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Setting the Stage

Key Lessons from Chapter 1: Setting the Stage

This chapter introduces the main spheres, observed patterns, drivers, and locus of change taking place. Detailed illustration is given of the four main spheres of change—people, resources, economy, and technology. Key patterns covered in the people sphere relate to demographic changes (youth, aging, population growth, urbanization, and migration). In the resources sphere patterns of change in water, food, energy, and environmental systems are given special attention. In economics, the focus is on change at the country and global levels such as in finance, trade, and integration of economies and societies, but also at the individual and firm levels as in patterns of production, sourcing, sales, and branding. The patterns of change in the technology sphere appearing in this chapter relate to knowledge, science, experience, and innovation.

The main skills introduced are reacting to tectonic change, using the first stage of Theory U of downloading and observing patterns and trends. A case study of the Monsanto Company highlights the decision-making and choices of a multinational company facing tectonic changes in all four spheres. Lessons from the case are used to draw issues of importance. The reader is guided through practice questions that aid using the material for similar situations.

Introduction

Decision-making in a complex environment relies on a specific set of abilities. Critical amongst them is uncovering the basic elements that could influence the outcome of actions. Once the basic elements have been uncovered, it is important to observe and interpret their response or behavior preceding and following a particular action. Such understanding, particularly of the interconnections between key elements, forms an important input into the decision-making process that allows decision makers to function in a complex environment.

F. Léautier, *Leadership in a Globalized World*

Bennet and Bennet (2008) argue that in any complex system there are trends and patterns that may be observed. However, such trends are often hidden or may be enmeshed with other factors in such a manner as to be imperceptible. Furthermore, delayed effects may render it impossible to see what may be happening to another element that is interconnected but not visible at first blush. Such complexities may combine the independent effects of changes into one element, making observation of the behavior of specific elements difficult to disentangle. The complexity of decision-making can be reduced if the decision maker can be guided through a set of questions or considerations that help to sequence decisions and actions, leading toward an acceptable solution (Bennet and Bennet, 2008).

The first question to guide the decision maker on the main trends in globalization is: *What are the principal patterns of shifts taking place and what types of discontinuities do they generate?* The question is aimed at highlighting the global discontinuities created by the shifting patterns one can observe. While many things are changing as the world continues to become interconnected, there are three factors to keep in mind: the *spheres* of change, the *drivers* of change, and the *locus* of change. It is by observing these factors that the "tectonic shifts" that have an impact on the decisions and actions taken in the face of globalization may be detected.

This module emphasizes the impact that patterns of change have on critical decisions and the pitfalls when decisions are made on the basis of only what is observable. The skill practiced is improving the ability to react effectively to tectonic change based on observations of what is happening around you. Particular emphasis is placed on guiding the reader through what is changing, what patterns can be discerned, and how changes are interconnected. A case study from Monsanto is used to establish the interconnectedness of decisions and choices, and the impacts created outside of the sphere of influence of the major decision makers. A set of potential reactions by different groups is provided as a response to the complexities of changes in the global food supply chain.

Spheres, drivers, and locus of change

There are four main spheres in which to interpret what is going on around us—people, resources, technology, and economy. Drucker (1992) refers to four main forces creating shifts in the ways that economies and societies function: the role of new *technology* and the emergence of the knowledge worker; major changes in the *economy* and the appearance of multinational corporations and their role around the world; the importance of the variety of institutions needed to solve issues impacting *people*; and the use of *resources*. Fariboz and Peterson (2005) sharply highlighted the implications of changes in these four spheres for the strategy and actions of CEOs and

leaders in the business sector. This chapter brings together all these threads, which have featured in management philosophy over two decades, to apply them in the public sector and public policy making.

People have long been the main sphere in which change has been visible historically. Measures of change include population growth, as people choose to have more or fewer children; migration patterns based on where people choose to live; aging and youth patterns driven by advances in medicine and health care; urbanization patterns, visible in the level of agglomeration of population in concentrated spaces; and the changes in the disease burden as a result of lifestyle and environmental factors. The person (people as a collective) is the main object of the "social technology" presented in Theory U (Scharmer, 2007: 377–442). It involves using the skills of listening to others with the mind and heart, reflection, and inner knowing, and seeing from the perspectives of others as well as acting with others in an adaptive sense. Such skills are important when facing tremendous change and when imagining a future that has not yet come about. All the questions around fertility, migration, urbanization, disease burden, and environmental factors revolve around individual choices and collective action. Being able to co-initiate policies, co-evolve visions of the future and co-create a set of actions to realize that future is critical and relies on skills learned from Theory U.

Societal choices around preservation, conservation, and use also change over time with impacts on the people sphere. The level of available *resources* in the future, such as water, food, and energy, as well as the friendliness of the climate for human existence, all vary with past patterns of use. Challenges like travel congestion and air quality in a city, which were previously local problems, become global problems when the drivers for travel are orders to deliver shirts from Dhaka in Bangladesh to Los Angeles in the US. Being able to connect the dots, listen, and engage in dialogue with stakeholders involved in the various parts of the interconnected world of using and interacting with resources is an important skill. One can learn from Theory U (Scharmer, 2007: 380–381) how such skills can help evolve global compacts to transform companies to become more socially and environmentally sustainable.

Technology advances and choices are another key sphere of change that is of relevance when observing globalization. What is the level of knowledge being used in a given economy? How are science and technology featuring in a given location or across a set of players? What sorts of experiences are embedded in the processes and products being used by a given society? All of these questions relate to the sphere of technology and its implications as the world globalizes. The skills to innovate across systems require joint leadership of international organizations, global companies, civil society organizations, and individuals. In Theory U this requires leaders (CEOs, executives in the public, private, and civil sectors) to be committed to lead differently

and to be equipped with the requisite skills to know what lies ahead of them and how to respond to the challenges ahead (Scharmer, 2007: 381).

Perhaps the sphere most looked at is the *economy*; whether it is in the finance and financial systems, or the degree of trade across societies and how integrated it is, or even in the patterns of production and product sourcing and their link to the evolution of brands and patterns of sales across companies. The economic sphere is perhaps the one receiving the most attention in political choices, as the effects tend to be visible over shorter periods of time. In Theory U, the concept of a global economy that works as a single unit raises many questions that require thinking and acting together in a different way (Scharmer, 2007: 81–104). Innovations that cause discontinuities in how companies behave (net-shaped industries), ethical issues concerning technology and science (e.g. genetic engineering, nanotechnology), and the globalization of governance (World Trade Organization (WTO), World Bank and International Monetary Fund (IMF)), all rely on the ability to co-exist, co-develop, and co-evolve.

The four spheres of change arise as a result of six drivers. The first is the emergence of *logistics* as a turning point in economic and business outcomes, producing both opportunities for success and added risks. Logistics management, as defined by Cooper et al. (1997) is "the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information flow from point-of-origin to point-of-consumption for the purposes of conforming to customer requirements." Such capabilities have made it possible for firms, consumers, governments, and civil society to operate in ways that were not possible previously.

Increased *mobility and connectivity* is the second driver, responsible for producing further pressures on productivity. This is mainly due to the simultaneous morphing and divergence of preferences. Consumer behavior differs across countries as a result of national culture, making it necessary for global firms to be conscious of this divergence and to serve these markets in a differentiated manner (de Mooij and Hofstede, 2002). The forces of globalization, such as access to common information instantly through social media, on the other hand, could create a sort of "global consumer," leading to homogeneous consumer needs, tastes, and lifestyles (Bullmore, 2000: 48). The driver of mobility and connectivity can help uncover the reason for observing certain trends in consumption patterns, environmental preferences, or indeed global governance outcomes. Such knowledge is useful for international retailers, but also for regulators and trade negotiators. Using the skills of co-sensing from the field from Theory U can help decision makers who are developing strategy to be better able to anticipate these changes and deal with them in an effective manner (Scharmer, 2007: 133–136).

