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Priorities for Education, Training and Intellectual Assets in the Knowledge Economy (1)

- Thanks to organizers.
- Subject broad. I want to be selective and focus on a few specific points. I'll draw on work done at the OECD, an international organization where I worked for many years, to situate Turkey in the international, and especially European, context.

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- First, intellectual assets. These cover a wide range but can generally be classed under three headings: those related to technology and knowledge creation, many of which give rise to intellectual property rights (IPRs) which can be protected (e.g. patents, software); those relating to human resources; and those related to organizational capital and systems management, allowing effective use of the first two groups.
- Of these the fundamentally most important, in my view, is the second, as they are the sources of the remaining two. **People** are any country's most important resource and investment in them is its most important intellectual asset. I will focus on human resource development and **mobilization** for the Knowledge Society.

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- Three key messages:
 1. Focus first and foremost on basic education for all.
 2. The Knowledge Economy depends heavily on a small number of highly skilled people, especially in S & T. Mobilize capable people and ensure that the higher education system develops them effectively.

(1) I wish to thank Pierre Boulanger for his assistance with this presentation.

3. Encourage mobility of the highly skilled, especially in S & T, across sectors and internationally.

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I Focus on Basic Education

- Good literacy and numeracy of the population at large are the foundation of the Knowledge Economy. (1) Routine tasks in a knowledge economy require them. They are taken for granted in ordinary jobs. (2) They are also preconditions for more advanced education and training and hence the scope for many people to realize their full potential.
- Good basic education has been at the root of major economic success stories.

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- To situate Turkey internationally, I call your attention to a major study undertaken by OECD and participating governments: the Programme for International Student Assessment (PISA).
- It is a survey of knowledge and skills of 15 year-olds. More than 250 000 students in 41 countries took part in a test assessing their skills in mathematics, reading, science and problem solving – the basics of the Knowledge Economy.

SLIDE 6 [Chart: Math proficiency]

- Overall picture: Turkey has work to do. While it compares favorably with Latin America it generally lags most OECD countries as well as Eastern Europe.

SLIDE 7 [Chart: Reading proficiency]

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- A notable point that came out of this study: dispersion of performance within Turkey is high. This is particularly extreme as *between* schools.

SLIDE 9 [Chart: Performance dispersion]

- A high degree of this dispersion is associated with variation in socio-economic background. Variation *within* schools is pretty average, similar to that in much of continental Europe and generally below that in Nordic countries and English-speaking countries.

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- How to respond? I will avoid educational theory but can offer some comments on resource allocation issues: (1) Targeting resources where they are needed obviously makes sense. In Turkey, the results suggest that policies should target low-performing **schools** rather than focusing on weak **students**.
- (2) Another issue is adequacy of teacher supply. Principals in Turkey report that a shortage of mathematics teachers hinders teaching in a high percentage of schools.
- (3) Investing in early childhood education pays returns.

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II Develop Highly Skilled Human Resources, Especially for Science and Technology

- I have stressed basic education for all. Does that mean you can neglect the high end of the education spectrum? **No**. The Knowledge Economy requires attention to all parts of the education pipeline, and especially in science and technology.
- Highly skilled people contribute disproportionately. They are the main drivers of important advances in productivity growth.
- And while science and technology are not everything they are often at the root of innovation. The Knowledge Economy requires highly skilled and trained science and technology people.

SLIDE12 [Chart: Science and technology occupations, levels]

SLIDE 13 [Chart: Science and technology occupations, growth]

- In many countries there are concerns about impending shortages of skilled scientific and engineering talent.

- These data do not allow us to situate Turkey internationally but we can provide comparisons for researchers, who are core to science and technology and indicative of development of the Knowledge Economy.

SLIDE 14 [Chart: Growth of business researchers]

- In Turkey their growth rate was higher than average but the overall level remains low by international standards.

SLIDE 15 [Chart: Researchers in the workforce]

- Thus, the need for catch up with Europe suggested by the PISA results at the level of basic education is also evident at the professional level.

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- Science and technology can be hard subjects. Success will require maintaining their **attractiveness** to students at all levels, from primary through secondary, tertiary, doctoral and post-doctoral levels. Where industry can be involved in order to leverage competencies and resources, so much the better.

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- How to respond?
 1. Ensure high quality teaching at all levels to enhance both performance and student enjoyment. Evidence suggests that mathematics and science teachers with academic degrees produce students who perform better, and that certified teachers out-perform those who are not.
 2. Adapt university curricula to modern needs. This means shorter programmes, greater multi-disciplinarity and facilitating commercialization of research.
 3. Make greater efforts to mobilize women. They are under-represented in scientific fields in most countries.
 4. Find ways to provide support, in terms of both funding and mentoring, for doctorates and post-doctorates.

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III Foster Mobility of the Highly Skilled

- It is important to minimize ivory towers, where specialized people spend long periods in quasi-isolation from practical matters.
- Movement of skilled people makes a major contribution to the **diffusion** of knowledge and innovation.
- Such movement should also be seen as an important part of the education and training process, something which should continue throughout one's life and career. Education and training should not be seen as limited to formal student years.
- Movement should be encouraged between **sectors**, especially between universities and public research organizations on the one hand and the business sector on the other. This contributes to diffusion and practical application of scientific advances while it also keeps specialists in touch with the practical realities of the business world.
- Movement is also highly desirable **internationally**. To date the main flows have been from Asia to OECD countries and within the EU.

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- This should not be seen in terms of concerns about brain drain/brain gain but of the advantages of cross-fertilization of ideas. It can also be an efficient way to meet specific skill requirements. Evidence shows that foreign researchers both contribute to host countries and benefit themselves from their experience.
- This of course leaves out the sending country. It can also benefit but getting the most from international mobility requires an ability to attract earlier emigrants home.
- Many Asian countries have been very successful in this regard, sending young adults abroad for university and post-graduate work, often work experience, and seeing them return home as skilled professionals and experienced business people. Turkey should be aiming to profit in a similar way.

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- How to respond?
 1. Ensure a flexible labor market which does not penalize movement. In particular, avoid restrictions that prevent scientists and other research specialists from participating in the business sector.
 2. Ensure an attractive environment conducive to research, innovation and entrepreneurship, notably:
 - financing, high quality facilities at universities, research labs;
 - Scope for commercializing new ideas. IPRs are important.
 - The wider economic environment should be conducive to starting new businesses and to the growth of successful ones.
 3. Career opportunities are essential.
 - To attract foreign talent.
 - To retain home-grown talent.
 4. In the EU degrees up to Ph.D are being increasingly harmonized. This should facilitate cross-border recognition of qualifications and international mobility. Turkey should align with these efforts.