Humanitarian Price Of Technological Progress: Main Outlines Of The Research

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Abstract

The article is worked out with support of the Marie Curie FP7-PEOPLE-2011-COFUND program - NEWFELPRO (The new International Fellowship Mobility Programme for Experienced Researchers in Croatia) within the project «Rethinking Territory Development in Global Comparative Researches (Rethink Development)», Grant Agreement No. 10. Current decline in competitiveness of many highly developed capitalist countries with innovation-driven economy stimulates scientists to find explanations for this by rethinking territory development's conceptual framework. Based on relevant publications of A.Toffler (1970, 1980), Ch.Murray (2003), G.Easterbrook (2004), R.Wright (2004), own research findings as well as ideas of Development Economics and Philosophy of Technology, the research hypothesis is as follows: territory development in the modern world declines when humanitarian price of technological progress begins to outweigh benefits, and this *price determines different paths of development for concrete territories.* Scientific approach proposed for using in this research is based on the fundamental economic Law of Diminishing Marginal Productivity applied for technological progress and humanitarian price of the progress in different parts of the world, which are perceived – based on the conception of F.Braudel – as "worlds-economies". Therefore, the main objective of this article is to outline key elements and tasks of the further empirical and econometrical researches aiming to propose a relevant methodology and techniques of measuring humanitarian price of technological progress for different territories as well as to define mechanisms to reduce this price in existed "worlds-economies"

Keywords: Price of progress, humanitarian price, technological progress, *Law of Diminishing Marginal Productivity*, "worlds-economies"

Introduction

Within the author's currently realized scientific research project "Rethinking Territory Development in Global Comparative Researches (Rethink Development)" supported by the Marie Curie FP7-PEOPLE-2011-COFUND program - NEWFELPRO the Global Rating of Territory Development[104] was created. Using this IT application, a current tendency that growth capacity of competitiveness of many countries which we use to perceive as "developed" is not just lower than in the case of the so called "developing" countries (as it is by the scientifically proved convergence principle - Sala-i-Martin 1995; Barro, Sala-i-Martin 1991, 1992; Cheshire, Carbonaro 1995; Cheshire, Magrini 2000; Quah 1993, 1997) but often it is even negative – for instance, in USA, Finland, Germany, UK, Denmark and Sweden, was identified (Boronenko, Lonska 2013).

Analysis of the statistics of the World Health Organization it has been discovered that while 5% of women and 3% of men suffer from obesity in the countries with a low level of income, 22% of both men and women suffer from obesity in the countries with a high level of income (World Health Organization 2013). As it can be concluded from health statistics, obesity can be referred to the so-called "civilization diseases" which start to occupy top places among human death factors in "developed" countries (nowadays even obesity of pets in these countries is an actual problem). These diseases increasingly depend on the lifestyle that people choose, as well as on their ability to use the available resources (Pakholok 2013). In general, the interrelation between the level of income in the country and crude death rate is rather interesting: 9.4 per 1000 population in low income countries, 8.0 – in lower middle income countries, 7.0 – in upper middle income countries, and 8.4 – in high income countries. It turns out that countries pay for the increase in income from upper middle level to high level with the increase in crude death rate.

All above mentioned facts make us question the efficiency of the use of resources by people and sustainability of the progress in so called "developed" countries - those ones with a high income level which have chosen a development path based on a market economy and consumers'

[104] The Global Rating of Territory Development (http://cler.uniri.hr/ rethinkdevelopment/web/) is the interactive IT application created by the specialists of the Center of Local Economic Development (CLER) of the Faculty of Economics of the University of Rijeka (Croatia). By the content it is some kind of alternative to the Rating of Global Competitiveness annually published by the World Economic Forum (WEF) in Global Competitiveness Report. Using data on the Global Competitiveness Index (GCI) provided by the above mentioned annual Reports, growth / decline of GCI (difference between GCI for current and previous year) – both annual and average for the period of 2005-2014 – was calculated, and countries were rated by their growth capacity as it was did by the WEF with current competitiveness level (GCI) of the world countries.

society - as well as about their further growth capacity. There arises the question about the humanitarian price of this progress which possibly becomes too high nowadays and, therefore, restrains and in some cases even turns back the further progress in the countries which have achieved a high level of competitiveness and high living standard.

The state of the art of the field

Adherents of market fundamentalism and liberalism in economics – starting with the 18th century's classicists-physiocrats, who substantiated the efficiency of the "laissez faire" principle, and to the relatively recent and very recent modern times (Mises 1927; Schumpeter 1934; Hayek 1941; Friedman M. 1962; Friedman D. 1973, 1989, 1998, 2014; Rockwell 2014) – have been actively searching for a moving force and factors of progress but not for the analysis of its social consequences.

