"Who's afraid of Virginia Woolf?"

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Abstract

Purpose of the paper: *Raise awareness about some issues related to automation*
Methodology*: Aristotelian*
Findings*: The present world is dying, the present world is dead*
Practical implications*: Huge and unpredictable*
Originality/value*: A revolution*
Type of paper*: Philosophical*

Key words: automation; robots; artificial intelligence; work; employment; universal revenue

Prologue: Heal the world. Make it a better place. For you and for me and the entire human race. (Michael Jackson)

ACT 1: man versus machine
(Enter Ludd, the Canuts, Capek and Asimov)

Scene 1:

1779: Edward Ludlam, better known as Ned Ludd, a weaver from Anstey, near Leicester in England had a fit of passion one morning, for unclear reasons, and smashed two knitting frames. The story was told more than 30 thirty years later in an article of the *Nottingham Review* (20 December 1811). The same year John Blackner in his *History of Nottingham* told the same story with some variations. Nobody really knows who Ludd really was, or if he even ever really existed but from then on every time frames were sabotaged, people would say "Ned Ludd did it". The character of Ludd became famous in the 1810s when groups of organized frame-breakers became known as "The Luddites". They used the destruction of machines to protest against their work conditions. It is not quite clear at the beginning if they only protested against some labour practices and not the machines themselves, but the Luddites (and "luddism") have remained in history as opponents to mechanization, automation and what we call today computerization or digitalization for fear that they would lose their skills and expertise in favour of machines and as a result be deprived of their *raison de vivre* as workers.

Scene 2:

1831: A group of silk workers from Lyons using Jacquard looms - a rudimentary form of mechanization - rose against their employers and working conditions shouting the slogan "*Live free working or die fighting*".

King Louis-Philippe sent the troops to crush the riot. Nevertheless the Canuts revolted a second time in February 1834, for six days, occupying part of the city of Lyons and again the revolt was crushed by the army.

Scene 3:

1920: Karel Capek, with a little help from his brother Josef, a Czech writer, published a play entitled *Rossumovi Univerzální Roboti* (Rossum's Universal Robots). The play takes place, largely, in a factory making artificial people called *roboti* hence the word *robot*. This word is derived from the word meaning 'work', so robots are workers. These robots are not machines *stricto sensu* but have the appearance of human beings. They are close to what we would call today human clones, and they can think for themselves: artificial intelligence already! One day they rebel against 'real humans', take power and this leads to the extinction of the human race. Maybe not everybody remembers the name of Capek, but everybody knows and uses the word robot and its derivatives robotics, robotization, robotize, today.

Scene 4:

1942: Isaac Asimov, best known as a science fiction author, stated *The Three Laws of Robotics* in his sort story Runaround to prevent the prophecy of Karel Capek from coming true.

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

(Exit All)

ACT 2: man or machine?

(Enter God, Aristoteles, Butler, Keynes, Leontieff and some others)

Scene 1:

The relationship between man, machine and work has always been problematic. Since times immemorial man has defined himself as a '*working creature*' deriving a large part of his essence, existence and pride from work. Work has been considered in the big majority, if not all, of cultures as co-substantial to a social order.

However, the concept of 'work' is ambivalent. If we refer to the Bible, for example, man did not originally have to work (*the earthly paradise*). Work was not part of social life. But because of the original sin work entered man's life and became fundamental in the sense that only work could ensure the survival of man. This is how work became a core value of social life: no work, no man, no man, no society. Remember the word of God: "In the sweat of thy face shalt thou eat bread" (Genesis 3.19, *King James Bible*). Work has then a double face; it is a curse but it is also the path

to redemption. The etymology of the word work provides some evidence of this original curse. In Latin *work* is *trepalium*, which means *torture*.

Therefore, in order to make the Fall less painful and to redeem oneself in more comfortable conditions, why not resort to some devices which could "do the job" in the place of men? And here comes the machine. The machine is not necessarily the enemy of man, but can be a friend.

If every instrument could accomplish its own work, obeying or anticipating the will of others, like the statues of Daedalus, or the tripods of Hephaestus which, says the poet, 'of their own accord entered the assembly of the Gods; 'if, in like manner, the shuttle would weave and the plectrum touch the lyre without a hand to guide them, chief workmen would not want servants, nor masters slaves. (Aristoteles)

In this world of brotherhood between man and machine, the multiplication of machines does not threaten the existence of man but alleviates the pains of labour (Bellamy: *Looking backwards*).

