Technology forecasting for strategic decision making - An Introduction
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Why do we need technology forecasts?
Limiting Resources

Prof. Dmitry Kucharavy: Hello, thank you to join us with Technology forecasting for strategic decision making. Now, we are going to discuss the next topic about Limiting Resources and why it is really difficult to perform reliable technological forecasts. But let us start using systems thinking; let us start from a general point of view.

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If you look to the basic economic problem, in fact, the basic economic problem if I try to make it as short as possible, of course, you can learn about more in a dedicated part of knowledge. But the basic economic problem can be expressed in one line, how to satisfy unlimited human needs, with limited resources. And the human needs they are always unlimited by definition. But the resources that we can use for satisfying these needs are always limited by definition also.

But let us see a bit more about what kind of needs we are talking about, and what kind of resources we are talking about. If you look at the evolution of different countries, by United Nations, it is used the Human Development Index, in order to measure how different societies, different countries are advanced or not. Which Human Development Index does not include

only the wealth, but it also includes health, how long people are living, how they are sick or not?

And it includes also education level; the 3 basic things education level, the health, and wealth are included in this Human Development Index. And if you use a Human Development Index as a measurement, and the number 1, this is something that we are looking at the idea of value. And we can see through the time, how different countries improve the human development index, we can see very strange stories.

For instance, if I take United States from 1975 to 2003, they were capable to improve the Human Development Index. But what did they pay for this? On the vertical X, we have our ecological footprint; it means how much resources do we spend? In order to improve our Human Development Index. Different countries they have different trajectory.

For instance, Italy, they spent much less resources in order to improve their Human Development Index, almost the same way like the United States. They started with less resources, but they finished that they use a lot of resources, the Human Development Index, show us how many not how many Earths we need, but how much from the earth we are demanding.

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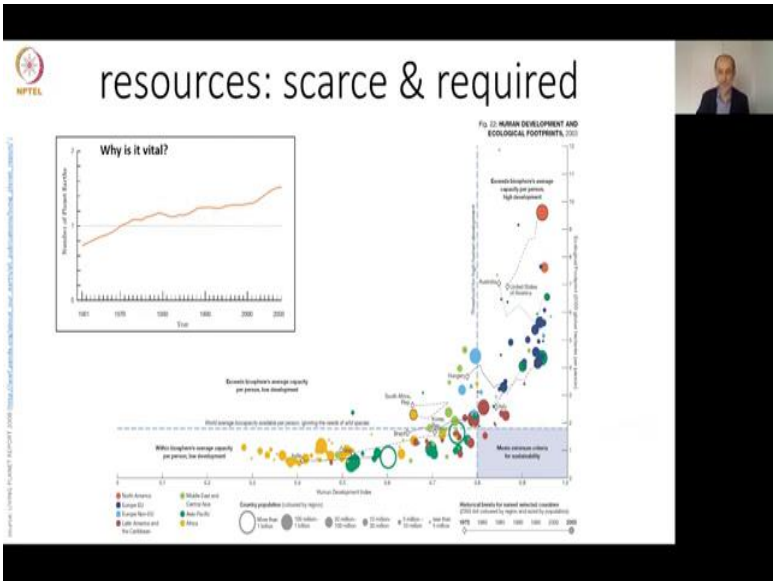

On this diagram, in the lower right corner, show us the minimum criteria for sustainability. It means if we are in this rectangular, we are sustainable, it means for the next generation, we will provide enough resources that they can continue to improve their human development

index. The size of the bubble represents the population of the country, when the different countries, different colours correspond to the different regions.

For instance, if I took India as an example, from 1975 to 2003, we can see that the Human Development Index was improved, when we still were in those times, in our threshold of sustainability criteria. The question is, we always in order to improve to satisfy our unlimited needs, to improve our development index, we always spend certain resources.

Because most of the solutions that we use today they are technologies and whatever technology we take, it uses energy, it uses space, it uses materials, and in order to have all of this, where it is taken from, it takes from the earth. The strange news that probably you are already familiar with is the following. In fact, we already passed the threshold somehow at the beginning of the 70s. On the worldwide scale, we start to spend more resources than we return to the earth.

Today, the gap is huge, we spend more resources in one Earth and what does it mean? That we have debt, which we are not returning to the earth and this is why the, from economic problem point of view the main problem, how to satisfy the needs with limiting resources becomes more and more strict if you like. So, from the large point of view from large scale, from the high level of granularity, we can see that there are all the needs, we need to satisfy the resources we have to spend.

And from technological point of view, from point of view of technology forecast. Today, we need to be more precise than before, because whatever technological solution appears on the market, it can be scalable very fast, much faster than before this is very true because we have a much higher level of international integration.

