

The role of science in thinking about the future

# From Here to the Future



**Prof. Jerzy Kleer is an economist and professor at the University of Warsaw. In his role as vice-chairman of the "Poland 2000 Plus" Forecasting Committee of the Polish Academy of Sciences, he studies issues regarding the future development of Poland and the world**

**JERZY KLEER**  
University of Warsaw  
"Poland 2000 Plus" Forecasting Committee, Warsaw  
Polish Academy of Sciences  
komprog@pan.pl

**One of science's important goals is to identify likely directions for future growth, and any accompanying opportunities and threats**

Major changes that have occurred over the past few decades and continue to occur across the globe are setting specific challenges for the research community. In response to some of those challenges, forecasting the future is a rapidly growing new scientific area that is emerging alongside the traditional fundamental and applied functions of science.

The contemporary tumult in all areas of societal pursuits, ranging from politics all the way to environmental concerns, forces us to ask questions about the future. Such questions are formulated on three levels.

The first concerns solving problems clearly defined within specific scientific disciplines. The difficulty here lies in ranking their importance, from the perspective of seeing results not only for the benefit of society, but also for its future growth. After all, we need to remember that the future is already being shaped today. Contemporary decisions regarding many important fields, from spatial management of land, through infrastructure, to specialization in production or services, will have far-reaching consequences in the future.

The second level involves the identification of long-term issues that will pose challenges for specific societies or countries in the near or more distant future. Their recognition is a major obligation for the scientific community. In this instance science needs not only to suggest directions for future growth, but also, and more importantly, to indicate potential or real threats.

The third level is perhaps the most important, while also the most difficult to forecast, as it concerns global issues. The contemporary world is constantly being affected by changes that influence one another both positively and negatively. The key ones are globalization, which is drawing all economies into the mechanism of the global market, regardless of their social and economic levels, and the information revolution, which is equipping the global society with new communications tools and connections.

## Is the future predictable?

Academics frequently give opposing answers to this question. For some, the future is unpredictable in two distinct ways. Firstly, it is impossible to determine how new inventions or scientific discoveries will impact future developments in a scientific discipline, or what societal or economic applications those innovations may bring. Secondly, they believe that predicting future developments in mass-scale processes is impossible, because there is always the chance that new factors or

**Forecasting is the task of defining potential and desired trajectories for growth**

phenomena will arise that can make entire projections obsolete. The current world economic crisis provides numerous arguments backing this position.

But there is another body of scientists who have solid arguments in support of forecasting the main trends in development, while not challenging either of the above arguments. Although the science of forecasting is admittedly incapable of precisely defining the shape of the future in specific countries or regions, it can help us to outline potential and desired trajectories for growth. How well those opportunities are actually harnessed is a separate matter, which large-



ly depends on choices made by politicians as well as individual societal groups.

And so, regardless of the misgivings spelled out above, we can nevertheless point to four areas in which predictions of the key directions of changes can be ventured.

### Demographic forecasts

The first such area concerns demographic processes. The field of demographics has tools at its disposal for forecasting future population structures and sizes. We can predict fairly accurately how a given society's demographic structure will be shaped over a few decades. For example, Poland's population forecast stretches up to 2035 - a relatively long period. Preliminary European forecasts reach 2050, in line with UN global predictions. Are we able to state with confidence that such forecasts are accurate? It seems that we can, although there are two caveats to bear in mind: we need to allow for certain deviations regarding population sizes and structures, and we must assume that no large-scale disasters will occur, such as war or climate catastrophe.

What does such a forecast offer us? It provides us with three important pieces of information: firstly, a predicted population size in 10, 20, or 30 years' time; secondly, average ages for men and women (whether they will increase, remain steady, or decrease); and thirdly, population structure based on pre-productive, productive, and post-productive brackets (0-17 years old, 18-59 for women / 18-64 years old for

men, and above, respectively). Such projections then allow us to draw several important conclusions regarding job markets, education, and demands for specific goods or services.

### Technological progress

The second fruitful area for forecasting work comprises technological progress in the broad sense. Although we are currently unable to predict what new inventions will come about in the next few decades, and the degree to which they will influence the functioning of societies and economies, we are able to consider the fact that technological progress usually follows specific steps, with innovation being followed by an incubation period. Based on past examples set by discoveries such as the television, mobile phone networks, or the Internet we know that it generally takes between 30-50 years for inventions to become widely available.

Some obvious conclusions follow: a certain amount of time will pass before technological innovations come into common use. This confirms the aforementioned assertion that the present is continually shaping the future in the sphere of technological progress.

Therefore, if we accept that technological progress is a key factor stimulating economic growth, or - even more broadly - societal progress, it follows that our ability to identify its key areas at present should allow us to predict its future conse-

**In knowledge-based economies, growth is a derivative of the creation, dissemination, and practical utilization of knowledge and information**

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One characteristic process of contemporary growth is "metropolization," which concentrates economic, societal, and cultural processes in huge urban agglomerations



quences with a high degree of probability. So, we are not completely at a loss even when forecasting such vital domains as technological innovation.