The third driver relates to *ownership and financing* arrangements, which are creating new risks but also opportunities. In particular, complex financing

arrangements generate large information asymmetries between the sources and users of finance, which could lead to an escalation in the level of risks with limited options for mitigation (Sufi, 2007). The motivation for anticipating risky behavior comes from models of agency and moral hazard (Holmstrom and Tirole, 1997) that assume that firms with limited public information require due diligence and monitoring by an "informed lender." But as the "informed lender's" effort is unobservable, the informed lender is forced to retain a larger share of the loan precisely when the borrower requires more intense due diligence and monitoring effort relative to when the borrower does not require such intense effort. Ownership and financing arrangements at a global scale, with more and more stakeholders involved, requiring different levels of due diligence, can generate a very complex web of interactions and interrelations, rendering the systems under-regulated. The risks of such complexity have materialized in the various financial crises that have been seen in the 21st century in particular. In Theory U, the skills needed to anticipate and indeed handle the risk structures that materialize from global capital are related to addressing root questions around equitable societies, more democratic institutions, and cultural sensitivity (Scharmer, 2007: 95).

Interconnectedness is the fourth driver, which puts a premium on the interaction between *knowledge and culture*. Global companies interact with different cultures as they source, produce, and sell around the world, having an impact on culture as well as responding to it, especially in the retail sector (Mooij and Hofstede, 2002). The use of pesticides and genetically modified seeds relies on the interaction between culture and science, which varies from one place to another. In this book, the focus is on the aspect of personal mastery (the use of dialogue as a change method), building from Theory U to handle conflicts and engage in joint inquiry on the issues impacting societies (Scharmer, 2007: 91).

The fifth driver is the evolution of key *risks* affecting decision-making around the world, raising the need for effective tools for risk management. These are the increased financial risks due to information asymmetry, but also increased risks of conjoined failure of financial systems due to the integration of banking and other financial systems. Risks have also evolved to become more severe, with a crisis in one country impacting another. Contamination from diseases as a result of travel also can portend higher risk. Understanding the evolution of risks is a skill that can be helpful as the complexity of decision-making environments increases.

Finally, the growing demands for *ethical and accountable leadership* across the world (even more so after the 2008 global financial crisis) are a driver which links up many of the other drivers, with important interactions on all four spheres of change.

Corporate leaders, politicians, and civil society influencers thus operate in a complex interconnected world. The degree of interconnectedness affects not only how they make decisions, but the outcomes of their decisions

as well. Making decisions on the basis of what is observable (surface phenomena) can lead to costly mistakes and irreversible effects. Understanding the dynamics is necessary for shaping strategy, developing effective risk management approaches, and selecting from a series of potential courses of action. Yet the dynamics can be complex, and not all options can be known in advance. Methods for dealing with partial information become necessary. The locus of decision-making also changes, with increased interconnections amongst societies rendering choice making more complex.

The good news is that complexity can be observed and harnessed (Bar-Yam, 1997), and understanding complexity is the key to managing risks. Leaders need to be conversant with the behavior of interconnected systems to make effective decisions under varying strategic and risk scenarios. Leaders also need to be equipped with the right set of values and behaviors to be successful in a specific context.

Patterns of change

The ability to observe change is a key aspect that distinguishes successful leaders from less successful ones. Making good choices usually comes from the responses to a simple question: what are the principal patterns of shift taking place? While the question is simple, the answers and the process for exploring the range of potential answers are not. The patterns that most affect decision-making on a global scale derive from four major spheres of change, introduced in the last chapter.

People: population, aging, migration, urbanization, and disease patterns

The starting point for understanding patterns of change is the sphere related to people. Where and how fast population levels are changing are important, but such changes need to be further viewed in the context of aging patterns and the dependency of the young and old on the working population. The growth in the number of young people, often referred to as a "youth bulge," is a determinant of many related changes, not least of which is the creativity of a society. The risks of conflict may be serious, as when disenfranchised people organize to get change and cause a revolution, as the young people of North Africa did in early 2010.

Where people move to and why is also an important sphere, as migration has a "brain drain" effect if skilled people leave their countries of origin. But migration can also have a benefit if people send money home as remittances. Where people live and the size of settlements they create determine the level of urbanization, including whether settlements are connected to other agglomerations around the world (global connectivity) and how fast cities grow. Patterns and trends in communicable diseases also change with the concentration of people in densely populated areas, which can be the

source not only of the spread and speed of infection and contamination, but also of the risk of emergence or reemergence of diseases.

Consider the patterns of population growth and distribution characterized by the explosion in global population in the last 200 years. Asia has historically been home to the majority of the people in the world (65% in 1800) and is projected to remain so in the near future (57% in 2050). However, Africa is expected to double its share from 11% in 1800 to 22% in 2050. Europe will see its share of world population drop from 21% in 1800 to just over 7% in 2050.

The main question for leadership relates to the capacity to tap into the creative potential of a younger and more concentrated population in regions such as Africa, where the population growth rates are also growing.

The patterns of growth across continents also raise the question of managing the twin challenges of creating jobs and securing food for larger populations, particularly if population growth outstrips the capacity to employ and feed the growing population. Patterns of growth present challenges such as how leaders will deal with the aging and declining population levels (say in Japan and Germany). The balance of power also shifts with the changes in population concentration across the world.

Where people are, or their spatial distribution in a given geography, is also an important pattern to observe. In Africa, the majority of people are concentrated along the coastal areas and in the central belt from Cameroon to Mozambique. Such a pattern is great for interaction with the outside world through ocean shipping, but presents risks should sea levels rise.

Changes in climate patterns interact with how populations are distributed. Where people and activity are concentrated also matters. The capacity to manage cities and communes at the decentralized level, while at the same time integrating people across regional commons such as water and other natural resources, is stretched when populations are growing unevenly and people are becoming more mobile.

Observing the spatial distribution of populations is important for many decisions in an increasingly globalized world. Where people are going, and the flows of people into and out of specific regions, countries, and spaces, are also relevant when looking at global trends. Patterns of migration have changed over the years as a result of a shift in the reasons to migrate.[1] Prior to 1930 there was strong regulation of migration in most countries and people moved mostly to look for jobs. Another reason for migration at the time was the search for land for agriculture, with migration mostly across short distances. After the Second World War there was a big effort to recruit guest workers for post-war reconstruction in Europe. Barriers to entering a country were lowered to allow for such migration. After 1973, migration became mostly poverty-driven, from developing to developed nations. Skilled workers were welcomed, but concerns were raised about the increase in unskilled labor and its implications for labor policy and employment.

Table 1.1 Migration stocks and flows

Countries	International migrant stock, total in 2010	International migrant stock, % of population in 2010
Brazil	688,026	0.36
China	685,775	0.05
India	5,436,012	0.47
Japan	2,176,219	1.70
South Africa	1,862,889	3.80

Source: World Bank (2010): World Development Indicators 2010, International Bank for Reconstruction and Development/The World Bank, Washington D.C.

The patterns of migration changed in the 1990s as new pressures developed across the world. Two measures are important when looking at migration—the share and the stock of migrants (see Table 1.1). The top five countries with the highest share of international migrants in 2010 were Qatar (87%), Kuwait (73%), Monaco (72%), UAE (70%), and Andorra (65%). These are countries that largely depend on international migration to meet domestic labor needs and resemble the migration-for-employment trends of the 1950s. In absolute terms, however, the top five countries with the highest stock of international migrants in 2010 were the USA (42.8 m), Russia (12.2 m), Germany (10.8 m), Saudi Arabia (7.3 m), and Canada (7.2 m).