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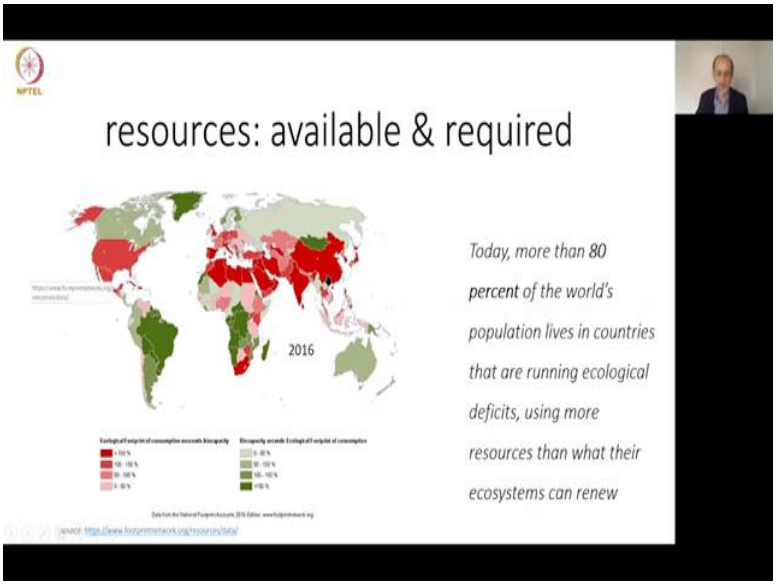

What are the resources necessary, available and required? On this slide, which is correspond to 4 years old situation in the world 2016. Their situation with adapt was really not so good, according to the data. At those times more than 80 percent of the world population, more than 80 percent of our 7 billion something population lived in the countries that are running ecological deficits, it means, what does it mean ecological deficits, we use more resources than ecosystem can renew.

So, in fact, what we use the resources that we are running out of these resources faster and faster. So today, when we take decision about technologies, we have to take into account how the new technology, how the new innovation will change this situation, because this situation can be temporary, but it cannot be for the long time. Why? Because for the long time, if you finish all available resources, so you have no resources anymore, stop, full stop. And then to make a full stop today, it is a very dramatic event.

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Because we satisfy our unlimited needs today, mostly by technological way. We said okay, we need transportation, let us use technology. We need a habitat, let us use technology. We need a movement communication, let us use technology. Whatever needs we take, we always try to satisfy those needs by technology, technology in agriculture, technology in transportation, technology in protection, our habitat and so on and so on.

Energy generation, always we try to use some technology. But we need today to be more efficient. And the way how do we predict the future impact of our technology. So, this way, in 21-century, the forecasting becomes much more on-demand because in the 20th century the map that they showed you that today is 80 percent red, in the 20th century, it was almost what, at the beginning of the 20th century, it was almost 100 percent green, we did not have this situation with available resources. So that is why today, the technological forecasting has to be more precise, more responsible, and more efficient. Just to sum up this part of our discussion, I would like to share with you some of ancient wisdom, which states the following.

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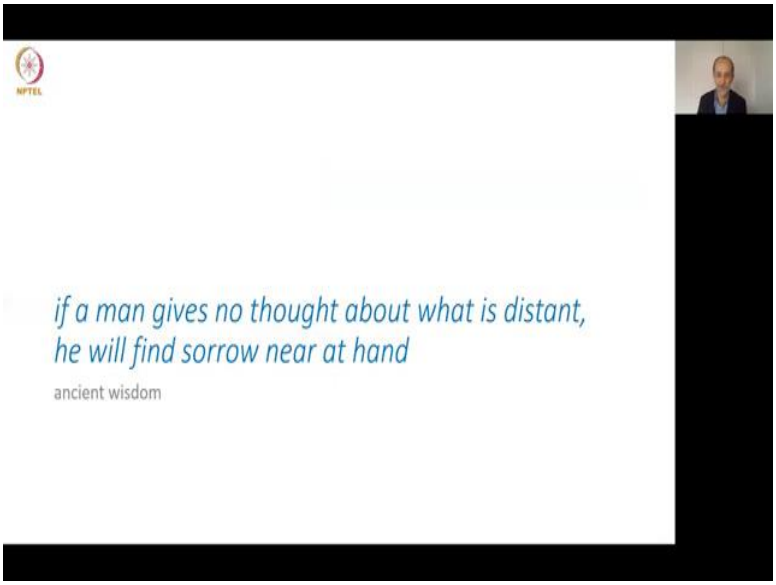

If a man gives no thought about what is distant, he will find sorrow near at hand. One of the reasons for today's situation that we are experiencing all around the world with a pandemic. This is a heavily polluted air in all the countries all around the world, which makes us much more vulnerable, for the viruses and for the disease. So, we need to have bold ideas about distant future in order to manage the situation today and not enough to come to the same situation in the future. And this is a question about technological forecasting in order to take strategic decisions.