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THE IMPACT OF ICT REVOLUTION IN TURKEY: TUNNELING THROUGH BARRIERS

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INTRODUCTION

We are all living in a changing world. And, over the years, particularly over the past few, we have been conditioned to acclaim the catchy term 'globalisation'. But deep inside, many of us have come to harbour reservations about the sweeping changes the process entails. The idea of unimpeded contact between the peoples of this very special globe, the only biosphere we so far know of, sounds good. But, along with it, different sounds have come. For instance, protests of hunger, from societies unable to handle the scope and speed of changes forced on them. It was not only investments, loans or consumer goods which flowed in from opened borders. In many instances, what came in were machines of destruction. Some of these were barely clothed bodies brandishing machetes. Some were state-of-the-art weapons designed and produced for wholesale butchery. Thousands upon thousands hungry for technology from the industrialised world saw it only in the lethality of the weapons they were sold or were confronted with.

Globalisation, in fact, is not a new idea on our globe. Looking back, we see its examples thousands of years ago and see that it worked much better. Scientists, for instance, travelled vast distances to learn what others knew and in turn, inform them about what they did. Christian and Moslem religious foundations became centres for the production and exchange of knowledge. Universities sprouted everywhere with cosmopolitan staff. Beside the academia, first the agriculture, then fledgling industry functioned as vectors of social globalisation, unifying peoples and cultures. Precious metals, with their universal currency, globalised the economies of the ancient and medieval world, establishing bridges between the Middle East and Rome, setting up Silk Routes between the Far East and Europe. So, what we are witnessing today may not be the materialisation of a novel concept, but, actually a much wider, if less refined, implementation of an old one.

It has become fashionable to describe the world as a global village. If so, the village elders must be pondering some very disturbing questions: why is it that some people are so rich and some so poor? Why do the rich get richer and the poor poorer? This is the question David Landes addresses in his recent book, The Wealth and Poverty of Nations. The author sees a more evenly balanced world some 500 years ago, with only marginal differences in wealth between not only Europe and Asia, but in all parts of the world. Between economies that were all based on traditional agriculture with very limited division of labour, little production for market and very limited commodity production, differences between wealth were estimated to be very small, the ratio being something of the order of 1 to 2. Landes observes, however, that in our day the gap between the rich and poor countries has

widened enormously. He cites a 400-to-1 difference between the per-capita GNPs of Switzerland and Mozambique to highlight the imbalance. Although there appears to be no one single, straightforward explanation for the fact, he credits the prominent role of the industrial revolution. As we are going through another, with no less momentous consequences, namely the Information and Communication Technologies (ICT) revolution, we have to guard against even wider disparities in wealth as the world indeed becomes a global village in many respects.

A most indicative characteristic of the new era is the radically changing perception of the essence of economic value. Thomas Jefferson, some 200 years ago, foresaw the value of information as an economic commodity. "He who receives an idea from me, receives information without lessening mine, as he who lights his taper at mine, receives light without darkening me. And the more candles lit, the brighter the light." The credit he deserves as a visionary is in no way depreciated by his forgivable failure to anticipate today's network effects.

The chief tool for change, without any doubt, is the Internet with the wholesale changes it has wrought in the edifice of our economy-ruled civilisation. The rules, the actors, the organisations, the whole public policy succumbed to its irresistible power. Only profit survived as an unchanged corporate goal.

Evidently, the new era is marked by its reliance on human capital and it is clear that in the new century, creativity will be the engine of growth and prosperity. And, to ensure it an undiminished supply of fuel, we need to overhaul the whole education system since the value and quality of education is paramount in an economy based on ideas and analytical thinking.

The collapse of the Soviet Union and the cessation of Cold War antagonisms have buried old ideological divisions, uniting almost every country under the joint altar of global markets. But, on the other side of the coin, one can see a widening cleavage based on technology, with a small part of the globe - just a sixth of the world's population of about six billion - providing nearly all of the world's technological innovations and catering to a far larger second part - about half of the planet's inhabitants - who can adopt these technologies for production and consumption.