However, social consequences of the unprecedented technological progress accumulated and intensified in real life have become the problem space which is dealt with in such science discipline as social economics (Milgate, Newman 1989), institutionalized within the Association for Social Economics (ASE), founded in New York City in 1941 by American Jesuits Thomas Divine (Divine 1959) – he was the 1st President of it – and Bernard William Dempsey (Dempsey 1943, 1958), who received his PhD in Economics from Harvard University in 1940, and was a student of J.Schumpeter (!).

American philosopher, sociologist and futurologist, one of the authors of the concept of post-industrialized society A.Toffler can be referred to as the father of the study of the issues close to the topic of the proposed research - PRICE OF PROGRESS,[105] and as the opponent of the adherents of "radical capitalism" (Friedman D., 1989). Two of A.Toffler's classic works seem to be the most interesting in relation to the proposed research: "Future Shock" (1970) and „Third Wave" (1980). In the first work A.Toffler argued that society is undergoing an enormous structural change, a revolution from an industrial society to a "super-industrial society". A.Toffler stated that the majority of social problems are symptoms of this

[105] However, this topic has been touched upon in the art literature even earlier than in social science. Karel Capek, a Czech writer, first detected and introduced a new type of conflict into the world art literature. He wrote about an opposition between a science-technological progress and moral-spiritual progress, and their contradiction which is dangerous for humanity in the conditions of a proprietary society (Capek 1955). He also thought about those tragic consequences which are caused by the uncontrolled and chaotic, based on selfish economic interests, dramatic and even revolutionary development of science and technology. An Austrian satirist, Karl Kraus claimed that "spiritual sterilization of masses is one of the ways capitalism supports its own existence" (Kraus 1974).

future shock. In his discussion of the components of such shock, he popularized the term "information overload" (Toffler 1970). Toffler's idea that the rates of changes are too fast for society to perceive them and it reflected the attitudes existed in the 1960s: the Third Wave of changes which transformed all aspects of human existence replaced industrialism. Computer, jet plane, contraceptive pills and high technologies are the symbols of the Third Wave (Toffler 1980).

According to L.Mises, the basis for contradictions in understanding of social consequences of technological progress is the West-East conflict: "The East never developed the idea of scientific research - the search for knowledge and truth for its own sake – which the Greeks gave to civilization. A second achievement of the Greeks, which has always been foreign to the East, is the idea of political liberty of government - of political responsibility of the individual citizen. These ideas, widely accepted in the West, never found counterparts in the East. Even today, only a small group of Eastern intellectuals follow these ideas" (Mises 2004). But the matter is that his opponents – A.Toffler, R.Wright, G.Easterbrook – are American intellectuals, but not Eastern ones.

The Human Capability Approach to territory development (Sen 1983) is possibly the most vivid example of the fact that the decrease in the humanitarian price of technological process is the problem of both West and East (as well as of North and South); and East is able to propose effective solutions in this field. Ideas of A.Sen and other Eastern scientists are recognized worldwide and they are taken up for further development by West, for example, the Human Development and Capability Association (HDCA)[106] which was launched in 2004, as well as a peer-reviewed journal, the Journal of Human Development and Capabilities: A Multi-Disciplinary Journal for People-Centered Development.[107]

In spite of this "West-East union" in the field of people-centered development it is possible to suppose that L.Mises's skepticism to some extent can be justified by the fact that the notion of human capabilities is hardly interpreted in the same way by West and East. This entails the "trap of progress" which was well described by Ronald Wright in his book "A Short History of Progress" (2004): "Paleolithic hunters who learned how to

[106] Amartya Sen was the founding president of the HDCA and remained President until 2006 when philosopher, Martha Nussbaum, took over. She was succeeded in 2008 by Frances Stewart, who specialises in development studies. Economist, Kaushik Basu became president in 2010, and was replaced by another economist, Tony Atkinson in 2012.

[107] It was established in 2000 as the Journal of Human Development, obtaining its current title in 2009. Its founding editors-in-chief were Khadija Haq (Mahbub ul Haq Human Development Center), Richard Jolly (Institute of Development Studies), and Sakiko Fukuda Parr (United Nations Development Programme).

kill two mammoths instead of one had made progress. Those who learnt how to kill 200 by driving a whole herd over a cliff [improving human capabilities, by some understanding of the Human Capability Approach] had made too much. Many of the great ruins that grace the deserts and jungles of the earth are monuments to progress traps, the headstones of civilizations which became victims of their own success".

