Identification of process variables both X and Y,
- Integration of X and Y (cost, time, performance) variable data collection in automated processes,
- Implementation of Special Cause detection and alert systems,
- Identification and data collection of key decision variables.

Ultimately, Six-Sigma’s unique abilities in the area of collecting data and building statistical models on transactional processes means that companies are able to easily realize the benefits of transactional Six-Sigma.

Six-Sigma: A Case Study in Motorola

When a Japanese firm took over a Motorola factory that manufactured Quasar television sets in the United States in the 1970s, they promptly set about making drastic changes in the way the factory operated. Under Japanese management, the factory was soon producing TV sets with 1/20th the number of defects they had produced under Motorola management. They did this using the same workforce, technology, and designs, making it clear that the problem was Motorola’s management. Eventually, even Motorola’s own executives had to admit “our quality stinks” (Motorola, 1988; Motorola University, 2006).

Finally, in the mid 1980s, Motorola decided to take quality seriously. Motorola’s CEO at the time, Bob Galvin, started the company on the quality path known as Six-Sigma and became a business icon largely as a result of what he accomplished in quality at Motorola. Today, Motorola is known worldwide as a quality leader and a profit leader. After Motorola won the Malcolm Baldrige National Quality Award in 1988 the secret of their success became public knowledge and the Six-Sigma revolution was on. Today it’s hotter than ever (Mikel, 1988).

It would be a mistake to think that Six-Sigma is about quality in the traditional sense. Quality, defined traditionally as conformance to internal requirements, has little to do with Six-Sigma. Six-Sigma is about helping the organization make more money. To link this objective of Six-Sigma with quality requires a new definition of quality. For Six-Sigma purposes I define quality as the value added by a productive endeavor. Quality comes in two flavors: potential quality and actual quality. Potential quality is the known maximum possible value added per unit of input. Actual quality is the current value added per unit

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Measure the existing system. Establish valid and reliable metrics to help monitor progress towards the goal(s) defined at the previous step. Begin by determining the current baseline. Use exploratory and descriptive data analysis to help you understand the data. Analyze the system to identify ways to eliminate the gap between the current performance of the system or process and the desired goal. Apply statistical tools to guide the analysis.

Improve the system. Be creative in finding new ways to do things better, cheaper, or faster. Use project management and other planning and management tools to implement the new approach. Use statistical methods to validate the improvement. Control the new system. Institutionalize the improved system by modifying compensation and incentive systems, policies, procedures, MRP, budgets, operating instructions and other management systems. You may wish to utilize systems such as ISO-9000 to assure that documentation is correct.

Infrastructure: A very powerful feature of Six-Sigma is the creation of an infrastructure to ensure that performance improvement activities have the necessary resources. In this author's opinion, failure to provide this infrastructure is the #1 reason why 80% of all TQM implementations failed in the past. Six-Sigma makes improvement and change the full-time job of a small but critical percentage of the organization's personnel. These full time change agents are the catalyst that institutionalizes change.

Six-Sigma involves changing major business value streams that cut across organizational barriers. It is the means by which the organization's strategic goals are to be achieved. This effort cannot be led by anyone other than the CEO, who is responsible for the performance of the organization as a whole. Six-Sigma must be implemented from the top-down.

Champions and Sponsors: Six-Sigma champions are high-level individuals who understand Six-Sigma and are committed to its success. In larger organizations Six-Sigma will be led by a full-time, high level champion, such as an Executive Vice-President. In all organizations, champions also include informal leaders who use Six-Sigma in their day-to-day work and communicate the Six-Sigma message at every opportunity. Sponsors are owners of processes and systems that help initiate and coordinate Six-Sigma improvement activities in their areas of responsibilities.

Master Black Belt: This is the highest level of technical and organizational proficiency. Master Black Belts provide technical leadership of the Six-Sigma program. Thus, they must know everything the Black Belts know, as well as understand the mathematical theory on which the statistical methods are based. Master Black Belts must be able to assist Black Belts in applying the methods correctly in unusual situations. Whenever possible, statistical training should be conducted only by Master Black Belts. Otherwise the familiar "propagation of error" phenomenon will occur, i.e., Black Belts pass on errors to green belts, who pass on greater errors to team members. If it becomes necessary for Black Belts and Green Belts to provide training, they should do only so under the guidance of Master Black Belts. For example, Black Belts may be asked to

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provide assistance to the Master during class discussions and exercises. Because of the nature of the Master's duties, communications and teaching skills are as important as technical competence.