### Economic development

The third area where forecasting can be applied regards transformations of the scope of economic activities. Despite the fact that economic growth is not linear and proceeds at different paces, a certain regularity can be identified. This is demonstrated by the transition from agrarian to industrial civilization, and then on to post-industrial, dominated by the service industry. This is a consequence of two processes which govern all economies to some extent: globalization, in which the financial sector plays a huge part, and the information revolution, which forms the basis of a knowledge-based economy. If the abovementioned assertion is correct, and all available statistical data do suggest that it is, we can define with a high degree of certainty the contemporary and future consequences understood in general trends, even if not in specific details. This applies to certain technological disciplines, educational models, and social relationships, as well as job markets and societal and professional hierarchies.

These regularities allow us to draw more detailed conclusions regarding specific countries or economies. Their prospects for the future will depend on their current

level of development, as well as internal driving forces and external stimuli.

### Metropolization

The fourth and final area we can forecast with a high degree of probability is the rapid process of "metropolization" or the rise of metropolises: the increasing concentration of economic, social, political, and cultural activities in large urban conglomerates. Although academics dispute whether the essence of the world is "flat" or "spiky" - rural or urban - there is rapid movement in the majority of processes, especially migration, towards the largest urban centers. In order to understand this process it is worth considering the following fact. Cities had around 30 million inhabitants in the year 1800, or 2.5% of the global population at the time, whereas in 2006 this figure reached 51% of the world's over 6 billion people. This rapid exodus of the population from the countryside to cities, especially to the largest metropolises, results in several economic, societal and organizational consequences which are by now well-recognized.

Regardless of how this process proceeds in the long term perspective (above 50 years) it is unlikely to halt in the next few decades, especially in poorer countries. Urban populations are expected to reach 80% of the world's population.

We can therefore conclude that within the four crucial areas discussed above - if

we have identified them correctly - the science of forecasting may not only be accurate, but may also open up a wide range of well-informed options. How rational our actual choices will be will then depend largely on politicians and other decision-makers.

### Globalization processes

Globalization and the information revolution are relatively recent processes, coming about in the last 30 years. Now they play an important role in our future plans. They provide new tools for forecasting main growth trends, as well as indicating potential threats and pitfalls that may occur in the future.

Today's form of globalization is characterized by relatively uniform rules of the game across world markets, resulting from the commonalities of the market economy. This facilitates current and future assessments of such phenomena as rapid income differentiation within individual countries as well as between them, the "oligopolization" of markets by multinational corporations, and shifts in terms of which economies dominate the global stage.

In turn, the information revolution has been responsible for the creation of the Global Village. Technology has simplified relationships between countries and between different economic entities. This is significant from the perspective of production costs, as well as expanding areas dominated by the market economy.

However, the most significant consequence of the changes brought about by the information revolution is the expansion and dissemination of information. In the past, information was in desperately short supply, holding back and restricting our ability to manage and plan for the future. Thanks to state-of-the-art technologies, the information revolution has become an important tool for evaluating the future, as well as constructing growth models.

Imitational models with varying degrees of detail, predominantly used for technological innovations, provide this tool. Another important area for imitational modeling is education in the most developed countries. Finally, various organizational models, including economic entities

and public institutions, can be used for imitational purposes.

### Educational expansion

It follows from the points made above, as well as our global experiences, that the role of the sciences in contemplating our future is growing continuously. This is most obvious in two areas: the rapid educational expansion on all levels (developed countries are now encouraging at least half of young people aged between 18-25 into higher education), as well as research and development funding, which according to standard criteria should constitute around 2-3% of GDP.

Another important conclusion is the need for separate scientific disciplines specifically concerned with forecasting. The world's most developed countries already have university departments, institutes and non-governmental organizations dedicated to studying the future. Unfortunately, none of the above conclusions so far apply to Poland.

**Demographic forecasts are able to define quite precisely the numbers and age breakdown of populations 10, 20, or 30 years into the future**



Justyna Furmanczyk, www.sci.hu

#### Further reading:

- Kleer J. (Ed.). (2009). *Przyszłość zniewolona przez przeszłość [Future Captive to the Past]*. [In:] *Rola nauki w myśleniu o przyszłości [The role of science in thinking about the future]*. Warsaw: "Poland 2000 Plus" Forecasting Committee.
- Kleer J. (Ed.). (2009). *Przyszłość sektora publicznego [Future of the Public Sector]*. [In:] *Co ekonomiści myślą o przyszłości [What Economists Think About the Past]*. Warsaw: "Poland 2000 Plus" Forecasting Committee.