Dealing with Risks and Uncertainties

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Operational Research (OR) is used to address some of the most important problems of mankind such as climate change, public health, energy and nutrition supply. However, less predictable events that have a far-reaching impact such as natural disasters (earthquakes, volcano eruptions or tsunamis), pandemics and political conflicts which result in trade sanctions and embargoes, restrictions for companies and, worst of all, in wars, call for more than the simple extrapolation of our existing predictions and models.

What support does OR provide in dealing with such issues? Can we adequately consider them in our models? Can we help decision makers to reach better decisions? Do the results of the decisions and actions taken create positive outcomes for human beings involved now and in the future? Taleb (2007: 140) provocatively warns us that, "we overestimate what we know and underestimate uncertainty, by compressing the range of possible uncertain states."

In the face of disruptive changes and increasing risks for international policies and businesses, we have to get engaged in inter-disciplinary research designs that address the multifaceted aspects of most societal issues. It requires experience in social science research to address the complexity of the given situation and to integrate multiple stakeholders and disciplines. It requires courage to admit that several complex problems may not have an OR solution and to openly address the potential long-term impact of any action. It requires creativity to develop meaningful alternatives in problem definition, process design and actions. It requires critical self-reflection to address ethical issues at all stages of the OR process.

Corporate foresight

Corporate foresight and issues management help to identify megatrends and anticipate future developments in order to shape the future rather than being forced to react to external changes.

Most companies are familiar with technology trends in their respective fields of activities. In a new, more society-oriented approach, changes in the business world are looked at as catalysts for innovation. Thus, megatrends in the political, legal and societal areas of any business, e.g., new rules or players in trade policy, shrinking government budgets as well as growing social differences/disparities and the societal changes that go with them, are noted and studied.

A megatrend can be interpreted as a global development that has a direct or indirect effect on the lives of a majority of people for the coming 10 years. Trends like demographic change, urbanization, migration, climate change and industry 4.0 have the potential to change markets, businesses, and global economic balance. Global challenges affect customers just as they affect the company's business, business partners, competitors, suppliers, employees as well as the public policies and societies in the world. Megatrends such as the scarcity of natural resources, climate change and the long-term development of emerging markets, come with a high probability of occurrence and can thus be predicted with greater accuracy. But the business environment of each country comprises interwoven factors such as political and economic stability and governance, including legal security, infrastructure, the state budget, education and health care. Data on population growth, education and unemployment provide good indicators of a society's inner stability and the risks of a country's domestic conflicts or conflicts with neighbors.

The focus of corporate foresight lies in the evaluation of

• Future trends, turning points, extraordinary events (wild cards) and related business opportunities,
• Probabilities of scenarios and consequences for the company's business,
• Strategy development and shaping the business environment.
Companies do much to systematize the process of corporate foresight. They identify trends that have a high likelihood of happening or have a strong influence on society. Closely cooperating with the world’s leading think tanks, strategy departments of big global players provide information and data about these megatrends and challenges. Global Procurement and Sourcing as well as Corporate Communications and Government Affairs units serve as early warning units of regional economic and political developments, media news and sensitivities of governments and the public. Strategic focus projects are then singled out after a detailed impact analysis, from which they conduct scenarios and workshops. Scenario techniques are a method to clarify the interplay of the individual trend factors and their possible effects as well as to formulate a strategic response.

Companies are mostly aware of the limitations of their models, but they use them in order to better understand the complexity and interplay of the individual factors. This internal learning effect is one of the major achievements for decision makers in the strategic research process. It makes sure that company units do not stick to a backward-looking plan and budget, but are rather focused on innovation and future needs of their customers. Megatrends therefore act as catalysts for innovation, for new business models, new target groups and collaboration with new partners and new service offerings.

Decision-Making with Uncertainty
Uncertainty stems from the unpredictability of nature. Governments install early warning systems for natural disasters such as tsunamis, earthquakes or volcano eruptions. However, they can only tell where there is a high probability, and are not able to give exact details on when and how the next big disaster will happen. Insurance companies have very sophisticated research models to find out which regions are more prone to disasters than others and include those forecasts into their pricing schemes. OR also provides models for disaster relief and efficient rescue logistics. But so far, there is no way to accurately predict such events.

Similarly difficult to predict are areas that depend on human behavior. A most current example is the Ebola crisis: States that struggle with unfavorable conditions and a lack of money, infrastructure and education are hardly able to master such challenges. As Fukuyama says, "regimes which are failing in providing the essentials of good governance such as security, infrastructure, health and rule of law lay the foundations for violent developments and warlord regimes".

But there are also problems of growing social disparities in industrialized countries. What will be the consequences if citizens and migrants are suffering from unemployment and lack of opportunities for long periods of time? Another source of uncertainty are potential cases of severe cybercrime, infrastructure (i.e. electricity grid) collapse or terrorist attacks. Political decisions that are taken as precaution or counteraction are new laws, new surveillance methods or reporting requirements and trade sanctions/embargoes – measures that usually make business more costly and complicated. In a worst case scenario companies might even be exposed to travel and/or Internet accessibility/usage restrictions, for limited or bigger periods of time and regions. What we take for granted right now might not be available eternally and like in countries with an unstable energy supply, we should have reserve batteries or other substitutes for the technologies we depend on so crucially.

Political, economic and social factors are inextricably woven together in a complex network. Serious prognoses on such kinds of issues are hardly feasible with so many variables and so many different players pursuing so many different goals. Nonetheless, economics and politics are areas in which decisions must be made under conditions of extreme uncertainty. But all models trying to forecast economic and political developments work with assumptions. The scenario that is most attractive for politicians is an optimistic one; the same is true for publicly listed companies that need to please investors. But neither an extrapolation of past data and experiences nor an optimistic approach is able to prepare us adequately for the worst case. The biggest market dislocations are caused by factors that are not attributable to trend-extrapolation but rather show up more under the header of "wild cards": natural disasters, pandemics or wars. Following Taleb (2007: 213) we should integrate such "wild cards" in our OR models in order to be prepared for events which are outside perceived possibilities yet extremely forceful when they happen.

In times of global interconnection each small political action or signal communicated via mass media can lead to much bigger consequences that impact further societal groups or regions. Frequently, there are psychological domino effects, such as those well-known examples from the stock market, which could, to some extent, also be applied to several societal developments. Behavioral economics, for which Vernon L. Smith and Daniel Kahnemann were awarded the Nobel Prize in economics in 2002, has contributed much to the understanding of this phenomenon. While making clear how much we are subject to biases and blunders, it warns against simplistic backward-looking heuristics. Decision-making has to be aware of these shortcomings, use several scenarios and double-check them with different experts and stakeholders to avoid unintentional biases, echo-chambers or other forms of one-sidedness or blind spots. But integrating different views also means that those decisions are group decisions, with all their implicit and explicit wishes and fears, unstable preferences and reassurance loops with diverse societal groups, knowledge/expertise ascriptions, power games, emotionality and mutual influences during the communication and interaction process – subjects which are to be deeply researched in Behavioral OR.

Conclusion
Foresight challenges the old ways of thinking and doing things and helps find untapped resources and opportunities. At the same time, it gives early warning of potential risks. Risk scenarios have to be an inherent part of every planning process. They can be the "stress test" for political and economic decisions and prove the robustness of a policy or business model in difficult times.

More and more, researchers in companies, universities and think tanks have to be in constant dialogue about future challenges and integrate all societal groups: the public, media, government and non-governmental organizations, politicians, unions, associations. Their expertise can contribute to dealing with some of the current challenges.
Related Readings / Bibliography


