The Knowledge Economy: Key to Sustainable Development?

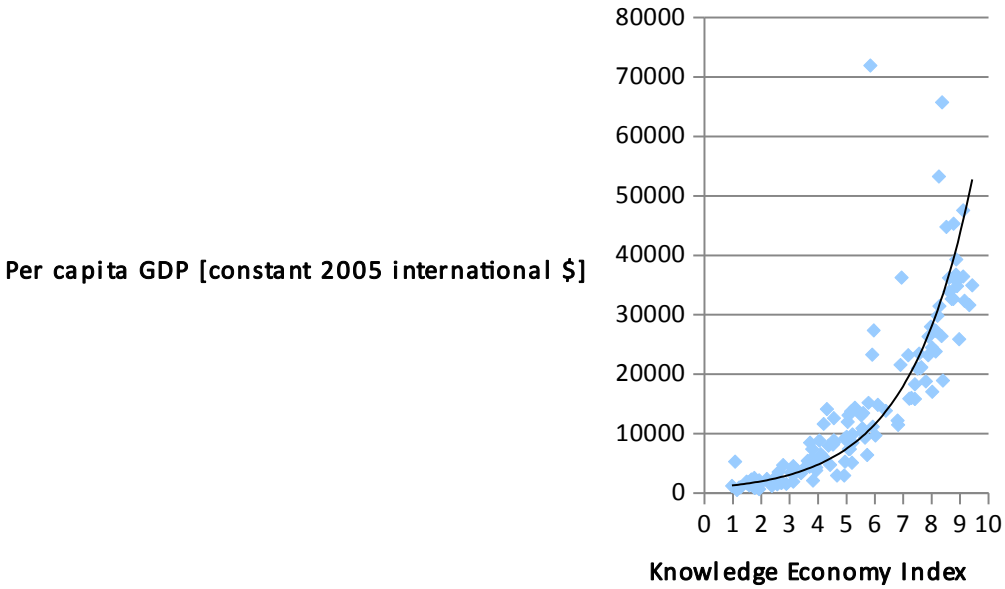
Humanity is facing harsh resource depletion and environmental degradation problems. Industrialized, technological societies are built on a foundation of cheap fossil fuels which are rapidly becoming scarcer and more expensive [1]. The economies which run these societies are similarly based on a concept of endless, limitless growth. More expensive fuels means that eventually growth must go into reverse, yet political and economic programmes and policies continue to call for more of the behaviours which have contributed to the current crisis. The Knowledge Economy is presented as a way to achieve both sustainable, continued economic growth, and a way out of the predicament of resource scarcity [2]. We examine this premise and its viability.

The World Bank has been touting the Knowledge Economy (further as KE) as a way to achieve economic growth without actually burning fuels or making anything tangible. The term "dematerialization" of the economy has been used to describe the kind of business environment where value is exchanged in terms of bits and bytes, rather than by tons or hectoliters. People still get paid, the economy still grows, because information has replaced tangible things and resources necessary for their production [3]. The Knowledge Economy makes a great sound bite, and appears to be a better alternative to a world choked with pollution and dependent, like an addict, on fossil fuels.

The Knowledge Economy Index (further as KEI) was created by the World Bank as a means to measure a country's economic performance relative to other countries, with regards to its ability to move, create and use information. Yet none of the indicators used in the KEI relate to sustainability. Indeed, sustainability, while presented as a laudable goal and the potential result of a KE, is never precisely defined in the World Bank literature. Richard Heinberg presents an excellent proposal for defining sustainability in his *Peak Everything* [4, pg. 88]. He presents axioms for a true sustainability because logic dictates that any use of a nonrenewable resource, over time, will be unsustainable. The KE, as currently formulated, doesn't value resources in any way that could be considered sustainable. The success of a knowledge-based economy, according to the KEI, is based solely on resulting GDP growth rates. Economic growth, with no serious accounting for the costs involved, or the physical limits imposed by resources, remains the ultimate goal. It's new wine in an old skin.

This paper examines the economic performance of selected countries based on their KEI in pre-crisis (1995-2008) and crisis period (2008 onward). Our aim is to show the actual economic performance of countries in relation to their standing on the Knowledge Economy Index, and also compare these relative performances with resource the consumption and material footprints of the countries involved.

Our analysis of the performance of knowledge economies reveals an exponential relationship between wealth measured as per capita GDP and KEI and according to our results, this relationship remains more or less constant in time. This relationship has strong implications for nonrenewable resource consumption of top Knowledge economies, as significant relationship between GDP and various natural resources consumption is well known [5, 6].