Indeed when looking at the evolution of the labour/machine ratio since the industrial revolutions, particularly the second one and even more with the present 'third industrial revolution', although in the present case the word industrial may not be appropriate, the share of labour in economic activities has been regularly declining, and at a more and more rapid pace (Karabarnoubis and Neiman, 2013) and concurrently the share of capital has increased.

So what does this evolution mean? It means that thanks to mechanization and automation human work has become less painful and stressing, it means that globally machines have not destroyed jobs for humans but have created jobs, and jobs which are more rewarding for people. In economic terms the productivity of labour, a classic indicator of economic performance, has increased dramatically since the early 19th century leading to an improvement in working conditions, a rise in living standards, and more well-being, if not necessarily perceived as more 'happiness', for the population. So all's well in the best of worlds? Hold on for a while.

Scene 2:

"There is no security against the ultimate development of mechanical consciousness, in the fact of machines possessing little consciousness now [….] Reflect upon the extraordinary advance which machines have made during the last few hundred years […] Assume for the sake of argument that conscious beings have existed for some twenty million years: see what strides machines have made in the last thousand! May not the world last twenty million years longer? If so, what will they not in the end become? Is it not safer to nip the mischief in the bud and to forbid them further progress? (Butler, 1872).

So what if machines became more intelligent than men and first replaced them in economic activities, then made decisions in their place - to the detriment of men? - and finally deprived men of their political (in its etymological sense) power?

This is the sort of trend that we seem to be experiencing today.

Let's have a look first at machines taking men's jobs. If 19th century style mechanization has in the end created more jobs than it has destroyed, in a Schumpeterian evolution of the economic environment, it seems that it is already no longer the case today and that the trend is gathering speed with what we can call 'intelligent robotization'. The conjunction of artificial intelligence and robots which/who (?) look just like human beings, the so-called androids (isn't it interesting to note that Google's operating system is called *Android*?) is driving us (literally, see the *Google car!*) towards an environment going much further than Butler or Capek. Some experiments have been carried out in Japan where a real human being and an android robot were presented side by side and people (real ones!) could not make the difference between them and tell which was which.

All studies today point to the fact that robotization using artificial intelligence will destroy a huge number of existing jobs in the near future. Figures vary, sometimes largely, from one study to another, but all indicate the same direction.

In a study from 2013 about the impact of computerization in the United States, the authors estimated that 47% of workers were threatened by automation. Mostly affected will be, and already are in some activities, jobs in logistics, office support and sales (Frey and Osborne, 2013).

Here is how Frey and Osborne estimated the probability for different categories of jobs:

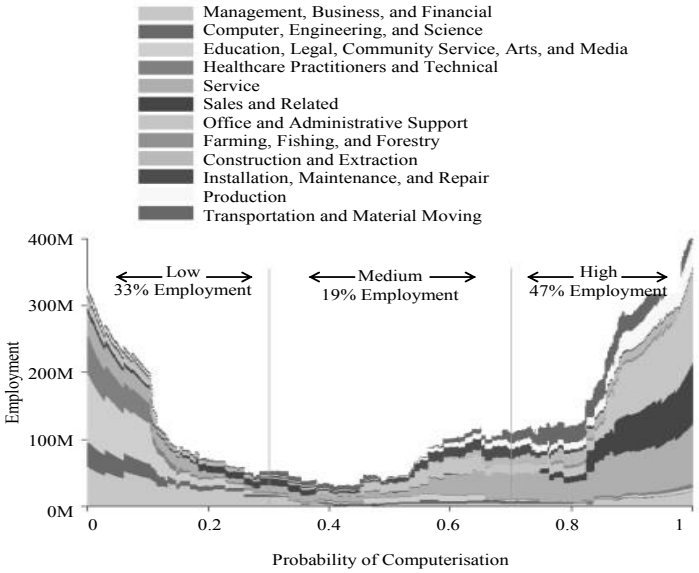
Catalogue of fears. Probability of computerisation of different occupations, 2013 (1 = certain)