Black Belt: Candidates for Black Belt status are technically oriented individuals held in high regard by their peers. They should be actively involved in the process of organizational change and development. Candidates may come from a wide range of disciplines and need not be formally trained statisticians or engineers. However, because they are expected to master a wide variety of technical tools in a relatively short period of time, Black Belt candidates will probably possess a background including college-level mathematics and the basic tool of quantitative analysis. Coursework in statistical methods may be considered a strong plus or even a prerequisite. As part of their training, Black Belts receive 160 hours of classroom instruction, plus one-on-one project coaching from Master Black Belts or consultants.

Successful candidates will be comfortable with computers. At a minimum, they should understand one or more operating systems, spreadsheets, database managers, presentation programs, and word processors. As part of their training they will be required to become proficient in the use of one or more advanced statistical analysis software packages. Six-Sigma Black Belts work to extract actionable knowledge from an organization's information warehouse. To ensure access to the needed information, Six-Sigma activities should be closely integrated with the information systems (IS) of the organization. Obviously, the skills and training of Six-Sigma Black Belts must be enabled by an investment in software and hardware. It makes no sense to hamstring these experts by saving a few dollars on computers or software.

Green Belt: Green Belts are Six-Sigma project leaders capable of forming and facilitating Six-Sigma teams and managing Six-Sigma projects from concept to completion. Green Belt training consists of five days of classroom training and is conducted in conjunction with Six-Sigma projects. Training covers project management, quality management tools, quality control tools, problem solving, and descriptive data analysis. Six-Sigma champions should attend Green Belt training. Usually, Six-Sigma Black Belts help Green Belts define their projects prior to the training, attend training with their Green Belts, and assist them with their projects after the training.

Staffing Levels and Expected Returns: As stated earlier in this article, the number of full time personnel devoted to Six-Sigma is not large. Mature Six-Sigma programs, such as those of Motorola, General Electric, Johnson and Johnson, AlliedSignal, and others average about one per cent of their workforce as Black Belts. There is usually about one Master Black Belt for every ten Black Belts, or about 1 Master Black Belt per 1,000 employees. A Black Belt will typically complete 5 to 7 projects per year. Project teams are led by Green Belts, who, unlike Black Belts and Master Black Belts, are not employed full time in the Six-Sigma program. Black Belts are highly prized employees and are often recruited for key management positions elsewhere in the company.

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After Six-Sigma has been in place for three or more years, the number of former Black Belts tends to be about the same as the number of active Black Belts.

Estimated savings per project varies from organization to organization. Reported results work out an average savings of about US \$ 150,000 to US \$ 243,000. It could be noted here that these are not the huge mega-projects pursued by Re-engineering. Yet, by completing 5 to 7 projects per year per Black Belt, the company will add in excess of US \$ 1 million per year per Black Belt to its bottom line. For a company with 1,000 employees the numbers would look something like this:

Master Black Belts: 1 Black Belts: 10
 Projects: = 50 to 70 (5 to 7 per Black Belt)
 Estimated saving: US \$ 9 million to US \$ 14.6 million
 (US \$ 14,580 per employee)

Do the math for your organization and see what Six-Sigma could do for you. Because Six-Sigma savings impact only non-value added costs, they flow directly to your company's bottom line.

Implementation of Six-Sigma: After over two decades of experience with quality improvement, there is now a solid body of scientific research regarding the experience of thousands of companies implementing major programs such as Six-Sigma. Researchers have found that successful deployment of Six-Sigma involves focusing on a small number of high-leverage items. The steps required to successfully implement Six-Sigma are well-documented.

1. Successful performance improvement must begin with senior leadership. Start by providing senior leadership with training in the principles and tools they need to prepare their organization for success. Using their newly acquired knowledge, senior leaders direct the development of a management infrastructure to support Six-Sigma. Simultaneously, steps are taken to "soft-wire" the organization and to cultivate an environment for innovation and creativity. This involves reducing levels of organizational hierarchy, removing procedural barriers to experimentation and change, and a variety of other changes designed to make it easier to try new things without fear of reprisal.
2. Systems are developed for establishing close communication with customers, employees, and suppliers. This includes developing rigorous methods of obtaining and evaluating customer, employee and supplier input. Base line studies are conducted to determine the starting point and to identify cultural, policy, and procedural obstacles to success.
3. Training needs are rigorously assessed. Remedial skills education is provided to assure that adequate levels of literacy and numeracy are possessed by all employees. Top-to-bottom training is conducted in systems improvement tools, techniques, and philosophies.