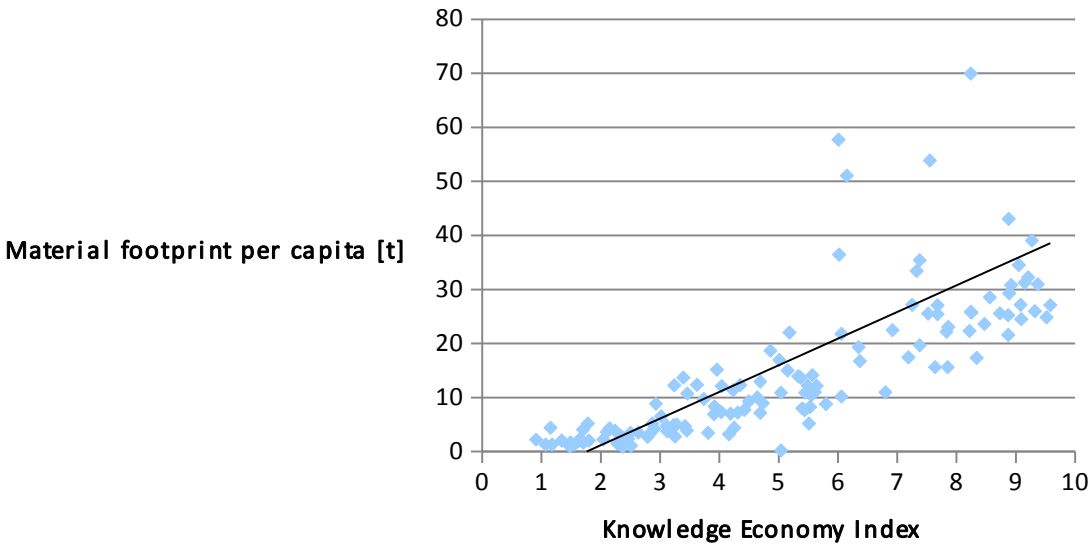


Graph 1: Per capita GDP and Knowledge Economy Index, year 2012. *Source: World Bank, data accessible at http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD and http://info.worldbank.org/etools/kam2/KAM_page5.asp*

KEI evaluates country's ICT infrastructure, tertiary enrollment, computers per thousand persons, amount of researchers in R&D etc., and therefore it depends on GDP and poor countries cannot afford aforementioned luxuries in western quantity and quality.

We also used Material footprint, indicator defined in the paper *The material footprint of nations* [7] which accounts not only for direct national domestic consumption of natural resources but also calculates raw material equivalent of imports and exports. Therefore it also

reveals country natural resource consumption acquired by trade. Results are in the graph below.



Graph 2: Material footprint per capita in tones and Knowledge Economy Index, year 2008. *Source: World Bank, data accessible at http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD and Study [7].*

Because the material footprint is a highly aggregated indicator of nonrenewable natural resource consumption, we also analyzed cases of single resources, i.e. Oil and their consumption patterns as they changed in time alongside the respective changes in KEI. Results are in direct opposition to truly sustainable development, which strictly demands gradual decline in nonrenewable natural resource consumption.

An interesting example is China, which moved in KEI rankings from position 100 to 84 since 1995. This advancement in Chinese KE was accompanied by well known, massive increase in coal consumption. Some authors write about KE as a successor to the old industrial model, but China is transforming itself into a KE with the help of coal, mimicking the economic success of 19th century England which used the very same fuel to its economic expansion.

Our argument is that the Knowledge Economy, as a solution to resource scarcity and sustainable economic growth, is an example of wishful thinking. The countries which are wealthier tend to consume more non-renewables, and also tend to invest more in IT and education. Our research shows that investment in the Knowledge Economy indicators, as defined by the KEI, does not guarantee economic growth and does not have anything in

common with achieving sustainability as measured by nonrenewable natural resources consumption. Indeed, since the beginning of the crisis, it appears that the highest performing economies, meaning the ones with the highest scores on the Knowledge Economy Index tended to suffer most when energy resources, notably oil, suddenly became much more expensive. In addition to pointing out the limitations of the Knowledge Economy as a solution to GDP stagnation, it brings the problem of resource scarcity into sharper relief. In the post peak oil era, when constraints on critical resources will become more acute, the inability of investments in IT infrastructure and schools to stop the slide of economies will become more obvious. There are many ways people can address the problems presented by peak oil and the resulting economic decline. The Knowledge Economy is not one of them.

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