In "The Progress Paradox" (2004), G.Easterbrook draws upon three decades of wide-ranging research and thinking to make the persuasive assertion that almost all aspects of Western life have vastly improved in the past century–and yet today, most men and women feel less happy than in previous generations. Charles Murray in his book "Human Accomplishment: The Pursuit of Excellence in the Arts and Sciences, 800 B.C. to 1950" (2003) explains this paradox, "Innovation is increased by beliefs that life has a purpose and that the function of life is to fulfill that purpose; by beliefs about transcendental goods and a sense of goodness, truth and beauty; and by beliefs that individuals can act efficaciously as individuals, and a culture that enables them to do so. Murray argued that there is an absence of this in the current secularist and nihilist society which has caused the decline".

It seems that R.Wright managed to identify the modern global challenge connected to unprecedented economic progress: "Capitalism lures us onward like the mechanical hare before the greyhounds, insisting that the economy is infinite and sharing therefore irrelevant. Just enough greyhounds catch a real hare now and then to keep the others running till they drop. In the past it was only the poor who lost this game; now it is the planet" (Wright 2004). Technology generated a deep contradiction between those who create civilization and those who would only like to use its products. The tragic meaning of the consequences of this new stratification is that modern world needs, first of all, representatives of "self-programmable" labour, and a relatively small number of "generic labour", which the vast majority of population belong to. Millions of people turn out to be "socially excluded". They are not needed in the modern world even as an object of exploitation, there is just not place for them here. Neither ruling classes nor society in general needs the class which is subjected to exclusion, and they do not depend on it, at least, economically (Tihonova 2006).

Key elements of the research

Research problem: Analysis of scientific literature, statistics and research outcomes showed that alongside achievements and successes in the economic development, there is also the price which the humanity (or a part of humanity) pays for new benefits received as a result of unprecedented technological progress. This price of technological progress has been already for decades the subject of heated debates between the supporters and

opponents of technological progress and its "ecological environment" – market economy, radical capitalism, liberalism etc. However, these debates are of a rather emotional character and they contain few scientifically founded arguments and facts which confirm or disprove the high humanitarian price which mankind pays for its technological progress. Therefore, there is a contradiction between the necessity to clearly identify and precisely measure the humanitarian price of technological progress in various countries/regions of the modern world and the lack of scientifically-founded tools for identification and measurement of the price of progress, as well as mechanisms for its reduction in various "worlds-economies".[108]

Aim of the further empirical and econometrical researches: to work out and test scientifically-founded tools for identification and measurement of humanitarian price of technological progress, as well as the ways to decrease it which are applicable for various "worlds-economies".

Subject of the further empirical and econometrical researches: humanitarian price of technological progress understood as a difference between benefits (employment, improved living conditions, expectancy of life, education, health etc.) and losses (unemployment, death rate, diseases, suicides, crime rate, etc.), which are direct or indirect consequences of technological progress.

Research hypothesis: *territory development in the modern world declines when the humanitarian price of technological progress begins to outweigh benefits from it, and as a result,* humanitarian price of technological progress determines different paths of territory development.

Research questions which have to be answered within the research: 1) How humanitarian price of technological progress could be identified and calculated? 2) What are the differences in humanitarian prices of technological progress between existing "world-economies"? 3) What is the potential of each existing "world-economy" to reduce the humanitarian price of technological progress?

Scientific approach

The scientific approach / thinking paradigm, which will be used in the *further empirical and econometrical researches*, is basing on two pillars: conceptual understanding of humanitarian price, and spatial understanding of the modern world. First one will be understood via economic Law of Diminishing Marginal Productivity applied to technological progress, second – via conception of "worlds-economies" which form a spatial framework for

[108] A "world-economy" is an economically independent part of the globe, which in general is able to be self-sufficient; that one, whose organic unity is based on its internal linkages and interchanges (Braudel 1967) (see detailed description of methodological applying of this conception for the research in the next Chapter "Scientific approach").

differences in humanitarian price of technological progress and mechanisms of its reduction.

Conceptual understanding of humanitarian price via Law of Diminishing Marginal Productivity applied to technological progress. Law of diminishing marginal productivity is an economic principle that states that while increasing one input and keeping other inputs at the same level may initially increase output, further increases in that input will have a limited effect, and eventually no effect or a negative effect, on output. The law of diminishing marginal productivity helps explain why increasing production is not always the best way to increase profitability. The law of diminishing marginal productivity shows that instead of continuing to increase the same input, it might be better to stop at a certain level, and to increase a different input, or produce an additional or different product or service to maximize profit.