The remaining third of the world's population is classified as 'technologically disconnected' (or, equivalently 'technologically excluded') by Jeffrey Sachs of Harvard University. These have neither the indigenous capacity to innovate nor to adopt foreign technologies since these technologies are not available in aggregate form. Mostly, the technologies they need are the ones geared to combating poverty. Although package solutions which do not even call for a well developed capacity to adapt are available abroad, countries making up this part lack the means to buy or license them on the required scales.

To be honest, one cannot say that today's version of globalisation is a picture of total gloom. There are, of course, people residing on the sunny side. And even where the clouds fill the skies, there are some silver linings. Even if the change does not necessarily increase our comfort, we still have to compare the benefits of resisting or riding it. I, myself, believe in the latter. For me, falling customs walls or disappearing frontiers bring, along with difficult challenges, opportunities for our people to put their resourcefulness to good use. And to a remarkable extent, that's what the Turks have done.

Turkish Economy in the late 90s

Turkey has a penchant for surprising the world and this goes hand in hand with a reputation for not

fitting any bill. While the cards on the table reveal a picture that conforms to lingering prejudices, the country always has something more up its sleeve that helps it keep its head well above the water. To name but a few: a dynamic and diversified economy which has survived years of runaway inflation and grown to disprove predictions of doom; a young and vibrant population with about a half under the age of 20, propelling more or less steady development; a well-trained and adaptive workforce that powers industrial growth; and an ever-growing ensemble of businessmen, willing and able to rise to the challenges of globalisation.

If you consult sober facts and statistics, these will look to have fallen short of working a Turkish miracle. Indeed, a per capita GNP of about $3000 ($6000 in PPP terms) is a third of the EU average. Inflation still reigns high despite recent successes in curbing it. Consumer price inflation at the end of the year 2000 was 39 percent and Treasury officials hope to attain the targeted 25 percent by March this year. Although exports stand out in volume and diversity, they lag far behind the imports, giving Turkey a widening trade gap. The external debt stock currently stands at $105 billion. State expenditures defy trimming, with domestic debt rising to some $50 billion. The GDP growth rate is erratic: having grown by seven percent in 1996, 7.5 percent in 1997 and 3.1 percent in 1998, the country recorded a negative growth of 6.1 percent in 1999. First nine months of the past year saw a spectacular reversal, with the economy scoring a 5.4 percent real growth. Unemployment runs at about eight percent and agriculture still accounts for over a third of the total work force.

To top everything, the country was struck by two devastating earthquakes in 1999 and is recuperating from a long combat with separatist terrorism that has cost the economy some $7-8 billion per year according to military analysts. The country has to keep up the costly modernisation of a large army with a price tag exceeding $30 billion to address the security needs of a country sitting in the midst of current and potential conflicts.

Have these for a couple of years, then you have a well-cooked recipe for disaster. Yet the country not only survives, but also actually thrives much to the befuddlement of pessimistic forecasters and IMF monitors. Its economy outperforms those of several candidates that are ahead of the queue for full EU membership. In the political and economic balances of a changing world, Turkey looms much bigger than the country of which statistics bespeak. In its 2 October 2000 issue, Der Spiegel paid tribute to Turkey's surprise robustness, marking the country as a potential leader for Eurasia. The European Union is becoming less reserved, at least about its economic credentials for accession compared with the past. The 1999 progress report issued by the European Commission says, "Turkey has many of the characteristics of a market economy. It should be able to cope, albeit with difficulties, with competitive pressure and market forces within the union, provided sustainable macroeconomic stability is attained and there is further progress towards the implementation of legal and structural reform programs… ." This year's progress report lauds the impressive reversal of negative growth, which, with an estimated six percent of robust growth, puts Turkey in the same basket of good performers in this respect, together with Hungary and Poland. The growth performance has been far superior to those of other candidates in the Balkans, despite their massive influx of foreign capital from their prospective EU partners. The composite report summarising the performance of all 13 candidate states notes that last year alone the percentage of foreign investment to GDP doubled to nine percent in the Czech Republic and to 6.1 percent in Bulgaria with lesser, but still substantial increases in other candidates. In Turkey, on the other hand, "Foreign direct investment is at an economically insignificant level of less than 0.5 percent of GDP," according to the EU assessors. Still, the country has managed to curb inflation to the lowest level of the past

decades, the EU Commission's performance report for Turkey notes for the year 2000.