When people leave their home countries they bring in new ideas, skills, and resources, but they also keep connections with the old country. Such connections become more and more valuable in a globalized world, as can be seen by the interaction between trade and migration. When the changes in trade patterns are measured by the growth in exports and changes in migration links to the home country are measured by growth in remittances, a pattern emerges which distinguishes countries that have strong growth in both exports and remittances (Cameroon in the early 2000s) and those that have declines in both trade and remittances (Chad in the early 2000s). Two other groups of countries emerge—those with growth in exports but decline in remittances (Burkina Faso in the early 2000s) and those with declining exports but growth in remittances (Angola in the early 2000s).

How long people live and how many children they have, when they start working, and when they retire are patterns that are important to observe for many global decisions.

Indicators like the age dependency ratio, which measures the share of people who are dependent on those who are of working age, can be helpful in tracking the changing patterns of aging and youth. The working age population needs to earn and generate more to support the dependent population in countries that have high age dependency ratios, or there have to be effective safety nets for those not able to do so. High age dependency ratios are also important indicators of potential future booms

as younger people come into the job market with creative ideas, but they can spell trouble if there are not sufficient opportunities for employment. Organizing to deal with an aging population is also a challenge for countries that have a high age dependency ratio that is driven by increasing life expectancy.

Spatial distribution of people in cities around the world shapes many other decisions and is important to observe (see Table 1.2). Agglomerations of people have always been good predictors of where the next innovations will come from or the next set of risks. Migration in the past 2,000 years has mostly favored people moving to cities rather than other rural areas, yet there is a growing trend for people in advanced economies, particularly in Europe, to favor migrating to smaller towns for a better quality of life. Before the 1950s the majority of people who lived in cities were in countries that were developed. By the 1990s that pattern had shifted to where the majority of city residents were in developing countries. The distance between cities is an important indicator when looking at the spatial distribution of population, as is the degree of connectivity of urban zones to the rest of the world.

Patterns of population agglomeration and density are also important because of the spread of diseases. Changes in population concentration and increased mobility impact the emergence and reemergence of infectious diseases throughout the world. Morens et al. (2004) highlighted the patterns of emerging and re-emerging infectious diseases throughout the world. Newly emerging diseases are mostly from North America, such as cycloporiasis, E. coli, hepatitis C, and Whitewater arroyo virus; from Asia, such as SARS and H5N1 influenza; and Africa, such as HIV. Re-emerging or resurgent diseases are mainly from Latin America (dengue fever, yellow fever, and cholera); Africa (cholera, ebola hemorrhage fever, plague, and drug-resistant malaria); and Asia (diphtheria, typhoid fever, and drug resistant malaria). Some diseases, such as multidrug-resistant tuberculosis, are re-emerging in all regions of the world due to travel and increased interaction. Morens et al. (2004)

Table 1.2 Spatial distribution and concentration of population by type of economy

Level of development	**Number of countries with large urban populations**		
	1950	**2000**	**2030**
Advanced economies	11	9	7
Developing countries	17	25	21
Share in advanced economies (%)	65	36	33

Note: Share calculations by author.
Source: Data from United Nations (2011).

also have a category called "deliberately emerging diseases," such as anthrax bioterrorism, which emerged in North America.

The proximity of people to animals is responsible for the added risks of animal-to-human transmission of diseases, but can also have positive effects on immune systems. Successfully assessing the risk of communicable diseases is a key enabler in building readiness for handling emerging diseases and responding dynamically to the data and treatment needs of various risks. There are a number of maps of hotspots for emerging and reemerging communicable diseases that are useful for making important decisions globally, especially around preventing pandemics.

Resources: water, food, energy, and environment sustainability

The distribution of water and how the existing resources are used and managed is a key dimension under the resources sphere of change. Most freshwater in developing countries is used for agriculture. Increases in irrigation of land put more pressure on water resources. When food production rises faster than population growth it may reduce the frequency of famine or persistency of chronic undernourishment. The patterns of water use across the world and their relation to the production and availability of food remains a key aspect of observation for decision makers.

The availability, efficiency of consumption, and sources of energy generation are also areas to pay attention to in terms of patterns of change. During the period 1990 to 2008, China registered a 20% growth rate per year in electric power consumption per person. During the same time period, India registered a 5.6% growth in per capita consumption of electric power (see Table 1.3).

Brazil nearly doubled its per capita consumption of energy, recording a growth rate of 2.1% per year. During this same period, South Africa, which has a higher per capita consumption of energy than China, Brazil, and India, registered a modest increase of 0.3% per year. Increases in the consumption of electric power result from improvements in the standards of living in these countries and are expected to grow as the numbers of people in the middle class in developing countries grow. China registered a high growth averaging 15.9% per year for 30 years (see Table 1.4).

Table 1.3 Electric power consumption (kilo-watt hour per capita)

Year	Brazil	China	India	South Africa
1990	1,457	511	275	4,431
2000	1,897	993	400	4,361
2010	2,384	2,944	616	4,803
Annual growth rate 1990–2010	2.1%	15.9%	4.1%	0.3%

Source: World Bank (2012): World Development Indicators Report 2012, International Bank for Reconstruction and Development/ World Bank, Washington D.C.

Table 1.4 Electric power transmission and distribution losses (% output)

Year	Brazil	China	India	South Africa
1990	14	7	20	6
2000	18	7	28	8
2010	17	6	22	10

Source: World Bank (2012): World Development Indicators Report 2012, International Bank for Reconstruction and Development/ World Bank, Washington D.C.

Changes in the pattern of electric power use in a given country can also be a good indicator of the changes in the modes of production or advances in science and technology. The efficiency and effectiveness of different systems of management can also be detected in the pattern of electric power transmission and distribution losses. Countries like Brazil and South Africa saw a deterioration in the efficiency of their electricity distribution systems in the 30 years between 1990 and 2010, while China was able to remain in single digit losses as a share of electricity produced. India managed to reverse runaway losses that had peaked at 28% in 2000 from 20% in 1990, bringing the losses down to 22% by 2010.

Water, food, and energy are sensitive to changes in climate and choices in technology. The level of use and renewability of water and energy feature in decisions around how sustainable development can be. As the world globalizes and these resources become scarce, the countries and regions that have these resources will have an advantage over those that do not.

Observing the impacts of changes in climatic and weather patterns is a key area impacting global decision-making, as vulnerability to change is a key aspect of risk and, in some cases, opportunity. Africa is a continent facing upside risks related to changes in weather and climatic patterns. Such changes impact mostly the coastal and central regions of the continent, which is where the majority of people live. The observed effects include desertification, deforestation and loss of forest quality, coral bleaching, coastal erosion, and sea level rises, as well as the spread of weather-sensitive diseases like malaria (Balance, 2002).

Economic: finance, trade, integration, production, sourcing, sales and branding

Economic integration has been taking place over centuries. Four key indicators usually measure the level and depth of integration. The first important marker of change in this sphere comes from the relations between firms and people in the trading and commercial relations across countries.

The second is the presence of goods and products that are sold and branded globally or across a wide set of countries. A third marker captures the spread or concentration of production and sourcing locations for a

Table 1.5 Geographical patterns of the top five highest real GDP growth rates in 2010 compared to those in 2009, ranked in decreasing order of 2010 growth rates

Country	Year		Span (change from 2010 to 2009) (%)
	2009 (%)	2010 (%)	
Mongolia	–1.6	12.8	14.4
China	9.1	9.5	0.4
India	9.1	8.1	–1.0
Mozambique	6.3	7.8	1.5
Ethiopia	8.7	7.7	–1.0

Source: IMF Data available at http://www.imf.org/external/data.htm.

variety of firms, which globalizes the process of production and marketing. The final marker relates to finance and the interrelationship between financial systems, including their degree of integration.