This law was first discovered in the 17th century. The law claimed that a permanent increase in the labor applied to a certain piece of land leads to a decrease in productivity of this piece of land. Economists in the 19th century applied this theory only to the sphere of agriculture, and did not attempt further application of the theory. In the 20th century the law of diminishing marginal productivity became universal and applicable for all types of activities once and for all. The authors suppose that in the 21th century this fundamental economic law can be applied to technological progress (production, output) and territory development (profit). In its turn, inputs (resources, factors of production) could be imagined as resources or factors of progress.

There are three main resources or factors of production in classical macroeconomic theory – land (all natural resources), labor (the ability to work) and capital (equipment, finances, buildings etc.); later the ability to combine resources – entrepreneurship – was added to three classical resources or factors of production, more later – information. Thinking about technological progress and territory development, the authors propose one more vital resource or factor of production – people's moderation / abstinence (the ability to satisfy needs, consuming less material resources), even morality / goodness. Although they are not economic categories, in modern reality of explosion of civilization diseases and vices, people's moderation / abstinence become economically valuable.

Coming back to the research hypothesis that *territory development in the modern world declines when humanitarian price of technological progress begins to outweigh benefits from it, it can be argued that previously mentioned humanitarian price's outweighing the benefits from technological progress happens when, according to the law* of diminishing marginal productivity, the rate of science-technological progress (one input) does not

correspond to *the level of* people's moral-spiritual progress (another input) on the concrete territory. Speaking figuratively, if a person has such level of moral-spiritual development that only necessity of physical needs' satisfaction can get him up from the sofa, let him live in material poverty, as prosperity (which is the result of technological progress) will just spoil him in this case.

Spatial understanding of the modern world via conception of "worlds-economies". The second part of the research hypothesis - the *resulting* humanitarian price of technological progress determines different paths of territory development – states that in various countries and regions of the modern world the humanitarian price of technological progress and, as a result, path of territory development, could be different. But there arises the question of what qualitatively different spatial parts modern world consists of, and what the nature of significant differences between territories is. A conceptual answer to this question can be found in the paradigm of "worlds-economies" suggested by F.Braudel.

F.Braudel argued that the world's economic history is presented as an alternation of dominancy of certain economically autonomous regions of the world - "worlds-economies" (Braudel 1967). Then, in the 1970s the first report of the Club of Rome "The Limits to Growth" was published (Meadows et al. 1972), later - the second report as well as "The 30-Years Update" (Meadows et al. 2004), which developed the concept of "organic growth", considering every territory as a separate cell of the living organism of the world with its own function (or even mission), which have to be fulfilled instead of aspiration for universal quantitative indices of development (Mesarovic, Pestel 1974).

The authors have chosen two key indicators as a methodological basis for identification and empirical interpretation of modern "worlds-economies": the use of natural resources (within the framework of this research – use of energy) – "nature-friendly" dimension (Meadows et al. 1972, 2004; Lahart et al. 2008; Global Footprint Network, Mediterranean Ecological Footprint Initiative 2015), and the quality of social infrastructure – "human-friendly" dimension (Hall, Jones 1998; Pakholok 2013; UNDP 2013; Schwab 2014). The data on 124 world countries are the basis for empirical interpretation of modern "worlds-economies", the information on whose resource consumption was available, in particular, on energy consumption as the empirical indicator "energy use per capita (kg of oil equivalent) (World Bank 2015) – average meaning for 2007-2011, as well as the second indicator – the index of social infrastructure as the empirical indicator "Institutions" (score by the scale 1-7) – average meaning for 2009-2013 (Schwab 2009, 2010, 2011, 2012, 2013).

The whole set of 124 investigated countries has been divided into groups in relation to the average values of energy consumption and social infrastructure:

Table 1 Methodical matrix of countries' groups classified by energy use per capita and index of social infrastructure

Energy use / **Social infrastructure**	***Higher than average ("bad" situation)***	***Lower than average ("good" situation)***
Lower than average ("bad" situation)	"Energy consumers with poor social infrastructure" (1st group)	"Ecologists with poor social infrastructure" (2nd group)
Higher than average ("good" situation)	"Energy consumers with strong social infrastructure" (3rd group)	"Ecologists with strong social infrastructure" (4th group)

Source: elaborated by the authors.