Less accommodating assessors of Turkey's performance, the usually terse international credit rating institutions, are also inclined to give Turkey at least the benefit of the doubt (Moody's rating is B, Standard & Poor's is BB for the year 2000) The country encounters no problem in raising international loans, a fact also highlighted in the EU's Progress Report for 2000. The picture brightens when viewed from a wider perspective. Instead of being rated alongside third world countries, Turkey is consistently counted among the 10 new emerging markets. A $400 billion GNP (in PPP terms) made the country the world's sixteenth largest economy in 1999, with a similar standing estimated for the past year. Turkey's economy is 1.5 times that of Poland and is far larger than those of Bulgaria and Romania. Contracts Turkish businessmen have bagged abroad add up to $30 billion, verifying the predictions of Turkey's emergence as a regional power.

Former East Bloc states have become a backyard for Turkish construction companies with only Germany remaining a serious competitor. Large shopping centres with Turkish titles adorn the main streets in Moscow and other post-Soviet capitals.

I am not an economist. So, what is the point of elucidating all these figures and digits adding up to sums which they should not? I am a physicist. So, allow me to use fitting metaphors from my trade. For me, all these show that the country is somehow 'tunneling through' the restrictive perimeter defined by statistical indicators, to play a more prominent economic role and wield larger political influence in the world.

Communication as the Leverage of Development

The question is what makes this possible? How can a parallel economy, which nearly equals the registered one in size and scope, come into being? That economy is run by an army of self-made street entrepreneurs who have spontaneously developed skills which include market research, public relations and international trade which often surpass those of the public officials. And underlying that development is a relatively new abundance of modern means of communications, the ensuing flood of information and the surprising adroitness of the population in handling them. The end result is a 'virtual Turkey' built by the tools of communications, less visible to the untrained eye but no less real, with dimensions and potential far bigger than the 'real' one.

What created such fertile ground for the massive influx and utilisation of information is the intuitive foresight of the politicians of the past two decades who ignited a communications revolution. Starting with the introduction of digital telephone exchanges, the country moved on to the adoption and mastery of satellite communications. The country already operates two communications satellites and two more are on the way. The number of mobile phones exceeds 10 million, making the country one of the hottest markets and an arena of contest for leading GSM operators. The second generation cellular phones are already replacing the older models. The country's record-breaking privatisation transaction was signed last year between Turkish Telecom and an Italian group allied by Turkey's top private bank. Today telephone exchanges control 20 million lines and 84 percent of the exchanges are fully digitalised. The country produces its own digital exchanges whose total value exceeded $640 million in 1999. The country still invests heavily in the modernisation of the communications infrastructure. In 1999, imports of telecom equipment totalled $2 billion, while production reached $641 million and exports $150 million. PC imports, totalling $380 million in 1992, climbed to $1.2 billion in 1999. Imports of computers and computer

equipment rose 13 percent in 1999 to $2.6 billion, reflecting a lively home market. PC sales, which were 240,000 units in 1996, rose to 526,000 units in 1999. A government-commissioned survey foresees an investment total of $40 billion-70 billion by 2010, depending on how much equipment prices will go down in the coming years.
The communications revolution has generated and nurtured a complementary information revolution. With the end of the state monopoly of the sector, Turkey witnessed an explosion of private radio and television channels. The EU Commission's progress report for 2000 notes the existence of 16 national, 15 regional and 231 local television channels, as well as 36 national, 108 regional and 1056 local radio channels. The lively sector has attracted even CNN, which has set up a news channel broadcasting in Turkish. The explosive impact of communications has not only eased people's lives; it has made the country more democratic and pluralistic. In contrast with the situation prevalent only a few years ago, diverse views find a multitude of channels for articulation. Yet, the most profound effect has been the creation of a very large window for the ordinary people to come into personal contact with new ideas, trends and sources of information in the world.

The most popular television commercial nowadays is the serialised rivalry between two normally uneducated street vendors comparing their favourite Internet channels, service providers and search engines as well as the cultural and e-trade benefits they extract from the net, which includes perusal of the Financial Times stock news. It takes no great effort to see, hidden beneath the humour, a serious measure of the depth to which the two revolutions have penetrated in the texture of the society and psyche of the public. And I cannot help but note with pride TÜB‹TAK's pioneering role in opening the floodgates for information. It was this organisation that first introduced the Internet to the country in 1993, the same year as Greece.