The outcome of interactions between these four markers is visible in the geographic pattern of production around the world. Looking at data from 2009 and 2010 (see Table 1.5), which is the period just after the 2008 financial crisis, one can illustrate the pattern of real GDP growth rates across a range of countries. Two subsets of data are of particular interest for discerning patterns—the top five countries with the highest real GDP growth rates in 2010 (representing the fast movers) and the bottom five countries with the lowest GDP growth rates in 2010 (representing the slower movers). The interest in these tail-behaviors comes from a model in the science of complexity known as the "punctuated equilibrium model," which assumes that long periods of small, incremental change are interrupted by brief periods of discontinuous radical change as a result of technological discontinuities (Rosenkopf and Tushman, 1998; Tushman and Anderson, 1986).

A capacity to sustain significant growth patterns over time is a key aspect that distinguishes one country from another, even as all countries are impacted by a global economic slowdown. The long-run patterns of growth and behavior immediately after a shock are also important, as there is a relation between economic activities and the carrying capacity and resilience of the environment (Arrow et al., 1995). A lot can be learned from looking at changes between one year and another—surface phenomena—as well as looking at long run patterns of growth and their relation to environmental resources. Let us focus on the pattern of response to a shock in this analysis.

Mongolia reversed a declining growth pattern of –1.6% GDP growth rate in 2009 to a positive 12.8% in 2010 (see Table 1.6). A general pattern to note in the dynamics is that the period-to-period change is usually higher when coming from a low base, and it is usually harder to grow fast once very high

Table 1.6 Geographical patterns of the bottom five lowest real GDP growth rates in 2010 compared to those in 2009, ranked in increasing order of 2010 growth rates

Country	Year		Span (change from 2010 to 2009) (%)
	2009 (%)	2010 (%)	
Germany	–4.7	1.2	5.9
Italy	–5.0	1.3	6.3
Spain	–3.6	1.7	5.3
Japan	–5.2	1.7	6.9
Congo, Republic	2.7	1.9	4.6

Source: IMF Data available at http://www.imf.org/external/data.htm.

growth levels have been attained. China, for instance, registered a 0.4% gain between 2009 and 2010, compared to Mozambique which showed a 1.5% gain and Mongolia a 14.4% gain.

The pattern holds for both the top fastest growing countries and bottom slowest growing countries, as can be seen when comparing Italy and Japan to Germany, Spain, and Congo. The patterns in trade over time are also a good marker of the level of economic integration. They indicate the differential capacity to transform primary products, manage complex supply chains, and negotiate appropriate trade agreements.

The pattern of exports in the wool value chain provides us with an example to explore the aggregate impact of firm-level changes and country policies on the outcomes in the long run. Compare the export values from 1994 to 2010 of the top ten exporting countries in the wool value chain. Two components of the value chain are relevant—wool that is not carded or combed; and woven wool and wool fabrics. Observe in particular the short run pattern between 1994 and 2004 and compare it to the longer run pattern between 1994 and 2010. In the short run, countries like the UK have succeeded in increasing their exports of un-carded and un-combed wool, going from ninth-ranked exporter in 1994 to number six in 2004. However, the UK could not keep up its position, sliding back to number eight in 2010. While the UK struggled in the area of exporting un-carded and un-combed wool, it managed to maintain its fifth position in the exports of woven wool and wool fabrics throughout the 15-year period of 1994 to 2010 (see Table 1.7).

Italy on the other hand, with a small role in "wool, not carded or combed," was able to maintain its number one position in the value of exports from wool and woven fabrics in the short and long run. Such patterns belie a lot change and decisions at the firm, country, and global level, including the role played by brands. The patterns are also related to the pattern of resource use in the country concerned and the potential effect it has on the use of

Table 1.7 Top ten wool exporters 1994–2010 by value (US$ 000)

Wool, not carded or combed			Wool, woven fabrics		
1994	**2004**	**2010**	**2001**	**2004**	**2010**
Australia	Australia	Australia	Italy	Italy	Italy
New Zealand	New Zealand	New Zealand	Japan	China	China
Argentina	South Africa	South Africa	Germany	Germany	Germany
South Africa	Germany	Germany	China	Japan	Japan
Kazakhstan	Argentina	Argentina	UK	UK	UK
Russia	UK	Uruguay	France	Hong Kong	Turkey
Uruguay	France	China	Spain	France	Czech Rep
France	USA	UK	Hong Kong	Turkey	France
UK	Italy	Spain	Turkey	Spain	Spain
Ireland	Uruguay	Belgium	Korea, Rep	Czech Rep	Portugal

Source: FAO, Statistics of Food and Agricultural Trade (2007) and ITC Trade Statistics (2010).

natural resources such as land, water, and forests and the ensuing pattern of pollutants and contaminants released into the environment.

Picking up what is changing is a good starting point to investigate the deeper changes taking place within the said sphere (in this case economy) and across others spheres (people, resources, and technology) as they interact with a given sphere. What matters in understanding the implications of these patterns is the content of growth—not only the inputs of sheep and wool into the production process by firms that result in a volume of production by a firm in a country, but also the preferences of consumers packaged in a brand that show up in the pattern of exports from a given country. All these factors are important and all this information can be seen in the pattern of change at the economy level of a system of interaction. Following all the changes that are visible in the sphere of the economy means not only following the composition of the inputs, but also that of outputs (including waste products). As Arrow et al. (1995) state: "This content (of economic growth) is determined by among, other things, the economic institutions within which human activities are conducted. These institutions need to be designed so that they provide the right incentives for protecting the resilience of ecological systems." How these patterns interact is the subject of the next chapter, where the subject of dynamics of change is covered.

Among the incentive types that impact on behavior is the question of brands. Brands have long been used to distinguish products but also to signal unique value to the consumer. There are theories that link purchasing behavior to information garnered from brands (see, for example, Howard and Sheth, 1969). Analyzing the pattern of brands can help uncover important interactions within the spheres of people, economy, and technology. An analysis of the top 100 brands in use today indicates that the

oldest brand is a beer made in 1664, which holds the name of the year it was made. The youngest brands are in mobile communications and motor fuel. Most of the top brands in 2012 are either American or European, but significant inroads have been made by emerging markets in the areas of beer (Mexico) and financial institutions (China and India). Brands have been the subject of much study and have been used to send all sorts of signals. Civil society groups have put pressure on the responsibility of brands, as have the media. Consider an article in the *Guardian*, posted in a blog on September 16, 2011, that argues for luxury brands to wake up to their ethical and environmental responsibility (Birch, 2011 07.00 BST). Looking at how long brands have been around is a pattern that signal resilience and ability to change.

Changes in the sectoral contribution to the economy are also an important marker distinguishing countries and regions of the world as policy choices are made and the impacts of integration felt. Compare Botswana and Colombia. According to the UN statistics for 2010, the share of travel services to overall trade in services was 13.03% in Botswana and 13.77% in Colombia. However, Colombia had a much higher contribution from transportation services of 46.86% compared to Botswana at 40.32%. Communications services in Botswana at 6.63% were higher than in Colombia with 4.49%. Differences in the composition of the service sector could have very significant effects on other spheres, such as whether young people can start up a service business after graduation from school. They also vary depending on the structure of the economy—whether agrarian, manufacturing, service, or knowledge—as we will see in subsequent sections of the book.