The largest group – almost half of the investigated countries (most likely also in the world) is comprised of "ecologists with poor social infrastructure" – mainly, the countries of former communist block in Central and Eastern Europe, Africa and South America (the leaders are Brazil and India). The second largest group (32 countries) is comprised of the countries opposite to the first group in terms of both indicators – "energy consumers with strong social infrastructure". They are mainly the economically developed countries of Western Europe, Scandinavia and North America (the leaders are UK and USA), as well as oil Muslim countries which consume quite a lot of energy, but – surprisingly for the authors – they have a strong social infrastructure which enables the efficient distribution and use of the available resources.

The analysis of the data shows that on the background of the above mentioned relatively large "world-economies" there appears the beginnings of new "worlds-economies" which most probably are new centers of the future dominant "worlds-economies". These two groups of countries – "energy consumers with poor social infrastructure" (the leader is Russia) and "ecologists with strong social infrastructure" (the leader is China).

In order to reduce the distrust of scientific community on empirical identification of "worlds-economies" was suggested by the authors, it is useful to compare differences in the average GDP between these four above described "worlds-economies" for statistical significance. Results of multiple comparisons' procedure made in SPSS showed that there are statistically significant differences in economic performance of the "worlds-economies" traditionally measured by the GDP per capita (Hanks 2009; Sala-i-Martin et al. 2013; Stankevics et al. 2014; Simpson 2015).

Table 2 Statistically significant differences between average GDP per capita (during the period of 2009-2013) in identified "worlds-economies"

"World-economies"	**"Energy consumers with poor social infrastructure"**	**"Ecologists with poor social infrastructure"**	**"Energy consumers with strong social infrastructure"**	**"Ecologists with strong social infrastructure"**
"Energy consumers with poor social infrastructure"	Average GDP per capita is 15661 USD	**There is a statistically significant difference (p=0.007)**	**There is a statistically significant difference (p=0.000)**	There is no statistically significant difference (p=0.420)
"Ecologists with poor social infrastructure"	**There is a statistically significant difference (p=0.007)**	Average GDP per capita is 4686 USD	**There is a statistically significant difference (p=0.000)**	**There is a statistically significant difference (p=0.033)**
"Energy consumers with strong social infrastructure"	**There is a statistically significant difference (p=0.007)**	**There is a statistically significant difference (p=0.000)**	Average GDP per capita is 46337 USD	**There is a statistically significant difference (p=0.000)**
"Ecologists with strong social infrastructure"	There is no statistically significant difference (p=0.420)	**There is a statistically significant difference (p=0.033)**	**There is a statistically significant difference (p=0.000)**	Average GDP per capita is 11839 USD

Source: elaborated by the authors using SPSS software and data of the Schwab 2009, 2010, 2011, 2012, 2013.

According to the data in Table 2, the countries of traditional capitalist "world-economy" (into which, as it has been discussed above, a group of Arabian oil monarchies has been added) has the highest average GDP per capita, and in this way it statistically significantly differs from all others "worlds-economies". It's opposite – "ecologists with poor social infrastructure" – have the lowest average GDP per capita, and also statistically significantly differs from all others "worlds-economies". There are no any statistically significant differences in the economic performance between two new emerging "worlds-economies": "energy consumers with poor social infrastructure" and "ecologists with strong social infrastructure" – both "worlds-economies" have approximately the same average GDP per capita. This is achieved mainly whether by means of intensive use of resources (in the first case), or by means of creating a social infrastructure which promotes a productive activity of economic subjects (in the second case). Therefore, the "worlds-economies" which were identified empirically have not only a specific combination of two characteristics chosen by the authors (scientific feasibility of these can be subjected to criticism and can be the topic for debate) but in the majority cases these "worlds-economies"

have also statistically significantly different level of economic performance measured by the average GDP per capita for the period of 5 years.

Conclusion

1) *Technological progress creates deep contradictions between those who built a civilization and those who just use its products.* The humanitarian price of this progress possibly becomes too high nowadays and restrains the further progress in the countries which have achieved a high living standard.
2) Humanitarian price of technological progress, for several decades, as the analysis of scientific literature showed, have been the subject of emotional debates among scientists and social activists, but not the subject of methodological discussions and econometric calculations which would enable researches to precisely and objectively evaluate humanitarian price of technological progress.
3) The scientific approach / thinking paradigm, which is proposed for using in the further researches on the issue of price of progress, is basing on two pillars: conceptual understanding of humanitarian price, and spatial understanding of the modern world. First one is understood via economic Law of Diminishing Marginal Productivity applied to technological progress, second – via conception of "worlds-economies" which form a spatial framework for differences in humanitarian price of technological progress and mechanisms of its reduction.

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