Job	Probability
Recreational therapists	0.003
Dentists	0.004
Athletic trainers	0.007
Clergy	0.008
Chemical engineers	0.02
Editors	0.06
Firefighters	0.17
Actors	0.37
Health technologists	0.40
Economists	0.43
Commercial pilots	0.55
Machinists	0.65
Word processors and typists	0.81
Real-estate sales agents	0.86
Technical writers	0.89
Retail salespeople	0.92
Accountants and auditors	0.94
Telemarketers	0.99

Source: "The Future of Employement: How Susceptible are Jobs to Computerisation?", by C. Frey and M. Osborne (2013)

Economist. com

And a graphic representation:



Other studies estimate the loss at 35% for Britain and 49% for Japan (The Economist, 2016). The dividing line is between routine jobs and non-routine jobs. The former are and will be the first to disappear as the repetitive character of the tasks makes it rather easy to automate them. But in the medium-long term, the latter will also be threatened as the technologies linked to artificial intelligence develop and become more and more sophisticated. Big differences can be found depending on the economic level of development of a country. Where the economy is already highly sophisticated, the threat may be lower, at least in the near future, but this is because a lot of jobs or tasks have already been automated. A study of OECD countries comes to the conclusion that 9% of jobs are automatable, with significant differences between countries (e.g. 6% in Korea and 12% in Austria), a figure which is much lower than that put forth by Frey and Osborne (Arntz *et al.,* 2016). The methodology, however, is different; Frey and Osborne base their study on 'jobs' whereas Arntz, Gregory and Zierahn break down jobs into tasks and use the tasks as the basis, considering that in a given job some tasks are easily automatable but others are not.

Here are some of the results obtained in the OECD study:

Automatable jobs

Country	Share of People at High Risk	Mean Automatibility	Median Automatibility
Austria	12%	43%	44%
Belgium	7%	38%	35%
Canada	9%	39%	37%
France	9%	38%	36%
Germany	12%	43%	44%
Italy	10%	43%	44%
Japan	7%	37%	35%
Korea	6%	35%	32%
Netherlands	10%	40%	39%
Poland	7%	40%	40%
Spain	12%	38%	35%
Sweden	7%	36%	33%
UK	10%	39%	37%
United States	9%	38%	35%

Source: OECD (2016)

But when we have a global look in the longer term the figures can be staggering. Think for example of the "emerging economies" which are "low cost" economies from the point of view of labour. A huge number of jobs have been relocated in those countries to take advantage of cheap labour. Let's take for example the two most threatened jobs according to Frey and Osborne: accountants and auditors, and telemarketers. These jobs involve a number of different tasks, some of which are easily automatable while others are less. On a task base, to use the OECD study's approach, let's consider bookkeeping and call centres and a country like India - a most significant case. Automation of those tasks means that millions of jobs will disappear in the coming years leading to huge social problems.

This evolution had been anticipated by a number of authors. As early as 1907, John Bates Clark foresaw the impact of automation on the labour market (Clark, 1907). His view however was rather optimistic as he acknowledged the destruction of jobs by new technologies but believed that it would make labourers available for new activities. More famously, John Maynard Keynes coined the phrase "*technological unemployment*", stating that "*the means of economizing the use of labour outruns the pace at which we can find new uses for labour*" (Keynes, 1930). He was not as optimistic as Clark. Similarly Leontieff argued that humans as the most important factor of production is bound to diminish (Leontieff, 1983). Some disagree with this vision and retain the second part of Clark's argument; the increased use of technology creates extra demand which requires new labour (Cyert and Mowery, 1987). It has indeed been globally, if not individually, the case in the past, but it is not sure at all that it will be in the future. This view also implies that the extra demand is solvent, which is not likely to be the case as will be seen in the next Act.

There is no doubt that "intelligent robotization" is destroying and will continue to destroy jobs at a rapid pace. And it might well be that this "intelligent robotization" is a black swan unpredictable and uncontrollable in its magnitude and effects (Taleb, 2010). We are probably embarked on completely different paradigm obliging us to re-think radically and re-invent management.

(Exit All)

Act 3: man-agement or machin-agement?