The reason for the difference across countries can be as varied as the cost of doing business and its consequences for the start-up of certain types of business, or the pattern of demand in a country favoring a different bundle of goods. When demand patterns across countries are linked, as when preferences for the same brand dominate across countries, or when production is outsourced, all these micro effects gain relevance that they would not do in a less interconnected sphere.

Technology: knowledge, science, experience, and innovation

Technology and knowledge form the sphere that has had the most profound impact on decision-making throughout history. The use of knowledge in day-to-day activities has never been as high as it is today, causing a number of thinkers to coin the term the "knowledge economy" (see Drucker, 1992). The term is used to refer to the production and management of knowledge in firms, or by individuals, but is also used to refer to the use of knowledge itself to create jobs and increase incomes or economic value.

As such, the term "knowledge economy" is closely linked to science, technology, and innovation. The speed at which discoveries are made and rendered economically valuable is another sphere of change in a globalized

world, with serious implications for decision-making. The other dimension in the knowledge sphere is more directly related to the consumer, the user, and the firm and the specific experiences they would like, have had, or would want to create, respectively. It is related to knowledge from a very special and distinct sense—the knowledge that comes from experience, practice, or deep understanding and skill.

The concept of the "knowledge economy" has gained more recognition in the sphere of global decision-making from comparisons of the development trajectories—such as between South Korea and Ghana, which had the same level of per capita income when they achieved independence in the 1950s. The countries diverged significantly after that, causing analysts to query the reasons for the observed patterns of divergence. The generation of data and development of tools to better understand the factors driving changes in the knowledge economy was largely responsible for the big investments that were eventually made by countries in the area of information and communications technologies (ICTs). The World Bank took a lead in assessing knowledge economies (Chen and Dahlman, 2005).

Pritchett (2011) made the linkages between knowledge and development trajectories in his famous work on mimicry in development, where he argued why poor countries could not just mimic the things that work in rich countries and see themselves evolve into fully functional states. This type of analysis makes connections between evolution and institutional development, with the tendency of countries to adopt the semblance of good institutions and practices just as natural selection will favor insects that look like other more dangerous insects. Thus, external influence through knowledge and ideas that have worked in other places could cause such forms of isomorphic mimicry (Pritchett et al., 2010).

Pritchett et al. (2010) argue that country development trajectories are visible in their economic prosperity and levels of productivity. One could also see advancement in the level of administrative capacity in a country. How a country treats its citizens could also be observed to make assessments of how well a country is doing. Measures like the degree of social equality, tolerance for diversity, and environmental sustainability would all be indicators of how well a country is doing. Other measures could also include whether the polity represents the will of the citizens.

The link to the knowledge economy relates to incentives for learning, creativity, or innovation, which would lead to effective generation and use of ideas and enhance not only economic prosperity, but also productivity and the quality of public management. Having skilled people who not only create but also use knowledge effectively, including knowing what works and what doesn't, could make a big difference to the quality of administration. Having such people engaged and their talents utilized through consultation and participation for sustainable production depends on the desire for sustainability. For the polity to effectively represent the will of the

people, you need organizations that can source local ideas, tap into the stock of global knowledge, and adapt and assimilate it to local contexts in a way that is not "isomorphic mimicry," but in a manner where the talents and perspectives of the citizens are linked to the contexts of application. Having an information infrastructure that facilitates dialogue and exchange, as well as the sharing of and access to ideas, is the final link that drives patterns of change in the knowledge sphere.

The link between information and knowledge can also be seen in the experience dimension. Experiences of a particular good or service are forms of "knowing" that are highly individual and contextualized. Where did the individual get to know about the product or service and where is it located now? Who else is consuming the product or service and do they "like" it or not as expressed in various social media platforms? How has the service been made possible by the advances in communication technologies? A coffee consumer at Starbucks has about the same experience, whether drinking the coffee in Seattle, Seoul, or Saigon. People who go to Starbucks go not only for coffee but also for the company, the ambience, and what it means to them. They share their experiences using social media and their views have an impact on what others do.

What and how people feel about a product or service as well as how they consume and trade it makes a difference in the price. A coffee cup consumed in a tourist hotel or at Starbucks costs more than when purchased at a Coffee Board or on the New York Stock Exchange. Pine and Gilmore (1999) had foreseen this phenomenon and coined the term "experience economy," which distinguishes countries and firms by the economic offering, type of economy, economic function, nature of offering, key attribute, method of supply, type of seller and buyer, and factors driving demand.

Pine and Gilmore (1999) classify decision makers by their ability to differentiate whether they are dealing with commodities, goods, services, or experiences. Producing coffee beans in Colombia puts you in the *commodity* realm, where you are handling players such as smallholder farmers who are extracting value from the land in an agrarian setting. The farmers could be selling their produce to a coffee board or to a series of small traders. Coffee boards could interact in commodity markets, where traders would be setting global prices, or they could sell to unique predetermined customers on the basis of long-term contracts. The key aspect of choice in such a realm is the characteristics of the coffee—Arabica or Robusta, AAA grade or other grade, and so on.

Roasting, grinding, and packaging coffee in a factory positions you in the *goods* area of influence, where you are dealing with industrial processes and functions to make a product that users would like. A coffee drinker would be able to distinguish one product from another and make choices to consume one brand over another. The production process is standardized to produce at scale and the producers inventory their final product. A coffee processing

plant would be linked to a manufacturer of coffee and brands would distinguish themselves on specific features of the coffee they sell—drip coffee, instant, roasted beans, flavored beans, and so on.

Offering coffee in a coffee shop puts a player in the *services* field and therefore in a service economy. The key aspect creating value is how the service is delivered, and the nature of service is less tangible. Clients coming to a service point would interact with the provider of service and would get their coffee delivered on demand. A return to the same service provider would occur be because the client sees benefits from the service. In some cases, the benefits of the service would be bundled, as in consuming coffee and a cigarette in the few remaining cafés that allow smoking, or consuming coffee outside on a pedestrian pavement where one can observe and contemplate life.

The *experience* economy has players who are staging experiences for their guests. The guest leaves with a specific experience of how coffee is brewed, the way it smells, how it is served, where they sit, and who else is there. These sensations over a period of time are revealed in the choices the guest makes from a flexible menu of options. The seller of the experience reveals the different ways in which coffee can be consumed over a period time. The key attribute of an experience economy is how personal it is, and the seller of the experience is in the realm of theater, as a stager of experiences.

Moving from an agrarian economy through industrial and service economies to an experience economy allows value to be extracted in different ways. Most countries have all four forms of economy going at the same time. For example, India has an agrarian economy in its rural areas, even as it embraces a service and experience economy in urban areas. The use of mobile communication tools puts India in a place where urban users can use sophisticated services to get just about any information on their cell phones (www.asklalia.com). Another service is GNT, where users are linked to each other by the quality of SMS messages in a GIVE and TAKE form, where you either give information or get information or both (www.gntindia.com). The rating system on amazon.com is a similar service, where users can use the experience of others to help them make choices. The experience economy can have a major impact on how activities are organized and decisions made and is one of the major changes in the pattern of production and consumption driven by the knowledge and experience economy.

Performance can be gauged by how a country is plugged into the knowledge and experience economy through observation of the patterns of a few indicators. Variations in the capacity of countries to tap into the knowledge economy are measured by high-tech exports as a share of manufactured exports, which measures the degree to which a country is straddling the knowledge, goods, and service economies. East Asia leads the developing countries in this indicator, but South Asia has managed to make a big jump in a few years in the share of high-tech exports in

manufactured exports. Africa, on the other hand, despite being a strong user in the mobile communications area, seems to be losing out in new idea generation at the goods production phase, having actually seen a big decline in the share of high-tech exports in manufactured exports during the period 2005–2007.