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4. A framework for continuous process improvement is developed, along with a system of indicators for monitoring progress and success. Six-Sigma metrics focus on the organization's strategic goals, drivers, and key business processes.
5. Business processes to be improved are chosen by management, and by people with intimate process knowledge at all levels of the organization. Six-Sigma projects are conducted to improve business performance linked to measurable financial results. This requires knowledge of the organization's constraints.
6. Six-Sigma projects are conducted by individual employees and teams led by Green Belts and assisted by Black Belts. Although the approach is simple, it is by no means easy. But the results justify the effort expended. Research has shown that firms that successfully implement Six-Sigma perform better in virtually every business category, including return on sales, return on investment, employment growth, and share price increase.

Case of Crystal Ball

In a paper and accompanying model, Crystal Ball showed how the future opportunity is formulated as a Six-Sigma project and showcase how Crystal Ball Professional Edition is used within each of the DMAIC (Define, Measure, Analyze, Improve, and Control) process phases to deliver responsiveness to the customer and financial results to the business (<http://www.decisioneering.com/articles/download/cb-and-jmp.pdf>).

As with most business situations of this nature, Crystal Ball is seeking the best (or most profitable) tradeoff between conflicting actions or strategies. This example specifically balances responsiveness to customer needs (higher levels of inventory given uncertain demand) against efficiency for the business (lower cost of goods sold). Of particular interest in seeking this optimal balance is how we can improve the solution and account for the effects of uncertainty in the key process input variables (KPIV's). This method (stochastic optimization) enables us to specify objective functions (Y's) and requirements (constraints on X's) in terms of likelihood of occurrence (i.e., maximize profit and provide at least 90% certainty that the total inventory costs would not exceed \$ 169,000).

Fortune 1000 organizations have realized immense success by implementing the Define, Measure, Analyze, Improve, and Control (DMAIC) methods made famous by Six-Sigma practitioners. These practitioners can maximize their project results (e.g., cost savings and defect reduction) by incorporating real variability and uncertainty in their processes and into their process models or spreadsheets.

Simulation, optimization, and forecasting can be used throughout the DMAIC process. In this case study, a company that sold perishable inventory used

1. Investment casting
2. Root machining
3. Cooling hole drilling (electrical discharge machining and electro-chemical machining)
4. Diffusion and ceramic coatings
5. Airflow testing and moment weight

The process of designing a turbine blade is inherently complex, involving precise and unique product characteristics, such as high-strength and high-temperature alloys, thermal barrier coating, and complex cooling to withstand extreme turbine operating temperatures and tight dimensional tolerances. Meeting the stringent requirements of the design intent and close to zero tolerance for failures requires the skills of many design, manufacturing and quality professionals across various organizations. This makes the design and qualification process for gas turbine blades highly collaborative and complex.

In Pursuit of Continuous Process Improvement

With the suspicion that variation in the PPQ process was affecting optimization of first-time yield, SWPC conducted a Six-Sigma study of the turbine blade PPQ process and its effect on the costs of poor quality, such as scrap and rework. Given the complexity of the turbine blade, the study hypothesized that an ability to define and solve problems collaboratively with suppliers through standardized processes at the early stages of the supplier manufacturing process development cycle can significantly improve downstream reaction times and costs. The Six-Sigma study was completed in October 2001. The findings confirmed the Group's suspicions.

After reviewing the data collected during the measurement phase of the study and comparing them with the goals of a closed-loop PPQ process, it was apparent that the existing PPQ process failed to map these goals. The Six-Sigma study also identified a direct link between the up-front effort put into process development and qualification as well as the nonconformance costs.

Among other improvements, the study demonstrated that a standardized, closed-loop PPQ process with consistent methodologies would improve first-time yield, thereby reducing or eliminating rework cycles and scrap.