Turkey's earlier contact with the information age, or, to be more precise, mass encounter with computers, has a history that spans no more than two decades. The public's acquaintance with the Internet has been even more recent, going back only seven years. But the great demand for access to the Web has turned service provision into a lucrative business. Business concerns, among them the country's top industrial conglomerates and banks, scramble to get a share. No less than 63 service-providing companies of varying sizes have been established since then, with the majority joining the race within just the past two years. A recent survey run by TÜB‹TAK, established the ratio of PC owners to general population as 7.8 million, although the number of households connected to Internet was 546.000. The number is estimated to go up to around 3 millon with the inclusion of office PC's.

Granted, these impressive six-digit figures pale before European statistics. According to a study comparing the Internet use by the OECD countries in 1998, Turkey trails with just one connection compared to the European average of 11 and the US average of 29. But, even here, one can view a remarkable jump: OECD statistics show that despite the comparatively limited growth of the IT service markets between 1990 and 1997, Turkey shared the highest growth rate with Poland, 20 percent. More up-to-date statistics will no doubt show an even steeper climb for the past two years, illustrating a great leap.

Even such quantum leaps may look modest when seen together with the numbers for the technology giants. A point that should not be missed here, however, is that the comparison has to be made along with a comparison of the per capita GNP for the respective countries. This would illustrate the share allocated from family budgets to the purchase of PCs, Internet time and, therefore, the purchase of information. This also explains the whole point of this presentation: how better communications

helps people's hidden talents burst to the surface. And it shows how the spontaneous reach for information becomes a multiplier for development; how it causes the country to outgrow its visible dimensions.

Despite its accelerating progress, one cannot overlook the fact that the resources available to Turkey to address the rocketing demand for information are not substantial. Over the past three decades, the number of universities has risen from just a few in big cities to the present 74 spread all over the country. Still, they can cope with only a fifth of the demand for higher education. The country has jumped 15 steps in 10 years to take 25th place in the World Science Citation Index, but about 10,000 researchers with post-graduate degrees do not constitute a significant percentage in a population of 65 million. The state's means for opening new schools and improving the quality of primary and secondary education is curtailed by lack of funds.

But rising demand for knowledge, and the suddenly available tools to address that need has caused an impressive, if unusual, expansion of the education infrastructure. A parallel, private structure of education has emerged beside the official one, drawing hundreds of thousands of students to mushrooming out-of-hours schools to get what the under-funded state schools cannot provide. The lengthy bureaucratic procedures for the selection of schoolbooks often make them obsolete even before they are published. Unable to receive proper attention at the overcrowded public schools, students brave hefty fees demanded by these complementary schools to keep alive hopes of joining the lucky few who can survive the harrowing central university entrance exam. This care-for-yourself education brings in an extra $1.5 billion to the sector.

The Internet and proliferating PCs also come to the aid as additional instruments supplementing formal education. Companies thrive on the sale of CDs of high-school maths or physics or history, or a multitude of other subjects. One particular company that has produced an elaborate set of educational CDs with TÜB‹TAK's support, reports brisk business with 80,000 sets reportedly sold in China beside home sales.
The Internet, of course, is not only good for helping students tackle university exams. A far more important function it serves is the education of the public. Advanced communications infrastructure and tools enable the provision of higher education through television, the Internet, CDs and electronic books, which gain wider usage. An additional benefit provided by new communications tools for students is immediate access to electronic bookstores through which they can select from a much wider variety of books, place orders and receive them within days. A further facility is access to the Web sites of scientific publications and popular science magazines.

The modern tools of communication and the Internet also allow the people to educate themselves about political and social developments in the world, beside science.

Yet one might rightfully ask how many Turks are able to make use of the information stored in the mostly English Internet sites. Perhaps not very many, but not too few either. The important thing here is the cascade effect. The first privileged few who could afford to buy PCs, shared the skill they gathered with friends. The more business minded among them, set up courses to communicate the knowledge at a profit. Thousands upon thousands of those who attended the courses handed down the acquired skills to new generations, causing a nearly exponential growth of the users. The end result is that today, even those with limited formal education run to computer classes or language schools to arm themselves with basic prerequisites of finding a job or starting a business. If you visit Istanbul, take a casual stroll in a shopping district. There is no chance of you walking a hundred

meters without a hawker challenging you in fluent English, French, Italian, Spanish, Dutch or Russian. These people did not sprout out of nowhere. The suitcase trade that makes up the bulk of the 'parallel economy' is run by people with little formal education who are armed with self-acquired skills in handling communications and information.