Other indicators for Africa show a different pattern. For example, services in banking, like Safaricom's M-PESA program, indicate that innovation in the use of mobile technology is very high in Africa. This also indicates that Africa occupies space in the service and experience economy, but not necessarily in the goods economy, and raises the question of whether countries can skip the goods production phase altogether and function without manufacturing much.

It is therefore important to analyze patterns of change. Decision makers need to be aware of broad trends. Leaders shape and intervene in spheres that drive the patterns of change and should have the ability to attract "followers" and create "trends."

Reacting to tectonic change

So far the book has covered how to read patterns of change for decision-making in a globalized world. Many of the changes presented are of such important consequence they can be labeled "tectonic." Ghadar and Peterson (2005) presented the revolutions that are shaping the future of every facet of society in a compendium that covered trends including aging and natural resource issues, as well as dramatic advances in technology, terrorism, and immigration. The compendium was aimed at educating CEOs and senior managers on what they need to know to develop and implement good global strategies. The main thesis is that CEOs often overlook small changes or gradual developments and miss out on shifting strategy until it is too late and the changes have become major quakes that shake the very foundations of the companies they lead.

There is an alternative view to waking up to gradual change, which is to embrace change and make it part of the organization's DNA. Brown and Eisenhardt (1997) use an inductive study of multiple-product innovation in six firms in the computer industry to show how organizations engage in continuous change. They show that successful firms rely on a wide variety of low-cost probes into the future, but also on the design of experimental products, hiring futurists into the firm and having them peek into the future, forming strategic alliances that help them leapfrog ahead. Brown and Eisenhardt (1997) develop the ideas that firms can use, such as creating "semi-structures" and deliberate "links in time" as well as following "sequenced steps" to crystallize the key properties of relevance to decision makers functioning in continuously changing organizations. As such, they extend the thinking about complexity theory, time-paced

evolution, and the nature of core capabilities in ways that are very useful to use in the workplace.

Scharmer (2007) puts together the types of behaviors that can sustain the constant adaptation into "Theory U." Along with case studies, the work of Scharmer (2007) can be used to highlight the skills of observing what is happening around you and downloading what you know about a situation from your past experience. Theory U is also useful when extant theory does not appear to be useful in explaining rare and unusual phenomena. As such, one has to rely on a grounded theory-building approach, which is more likely to generate new insights into the phenomenon under study. Glaser and Strauss (1967) argue that indeed grounded theory-building could be more useful in generating accurate and novel insights into rare phenomena than either past research or office-bound thought experiments. The reader is encouraged to go along with this grounded theory-building approach in its application to a case study and extension of the work of Scharmer (2007). The key practice skill is one of keen observation and ability to identify what is going on, taking time to retreat and reflect about the patterns observed and find solutions quickly using previous knowledge and past experience, which can be downloaded quickly.

Reacting to tectonic change: Monsanto[2]

This case study assesses the responses of a multinational company to advances in science and technology that have caused tremendous change in the way food is consumed and agriculture practiced. As such, it provides the reader with examples that illustrate the skill of reacting to change and the aspect of Theory U related to adapting to change.

Genetically modified products offer tremendous opportunities as well as risks that cause players involved in this business to adapt their strategies and respond to the issues raised by society. The company concerned is Monsanto, a firm that has a powerful role in the invention of methods of cultivation of genetically modified plants and animals aimed at increasing productivity and reducing the cost of food production.

The Monsanto case is important for assessing reactions to patterns of change around you. The case offers the opportunity to derive deeper learning as you interact with the materials. The Monsanto case is about competition, cooperation, investigation, and regulation; but it is also about interactions between different groups active in a complex chain of decisions. The exercise is useful for self-learning to *observe* the challenges and choices made by the company, reflect on the process followed by its leaders to make choices, and to *retreat and reflect* on the production or use of genetically modified organisms and their implications for a variety of decisions. What are the different types of reactions by groups of decision makers to the choices made by Monsanto? What characterizes these reactions and how did Monsanto formulate and execute a response—in other

words, how did Monsanto react to the tectonic changes that come from consumer preferences and regulations in different parts of the world? What has been the role of science and technology, and how have leaders in different spheres of production, consumption, branding, sales, and regulation used such information? How would you *solution quickly* if you were faced with similar challenges? These are the questions explored in diving into the case.

The grounded theory-building approach is used to draw conclusions from the author's perspective that would be useful for the reader. The reader is encouraged to reflect further on these interpretations and lessons and inform their own lessons learned, in a grounded theory-building effort.

Downloading: learning from Monsanto

Monsanto is a multinational, joint-stock company, specializing in biotechnology and organic chemistry for use in support of production in agriculture. It was founded in St Louis, Missouri, in 1901 by John Francis Queeny, a 30-year-old veteran of the pharmaceutical industry. It is the world's leading producer of the herbicide glyphosate, marketed in the "Roundup" brand of herbicides and in other brands. Monsanto is also the leading producer of genetically engineered (GE) seed; it provides the technology in 90% of the genetically engineered seeds used in the US market. Headquartered in Creve Coeur, Missouri, Monsanto controls from 70 to 100% of the market, producing the genetically modified seed grain. Monsanto is a good example of a globalized company intervening in all four spheres of change—people, resources, technology, and economy.

Monsanto and its subsidiaries provide agricultural products for farmers internationally. It operates in Seeds and Genomics and Agricultural Productivity. The Seeds and Genomics segment produces corn, soybean, canola, and cottonseeds, as well as vegetable seeds, including tomato, pepper, melon, cucumber, pumpkin, squash, beans, broccoli, onions, and lettuce seeds. This segment also develops biotechnology traits that assist farmers in controlling insects and weeds, as well as providing genetic material and biotechnology traits to other seed companies. The Agricultural Productivity segment offers glyphosate-based herbicides for agricultural, industrial, ornamental, and turf applications; lawn-and-garden herbicides for residential lawn-and-garden applications; and other herbicides for the control of pre-emergent annual grass and small seeded broadleaf weeds in corn and other crops. The company offers crop seeds principally under the DEKALB, Asgrow, Deltapine, and Vistive brand names; vegetable seeds under the Seminis and De Ruiter brand names; traits primarily under the Roundup Ready, Bollgard, Bollgard II, YieldGard, YieldGard VT, Genuity, Roundup Ready 2 Yield, and SmartStax brand names; seed treatment products under the Acceleron brand name; and herbicide products under the Roundup and Harness brand names. It also licenses germplasm and trait technologies to

seed companies. The company sells its products through distributors, independent retailers and dealers, agricultural cooperatives, plant raisers, and agents, as well as directly to farmers. It has a collaboration agreement with BASF in plant biotechnology that focuses on high-yielding crops and crops that are tolerant to adverse conditions.

Retreat and reflect: the science, its benefits and risks

The DNA of living organisms frequently contains dormant forms of viruses and bacteria. Putting them into genes which are used in the production of GMOs may activate hidden forms of microorganisms and cause unpredictable recombination and mutation of microbes. This may lead to the development of a new generation of pathogenic microorganisms more dangerous than SARS and H5N1 viruses. Scientists name such actions "biological terrorism."

Fragments of altered genes from GM soy and corn penetrated genes, blood, liver, spleen, kidney, and fetal warm-blooded organisms fed with genetically modified food. Scientists report that this causes danger to the health of humans and animals.