A standardized closed-loop PPQ process must:

- Minimize supplier product nonconformance
- Minimize PPQ cycle time with suppliers
- Ensure ongoing process control
- Predict future quality
- Provide visibility across PPQs
- Document the qualification process
- Provide complete documentation of qualification
- Effectively balance workload and resources

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Furthermore, the Six-Sigma study concluded that a system leveraging the Internet would drive the PPQ process in a way that steers suppliers to focus on up-front process development as opposed to the current practice of creating a basic process and modifying it after full production has begun.

Applying Six-Sigma Methodology to Energy-Saving Projects: A Case of Dow Chemical Company

The Dow Chemical Company is a leading science and technology company that provides innovative chemical, plastic, and agricultural products and services to many essential consumer markets. With annual sales of \$ 27 billion, Dow serves customers in more than 170 countries and a wide range of markets that are vital to human progress, including food, transportation, health and medicine, personal and home care, and building and construction, among others. Committed to the principles of Sustainable Development, Dow and its approximately 50,000 employees seek to balance economic, environmental, and social responsibilities. In 1998 Dow chose to implement Six-Sigma methodology to accelerate the company's rate of improvement in quality and productivity (<http://portal.acm.org/citation.cfm?id=1181965>).

A trial of Six-Sigma in two of Dow's global businesses convinced management that the value proposition was well worth the effort, and in September 1999 the company launched a corporate-wide program to incorporate the Six-Sigma methodology into all of its businesses and functions. The company's 1999 annual report stated that by the end of 2003, Dow expected its Six-Sigma implementation to deliver revenue growth, cost reductions, and asset utilization totaling \$ 1.5 billion in earnings before interest and taxes (EBIT). At the close of 2002, Dow achieved its \$ 1.5 billion cumulative financial goal—a full year ahead of schedule. This case study presents four examples of Six-Sigma implementation for projects at Dow facilities in Texas and Louisiana:

- Steam Trap Improvement
- Polycarbonate Unit Energy Reduction
- Styrene Unit Energy Envelope
- Angus Site Energy Reduction

Dow employs Six-Sigma MAIC methodology to upgrade performance. **MAIC** is defined as follows:

Measure – Gather the right data to accurately assess a problem.

Analyze – Use statistical tools to correctly identify the root causes of a problem.

Improve – Correct the problem (not the symptom).

Control – Put a plan in place to make sure problems stay fixed and sustain the gains.

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start to explore the identification of waste and inefficiency in the processes. An associate at the meeting captures this information into a PowerPoint template that is used to out-brief at the end of the event.

Bringing the process into focus Midway through the event, the facilitator exports to MindManager the information captured in Power-Point. She begins arranging the ideas presented by the team into categories, such as the execution of work, the decision-making process, leadership and governance, communication processes, people's behaviors and attitudes, and reactions from customers and stakeholders.

When she reveals the categorized ideas to the team, she finds that it is easier for the participants to discuss ways to improve the process to meet the needs of customers.

"I have found that the mind map stimulates their thinking, which helps them come to conclusions faster," she says. "When they look at the map, they say, 'Now we "see" what our current environment looks like,' because it's all categorized into nice neat groups. The initial brainstorming process is effective in generating new ideas.

But it is hard to organize ideas written on multiple flip charts. The map adds structure to the ideas so the team members can easily view their environment as they have perceived and articulated it." The facilitator uses the map through the remainder of the event. "The map changes dynamically from the time it is first created through to the end of the event," she says. "It becomes the team's holistic view of the process under assessment, categorized and on one page, which is always included in the event outbrief. This leading defense technology company uses MindManager to create visual representations of current, ideal and future state characteristics.

Product Mindjet MindManager Result

Team members are able to quickly grasp the current and future state characteristics, issues and process improvements related to those characteristics, and to work together to devise ways to improve mission-critical business processes.

Conclusion

According to Greg Brue (2003), Six-Sigma is today's most honoured and effective quality initiative. Yet to achieve optimal results from such an initiative, companies must first master the building blocks of Six-Sigma. Design for Six-Sigma (DFSS) shows decision makers at all levels how to implement and improve the DFSS tools and techniques from earliest design through final production of virtually any product, service or process. Six-Sigma principles and methodologies also show us how to join today's quality leaders by incorporating DFSS to each step of new product or service development programme for maximum impact and return on Six-Sigma Investment.