Scene 1:

(Enter Ford, Taylor, Solow, Brynjolfson and some others)

It is at the turn of the 20th century that the question of mechanization became a conscious management issue and led to the application of new techniques for production and a new use of the labour force. When Ford set up the assembly line in his factory and when Taylor invented and implemented the scientific organization of work (Taylor, 1911), the philosophy, if we may use this word, was to organize work around the machine in order to increase productivity and reduce costs. Man worked for the machine, as illustrated in Charlie Chaplin's film *Modern times*, not the machine for man. This 'scientific organization' of work was based on standardization and can be seen as the forefather of quality assurance, still central to quality management. The success of this organization of work was so great that it is still widely practiced today here and there in the world (Martin and Weill, 2002). That's all very well, so to say. But today we do not need workers any longer on assembly lines. Robots have taken their place.

For a while, the introduction of computerization into production techniques did not seem to revolutionize productivity as Taylor did. For example Robert Solow wrote in 1987: "We see the computer age everywhere, except in the productivity statistics" (Solow, 1987), or Erik Brynjolfson (1993) noting, though, that at that time computers were still a small share of the economy and that complementary innovations were necessary to appreciate the real impact of IT, so that the rise in productivity lags behind the implantation of the new technology. Some went as far as questioning the impact of the IT revolution (Syverson, 2013). But our memory is short; the same phenomenon appeared in the past. "*The productivity slowdown in the 1970s, and the subsequent speed-up twenty years later, had an interesting precedent. In the late 1890s electricity was being introduced to American factories but … labor productivity growth did not take off for over twenty years*" (Brynjolfson and McAfee, 2014). In fact we may only see the beginning of the impact of robots on management practices.

Traditionally labour productivity has been measured by calculating a ratio between the volume of production and the labour employed. The classic formula is: Productivity of labour = volume of production / number of man hours. This means that when either the volume of production

increases for the same number of man-hours or the number of man-hours decreases for the same volume of production, the productivity of labour increases. An increase of labour productivity has always been considered as beneficial in classic economics and management both for producers and employees. Undoubtedly, automation is a good means to boost productivity. Therefore a manager should strive to increase the "return on human resources" by constantly finding ways of increasing their productivity. So, the more robots, the better! But when we push this approach to its limit, we get trapped in a mathematical conundrum. Let's imagine that production is 100% automated and that as a result the number of man-hours is equal to zero. We apply the formula and what do we get? x/0 (x being the production and 0 the man-hours)! We then have to re-invent this notion of labour productivity and the way human resources are used and valued… or not. Now we could turn to another classic indicator of management efficiency: capital productivity. The formula is the same except that labour has been replaced by capital. Here again when output increases for a certain amount of capital or capital decreases for the same amount of production, productivity increases. Robots being considered as capital, their multiplication increases the capital used. And here emerges another paradox. The more robots we use, the lower the productivity for a given output! No sensible manager would then use robots… So, let's try something else. We consider that robots are like human(oid) beings and we apply the labour productivity formula to them. It may look 'fair enough' but we are driven into another impasse; the fewer robots we 'employ', the higher the productivity, which is the opposite of what we want to do with robots. There is something definitely rotten in the kingdom of management. All that we have done until now, all that we have thought until now about managing labour and capital has become obsolete and irrelevant.

We are then compelled, against our will, to come to the conclusion that all-purpose android robots able to do about everything that human beings can do, eventually even reproducing themselves, will render human labour worthless (Brynjolfson and McAfee, 2014). So, we need to look at things differently and find new ways to use the time and energy of the people who have been replaced by robots in the workplace.

Scene 2:
(Enter More, Paine and a dozen economists)

Let's forget about production activities in themselves. They are something of the past, in industry of course but also largely in services (Davenport, 2016). But before and after production we can still find some jobs for human beings. Research (especially fundamental research) and Development will be one area for humans to act in for some years to come - after all, who invented the robots? - although R&D is not devoid of internal contradictions. R&D in artificial intelligence for example is a sort of way to commit suicide for men. Everything dealing with customer relationships, especially where the 'human' dimension is paramount (Martin, 2014), will provide job opportunities for people. Activities related to the design of logistics, delivery of products and services and customer care in order

to meet ever-increasing customer expectations will certainly continue to develop at a fast pace. It is doubtful, however, that all these activities will provide new jobs compensating the loss of traditional jobs in industry or routine services.

If we turn to the function which is fundamental in management with regards to the use of the labour factor, that is Human Resource Management, what have we been doing for decades and decades and what could we do in the future?