Again quoting the EU progress report for 2000, about 27,500 new enterprises were established during the first half of 2000, a figure which was more or less the same for the same period in 1999. The number of liquidations, meanwhile, remained at about a third of the total in 2000 and a much lower level in 1999, attesting to a well-developed capacity for survival.

The same report also notes, "Small and very small family companies are the backbone of the Turkish private sector", accounting for 99.5 percent of total enterprises in the manufacturing sector, employing 65 percent of the total work force and generating 27.3 percent of the value added.

The effect is not necessarily confined to the shadow economy, the wealth from which does not perhaps enter tax books or statistics, but which, nevertheless, is felt like the shimmer from a radioactive substance. In the registered economy as well, the effects are telltale. The small and medium enterprises, which are steadily increasing their share of the export and services sectors, are products of the communication and information revolutions.

The cumulative effect of all these has been a marked improvement in the formal and informal education of people as well as a general rise in culture to levels and in a time unthinkable with traditional means. Let me claim credit again for TÜB‹TAK for playing a major role in that process by making use of modern means exactly the way I have tried to describe. A handful of people constantly probing the Internet sites for scientific knowledge hand it down to some 75,000 people through two successful popular science magazines; one of them specifically designed for children. And, if you will forgive me another metaphor from physics, I would like to wrap up Turkey's case with a linear equation that works particularly well for developing nations. Facilitated communications increases information, which, in turn, brings about a resonance.

Conclusions

Despite the harsh conclusions of the Sachs worldview, which looks coloured by deep-rooted political perceptions, it is clear from the picture I have just described that Turkey is marked for promotion. When saying that, I bank on the dynamism of my people, on their latent energy, their resourcefulness and their determination to move forward. One may find the model too general or perhaps a bit more forgiving of the 'technology providers' when it comes to the ills of the technologically deprived. To be fair, Sachs calls on the privileged to be more forthcoming with instruments to lift the boundaries dividing the rich and the poor. No one doubts that technology, or rather its production, makes the difference. Yet, one would have also liked to see some reproach addressed to the apparent aim of the technology providers to use their advantage for collective political gain.

Perhaps one flaw in the otherwise perceptive analysis is that it views the movement through the categories as an independent process, immune to political manipulation. So, once stripped of political motives, the cogs and wheels of the machine seem to work smoothly. These diverse realms do not appear hermetically sealed to outsiders despite the disparities. Many of the technologically excluded are poised to move up the ladder to join the ranks of technological adopters. Upward mobility can be seen in the top floors as well: Taiwan, South Korea and Israel, for instance, have

advanced to the next group, becoming innovators themselves.
This, however, should not convey a picture of countries freely transiting through the boundaries. Some two billion people living in technologically excluded countries waiting to sample the benefits of globalisation, need a strong push across the threshold. For that, the commanding role of technology in the global economy should be well understood, while the richer governments have to be more generous with their aid and the poorer ones, more careful in using it to build up technological capacity. Multinational companies as well as the universities and scientific establishments of industrialised countries should join the effort. The tasks of international organisations, including, the IMF, the World Bank and the OECD, have to be redefined for the effort to bear fruit.

It is, of course, not easy to overturn a deep rooted culture of tending national interests and start mobilising an international effort to diffuse the technology with a snap of the fingers. But the ended ideological conflict and the record wealth of the industrialised world raise hopes that selfishness can be overcome.

And as for us scientists, we, too, have a responsibility to help our politicians and the public to see the grand picture and do that both on the winning and the losing side. We should help our peoples navigate stormy patches. Our will to share should set an ethical example for the politicians and the businessmen to follow. For, we know better than anyone that science could not have progressed to its present glory without this spirit of sharing. And we know that we cannot go any further if we do not rid ourselves of selfish interests for the benefit of the truth.

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