BST (rBGH, nourish)—genetically modified growth hormone—increases milk production in cows. Unfortunately, it also increases the risk of breast, colon, and prostate cancer in milk drinkers. The use of BST has been prohibited in EU countries. Roundup is an herbicide produced by Monsanto. After application on an industrial scale in corn, soybean, rapeseed, cotton, and sugar beets, it formed Roundup-resistant weeds. As a result, farmers must now use higher doses of herbicides, which mean higher costs.

During the 100-year history of Monsanto, the company has been responsible for tremendous innovation and has driven the inputs into food and beverage businesses around the world. It has also been the subject of controversy and legal challenges.

The company's first product was the artificial sweetener saccharin, which it sold to the Coca-Cola Company. It also introduced caffeine and vanillin to Coca-Cola, and became one of Coca-Cola's main suppliers. The 1940s saw Monsanto become a leading manufacturer of plastics, including polystyrene and synthetic fibers. Since then, it has remained one of the top 10 US chemical companies. Other major products have included the herbicides 2,4,5-T, DDT. In 1945, Monsanto introduced the manufacture of DDT—a chlorinated hydrocarbon used to control insects. Scientific discoveries on the effect of these products caused challenges to the safety claims made by the company. Today it is known that DDT is highly toxic, causes cancer, and accumulates in the fatty tissues of animals and humans. In the late 1960s DDT was banned in developed countries, but it is still used in many developing countries to this today. DDT and "Agent Orange" were primarily used during the Vietnam War as a defoliant agent and are believed to have caused immense damage to health, not least by genetic modification.

In 1976, Monsanto launched Cycle-Safe—the first plastic drinks bottle—banned a year later because of carcinogenicity. In 1985, Monsanto began selling Aspartame (Nutra-Sweet)—a sweetener suspected of causing brain tumors, and later banned in the US. In 1979, Monsanto conducted a study that stated that dioxins do not increase cancer risk. Later in 1990 it became clear that these results were falsified. In 1997, it came to light that Monsanto had sold 6.000 tons of waste contaminated with cadmium to companies producing fertilizers.

Observe, retreat, reflect: new ownership continues to dominate global markets but faces legal challenges

Pharmacia purchased the Monsanto Company in March 2000, and the new ownership resulted in changes in the structure of the company. On May 19, 2001 Monsanto revealed that the genetically modified Roundup Ready soybeans contain "unexpected genetic fragments." In 2004 and 2005, Monsanto filed lawsuits against many farmers in Canada and the US on the grounds of patent infringement. Agracetus, a company 100%, owned by Monsanto, has a monopoly on the production of genetically modified soya beans sold under the name "Roundup Ready." Monsanto employs 15,000 people worldwide. According to its August 2004 tax return, its gross annual income is US$ 5.4 billion.

Monsanto has delivered superior performance despite the legal challenges. Common stocks of Monsanto have consistently outperformed those of a competitor, *United Phosphorus Ltd*.

Observe and react: highly varied regulations for the production of GMOs in the EU and US

Monsanto operates in a complex legal environment with highly differentiated regulations. The EU has possibly the most stringent GMO regulations in the world. And in fact, people in the EU do not willingly consume GMOs, which renders the EU a tough market for Monsanto. EU legislation after 2003 contained strict rules on labeling, traceability, and risk assessments of genetically modified foods by all the biotech companies.

Legal requirements governing organic production in the EU are set out in regulations enforced in its entirety and directly in each EU Member State. They are:

- Basic COUNCIL REGULATION (EC) No 834/2007 of June 28, 2007 on organic production and labeling of organic products and repealing Regulation (EEC) No 2092/91.
- Implementing COMMISSION REGULATION (EC) No 889/2008 of September 5, 2008 laying down detailed rules for implementing Council Regulation (EC) No 834/2007 on organic production and labeling of organic products with regard to organic production, labeling and control.

The use of hormones in all primary production and in organic production is strictly prohibited in the EU. The only GMO food crop that was approved in 1998 is the GM maize MON810; therefore it can be used for cultivation in Europe. On March 2, 2010 a second GMO, a potato called Amflora, was approved for cultivation for industrial applications in the EU by the European Commission and was grown in Germany, Sweden, and the Czech Republic that year.

The US is the largest commercial grower of genetically modified crops in the world. A lot of GMO products that are forbidden in other parts of the world can be freely produced in America. No single statute and no single federal agency governs the regulation of biotechnology products. The Food and Drug Administration, the Department of Agriculture, and the Environmental Protection Agency have primary responsibility for the regulation of biotechnology products. Each of the laws that exist today in the US was developed before the advent of biotechnology products and reflects widely different regulatory approaches and procedures (Box 1.1).

Box 1.1 Responding to the Promise and Limits of Science

The reader is encouraged to see how differently they would act in the space that Monsanto had to act, where there are links between the knowledge gained from science on how to grow food, which resides in the sphere of *technology*, with the health of *people*, and the impacts on the environment where food is grown, which is the natural *resources* of soil and water. All these are taking place in an *economy* where the leaders of Monsanto have to react to shareholders, who want to see profits.

From my perspective, the main problem Monsanto has faced in using a broad-based GM strategy is the lack of independent, reliable information. Societal concern for contamination of the environment and attention to human health risks demands a tough tradeoff if you are in the GM business. These tradeoffs vary across cultures, and when operating in a global sphere they require differentiated strategies that help a multi-national company like Monsanto, shift to meet the expectations of consumers in local markets that they serve around the world.

The main argument for an expansive strategy such as the one used by Monsanto is that GMOs can be used to produce better and cheaper vaccines and drugs, as well as help to tackle the problem of world hunger. The reality has been challenging, with secondary effects such as plants that produce toxic substances, and toxic plants that are resistant to herbicides. Yields have not universally improved in all cases and farmers cannot all afford the increasing volumes of herbicides and fertilizers.

Modified grains are in fact patented and in many cases cannot re-germinate, causing farmers to change their behavior and having them

purchase seeds to sow for the next season. Changing farmer behavior is costly and can cause short-term risks, as productivity is lost until local systems can adjust to having farmers in a cycle of seed-buying from independent seed companies.

When patents are highly valuable, copying and mimicking can take place, reducing the incentive for further innovation by a company. Patent infringement, on the other hand, is a challenge and Monsanto has been the subject of many law suits to defend its patents.

Developing countries in Africa, Asia, and Latin America, with their need to meet nutrition challenges in the short run and their capacity to use abundant land for global food production, are a wide open territory in terms of choices around GMOs and whether to use them or not. A good understanding of the risks and opportunities is needed in order to pair such knowledge with societal preferences to make a choice that is meaningful to developing countries. How easy it is for actors in the whole agriculture value chain to adapt to science and technology is another consideration.

Retreat and reflect: anti-globalization and environmental organizations against Monsanto

Activity in the market for genetically modified seed corn and the production of domestic bovine growth hormone rendered Monsanto one of the most targeted companies by anti-globalization activists and environmental multinationals. They coined the term "frankenfood" (from the reference to genetic modification of humans in "Frankenstein") in relation to food produced using Monsanto's technology, and the name of their group, "Monsatan," means "my Satan" in French. According to the opinion of anti-globalists, Monsanto is a leading example of so-called "corporate terrorism."

Such organizations hold many protests and publish e-articles and in newspapers. But so far they have not joined forces to fight against the products of Monsanto.

Lessons from the Monsanto case

In this case study one learns what happens when changes interact in the common decision space of an organization. Also learned is how to identify reactions by individual stakeholders and the unique strategies they employ to get a desired outcome. The case also shows us that the reactions are not a zero-sum game, and indeed there are winners and losers. However, a special focus on downloading and observation from what is going on can help identify the potential for a common vision and strategy on how to use

science for the benefit of farmers, consumers, and companies that make innovative products. The lessons learned are summarized below.