We can list a number of HRM activities that have been around for a long time: job designs and job descriptions, training, career development and of course compensation. All these activities have been carried out in connection with specific jobs, broken down into a number of tasks (WBS) in the production of tangible goods or the delivery of services. But what if the production jobs have disappeared and the service ones have largely gone? HR managers are also on the dole (if any!). Therefore we can assume that HRM will have to focus almost exclusively on 'soft skills and competencies' for jobs, if we can still call them that, which cannot be described and which cannot unfold in a linear way in a 'career'. Therefore leadership and motivation cannot be oriented towards specific objectives but towards some contribution to the 'well-being' of organizations and their customers (and probably this word will have become inappropriate). The way people are compensated will also have to be radically different as the classic measurement of performance will have become irrelevant in this new 'work environment' (here again it is not sure that the word 'work' will still be appropriate).

In this respect, if we cast a look at the value that is created by organizations, what can we anticipate? Until now, in classic economic terms, the value added by the working of an organization is shared, in varying proportions depending on the economic activity but globally more or less equally between labour and capital. But in a nearly fully automated production system, the value added will overwhelmingly come from the robots. So how do we distribute it? Does it go to the robots? Does it nevertheless go to the employees (again a wrong term)? Does it go to the shareholders? The issue of the appropriation of the returns also needs to be re-thought entirely; a nightmare for the CEO and the CFO! And with huge social and societal consequences.

If we carry on with our old habits, what will happen?: "The first two sets of winners are those who have accumulated significant quantities of the right capital assets. These can be either nonhuman capital or human capital. The third group of winners is made up of the superstars among us who have special talents - or luck" (Brynjolfson and McAfee, 2014).

What has been briefly said of the impact of intelligent robotization on production, HRM and finance, could also be said of any of the classic functions of an organization. Nothing that has, or may have, worked in the past can work in the future. And first of all we must bury for good the classic theory of the firm (summed up in the sort of slogan "*maximization of profit*") and the functional approach of the management of an organization.

Something different is then needed.

Scene 3:

When considering the appropriation and distribution of the returns in an automated economy, we have to move from a managerial decision to a political decision and from a micro-economic perspective to a macro-economic one. Indeed what we have tried to show in the preceding Scene is that organizations in themselves cannot make decisions about the appropriation of returns, which can be satisfactory for society when on the one hand labour is no longer a significant contributor to the creation of value in its classic economic sense and when on the other hand a large proportion of this labour is in fact idle, so it is no longer labour.

Although intensive robotization may be a necessity for some countries in the medium term, ceteris paribus (but "other things will certainly not remain equal"), because of an aging and declining population, the best example being Japan (which significantly is leading the race in robotics) (Dobbs *et al.,* 2016),as stated above (Brynjolfson and McAfee, 2014), in most cases, new ways of occupying people must be found, which are not, at least directly, linked to the creation of economic value in its classic sense. The new outlook could be then not to create 'economic value' but to create 'social value' by using people for "non-economic (social) jobs", what is sometimes called the 'peer economy' in which people act for the well-being of all (Stiglitz *et al.,* 2010). In this perspective, how can we solve the question of compensation? Organizations cannot do it as people do not, or little, contribute to direct value creation for them. Consequently the answer has got to come from governmental authorities. The value created by automation has got to be distributed to the population as a whole. Some suggest taxing the robots. Stricto sensu, this is nonsensical. To have a tax, you need to have a revenue. Are we going to give the robots a salary? How? How much? This does not seem practicable. So, taxing the robots means in fact taxing the organizations using (employing?) the robots. And we are back to the old recipes. Failure is assured. Moreover in the democratic tradition, taxation must be "voluntary". Remember the American revolutionaries' "no taxation without representation". Are we going to give robots the right to vote?

So, this is where an old idea is re-surfacing, that of a 'universal income' known under various guises (basic income, unconditional income, citizen's income, etc.). This income would not be linked to a special work (this is logical in our new logic because there would be none) but to ensure a decent or minimum well-being (criteria would have to be agreed of course, which is not an easy task) to every member of the society. This revenue would come from the value created by automation (here again the calculation would need to be agreed, another tricky matter). Endless refinements can be imagined to take into account the 'social contribution' of people to the general well-being.

The idea can be traced back to Thomas More (1516) although it is a bit of an extrapolation, and was, with specific modalities, advocated by Thomas Paine (1797). Later a number of economists of various, sometimes opposite, trends such as James Tobin, Paul Samuelson, John Kenneth

Galbraith, Milton Friedman or Friedrich Hayek have supported the idea. In the social realm, Martin Luther King also raised the issue (1967).

Starting from an apparently plain economic and managerial issue, we realize that an 'intelligent automated system of production' (in a wide sense) leads us to question and redefine the tenets upon which society is founded.

Whither?

"A digital society? A post-human society? A neo-human society?" Rejoycing?

Why not an "Epicurian society"?

(Exit all)

Epilogue:

"Let no one be slow to seek wisdom when he is young nor weary in the search thereof when he is grown old. For no age is too early or too late for the health of the soul. […] Therefore both old and young ought to seek wisdom, the former in order that, as age comes over him, he may be young in good things because of the grace of what has been, and the latter in order that, while he is young, he may at the same time be old, because he has no fear of the things which are to come. So we must exercise ourselves in the things which bring happiness, since, if that be present, we have everything, and, if that be absent, all our actions are directed toward attaining it". (Epicuros, Letter to Menoeceus).

References

ALBEE E. (1962), *Who's afraid of Virginia Woolf?*, Signet, New York, USA.

ARISTOTELES (384-322 BC), *Politika*.

ARNTZ M., GREGORY T., ZIERAHN U. (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, n. 189, OECD Publishing, Paris.

ASIMOV I. (1942), *Runaround: The Three Laws of Robotics*.

BLACKNER J. (1811), *History of Nottingham*.

BRYNJOLFSON E. (1993), "The productivity paradox of information technology", *Communications of the ACM 36*, n. 12.

BRYNJOLFSON E., MCAFEE A. (2014), *The second machine age*, WW Norton & Company, New York.

BUTLER S. (1872), *Erewhon*, The book of machines.

CAPEK K. (1920), *Rossumovi Univerzální Roboti*.

CLARK J.B. (1907), *Essentials of economic theory as applied to modern problem of industry and public policy*, MacMillan, London.

CYERT R., MOWERY D.C. (1987), T*echnology and employment: innovation and growth in the US economy*, National Academies Press.

DAVENPORT T.H. (2016), *Wall street jobs won't be spared from automation*, Harvard Business Review, Cambridge, Mass., USA.
DOBBS R., MANYKA J., WOETZEL J. (2016), *No ordinary disruption, Public Affairs,* Perseus Books.
EPICUROS (342/341 - 270 BC), *Letter to Menoeceus*.
FORD M. (2015), *Rise of the robots,* Basic Books, New York, USA.
FREY C., OSBORNE M. (2013), *The future of employment, how susceptible are jobs to computerization?*, Oxford University.
GOD, *Genesis* 3.19, King James Bible, 1611.
JACKSON M. (1991), *Dangerous: Heal the world*, Sony Studios, New York City.
KARABARNOUBIS L., NEIMAN B. (2013), "The global decline of the labor share", *National Bureau of Economic Research*, N°w19136! Cambridge, Mass., USA.
KEYNES J.M. (1930), "Economic possibilities for our grandchildren", in *Essays in Persuasion*, WW. Norton & co, New York, 1962.
KING M.L. (1967), *Where do we go from here: chaos or community?*, Harper and Row, New York.
LEONTIEFF W. (1983), "*National perspective: the definition of problems and opportunities, The long-term impact of technology on employment and unemployment*", National Academy of engineering.
MARTIN J., WEILL M. (2002), *Is there a life after Taylor?*, Proceedings of the 5th Toulon-Verona Conference, Lisbon.
MARTIN J. (2014), *Robot: ban hay thu?,* Doanh Nghiep, T.P. Ho Chi Minh.
MORE T. (1516), *Utopia*.
PAINE T. (1797), *Agrarian justice*.
SOLOW R. (1987), New York Times Book Review
STIGLITZ J.E., SEN A., FITOUSSI J.P., (2010), Report by the Commission on the Measurement of Economic Performance and Social Progress
SYVERSON C. (2013), *Will history repeat itself? Comments on 'Is the information technology revolution over?'*, International Productivity Monitor 25.
TALEB N.N. (2010), *The black swan*, Random House.
TAYLOR F. (1911), *The principles of scientific managemen*t, Harper & brothers, New York.

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Web sites

www.cfr.org
www.well-beingindex.com

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