Spheres and patterns of change

The Monsanto case study shows effects in all four spheres of change. In the *people* sphere there is the question of nutrition and feeding the world, but there are also preferences for organic food and non-genetically modified products due to the presumed impacts on the health of consumers. In the *economy* sphere there are many factors, such as the dependence on agriculture and the need for increased productivity that could rely on the use of better seeds and treatments for higher yields. There are also expected returns from science and innovation in the form of patents that need to be protected in a globalized world where patent infringement is serious. In the *technology* sphere are the methods and practices of farming (organic, modern, traditional, and so on) as well as the scientific research that brings in new technologies and the reliance on knowledge systems and knowledge workers. A farmer in rural Africa, Asia, or Latin America may not have the skills needed to use some of the highly scientific products available on the market. Effects on *resources* are also present, such as soil contamination, the use of water for irrigation, and the impacts on the ecosystem, including on the growth of other plants and on animals and their consumption of genetically modified products.

Reactions to change

One may also identify the distinct reactions to change of five groups of stakeholders, each with a different approach to dealing with the tectonic changes facing them, but all interacting in the dynamic decision space for Monsanto. These include the company, governments in different parts of the world, donors engaged in agriculture, civil society, farmers, and agricultural workers.

Monsanto has reacted by rethinking its policies and actions aimed at consumers and farmers. First, it has revised its approach to the dissemination and promotion of their genetically modified products, and works with farmers and farmers' associations to do so. Secondly, the company has been seeking a better balance between patenting its products and sharing research ideas and inventions with farmers in poor countries. Monsanto is also focusing on research in organic and other forms of products that are a better fit to the variety of ecosystems in which the company has clients.

Governments in different parts of the world have started to collaborate to come up with a common set of regulations that match their citizens' demands for purity and safety of the environment, yet allowing other countries to choose on the basis of a localized risk assessment. Legislation from the EU is such an example. The authorities of different countries also conduct educational programs on the potential and actual dangers

contained in genetically modified products, including Monsanto's products. Governments deliver useful information to agricultural workers, farmers, and owners and employees of food companies, so they can also be partners in making effective policy choices. There has been progress on an agreed set of penalties and fines for the use or production of harmful genetically modified products. Supporting organic methods of cultivation and managing the farm sector in general is also helping to reduce dependency on single large players in the market of GMOs.

Donors have supported programs of research and finance for smallholder farmers and agricultural workers, providing means and an opportunity to experiment and use organic products in their work. Through financial support programs, farmers have been encouraged to use organic and nature-friendly products, or choose from a wider variety of input producers, including at the national and international level.

Global environmental civil society has concentrated on coordinating its activities on the common dissemination of information on a global scale. It has organized the gathering of voices of citizens in different countries, in order to appeal to the parliaments and governments of those countries, so as to influence their decisions to introduce relevant laws governing food safety. Also, activists have effectively influenced the activity of companies like Monsanto by putting better research in the hands of lawyers in important court decisions. Environmental organizations have worked together to support farmers and agricultural workers, and *ecologists* have provided research, analysis, and product testing to provide independent assessments of the products of companies like Monsanto.

Farmers and *agricultural workers* have started to use alternative products, such as organic solutions and those free of human pathogenic microorganisms and without residues of harmful substances (antibiotics, coccidiostats, or other feed additive products) used in primary production in consumer-ready products. Farmers are blending traditional methods of land cultivation and sowing with recently invented new technologies, with beneficial properties in terms of food and livestock production.

And finally, *consumers* are making better choices in the consumption of genetically modified foods, including choosing to eat organically grown foods when that is a better value-for-money deal.

Implications for strategy

This case study has shown how a company (Monsanto) has been impacted by changes particularly in the spheres of people, technology, and economy, and how the company has reacted to and caused tectonic shifts in technology, economy, and resources. The case is also illuminating in how science is used for profit, how farming interacts with science, what people consume and the effects on their health, and how the use of scientific

knowledge is regulated. A set of potential reactions by different groups was considered and their reactions to the complexities of changes in the global food supply chain analyzed. A balance was provided between competition, cooperation, investigation, and regulation, and a set of reactions by different groups active in a complex chain of decisions was highlighted. The implications of this case study for strategy are that it is important to learn from and adjust to the ways that other stakeholder groups see an issue.

Practice Block I: reacting to tectonic change

The case study (Box 1.2) illustrates the wide range of issues to consider when making decisions in complex global world. These include the production and use of genetically modified organisms and implications for a variety of decisions, leading to a series of diverse reactions by a varied group of decision makers. Had you been the leader responsible for making decisions, what would you have done differently?

Box 1.2 Practice Block I: Reacting to Tectonic Change

Premise: Global trends are shifting the topography and environment in which your business and political decisions are made.
Objective: To practice the skill of learning from the past while adapting to major shifts.
Approach: Using the Monsanto case study, identify three key tectonic changes that the company was facing.
Recommendation: Looking at potential challenges presented in the Monsanto case study, use your prior experience (including from reading, internet searches, and your own knowledge) to prepare and present the areas you have identified as critical.
Exercise: Summarize your approach for selecting the tectonic changes facing Monsanto.
Skill: Learning from the past and practicing "observation and downloading" in a structured setting.

Theory U makes a distinction between different qualities of how action comes to be undertaken. Action from one player (say Monsanto) could be subject to blind spots, as the objectives of the company of using science for productivity improvements in agriculture and for profits clashes with that of government, of ensuring healthy food is available to society. The sources of action of civil society organizations also differ from those of government and companies. By mapping the topography of the blind spots, Theory U

offers a language and a roadmap for crossing the threshold to authentic renewal and change (Scharmer, 2007: 118). Critical in Theory U is the "source of knowing." The key lesson is to identify the key stakeholder group and see the world from their perspective (Box 1.3). Also, the information to share (download) to these stakeholders could have an impact on how they react to the new science or new knowledge.

Box 1.3 Questions for Self-Development

- Who would you have identified as the key stakeholder group?
- What would you have shared to ensure they understand your perspective easily?
- What would you do to ensure success in having them see things from a fresh perspective?
- What information would you provide them and how would you share it to help them think along with you?
- What reasoning and arguments would you use to support the main direction you wanted to take as well as support your conclusions?
- What array of possible options would you consider and what sources of information would you use to advance the options?
- What stories would you tell, or what metaphors and anecdotes would you use to make your context-setting arguments?
- Where would you use humor to lighten tensions and where would you be serious in bringing in the key issues?
- How would you make your arguments and presentation consistent and where would you try to force your ideas on them?
- What reactions would have made you panic or get emotional and how would you handle criticism?
- How would you make all stakeholders feel comfortable?
- Where would you act like yourself, and where would you role-play?

An important skill in Theory U is convincing other stakeholders to see from your perspective or to see from a fresh perspective. What information to provide and how to provide it makes a big difference in how it is used as people have biases when they make judgment under uncertainty and rely on heuristics and other forms of past knowledge and experience (Kahneman et al., 1982). Getting others to buy in also relies on making convincing arguments and skills in negotiations (Fisher et al., 1991). The sources of information used and the approaches for getting points across also matter. Storytelling can be an effective way to get a common vision and to establish powerful motivators for change and acceptance of an idea (Llewellyn, 2001).

Convincing others to see from a fresh perspective and getting buy-in from others relies on communication skills. This book puts the emphasis on learning how to communicate, which is in the realm of emotion and behavior, also known as EQ (Goleman, 1997). Emotional behaviors are learned. To support the reader, the book includes a set of guiding questions to be aware of in developing one's emotional skills of downloading and observation.[3] The guiding tool is a useful complement to the materials in each chapter in steering through day-to-day practice in similar situations.