INDUSTRY 4.0 AND THE LIMITATIONS OF RHETORIC OF TECHNO-OPTIMISM IN POLISH POPULAR SCIENCE DISCOURSE

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Purpose: The basic premise of this article is the claim that technology is largely socially constructed. Invoking Armin Grunwald's framing of the hermeneutic approach to technology assessment, we analyse discourses on Industry 4.0 in polish popular science.

Design/methodology/approach: The conclusions were reached by analysing the basic metaphors used to describe Industry 4.0 in popular science discourse. We were juxtaposed the techno-optimistic narrative of Industry 4.0 with some findings from science and technology studies (STS). As theoretical basis we used Armin Grunwald's hermeneutical model of technology assessment.

Findings: In the course of the work we find that narrative about Industry 4.0 in polish popular science is characterized by naïve techno-optimism. We also indicate on the deterministic model of development of technology and technological fetishism contained in the narrative about Industry 4.0.

Research limitations/implications: Similar research can be conducted on broader, international scale.

Social implications: Paper can raise awareness of the persuasive nature of the discourse on Industry 4.0. It can also contribute to changing perceptions of the overall nature of Industry 4.0 challenges, in which case Industry 4.0 ceases to appear as a solution to all social and environmental problems and begins to be seen as a challenge that requires comprehensive reforms.

Originality/value First paper analyzing the rhetoric of Industry 4.0 in polish popular science.

Keywords: Industry 4.0, Narratives, Technology Assessment, Rhetoric, Techno-optimism, Science and Technology Studies (STS), Popular science.

Category of the paper: Research paper.

1. Introduction

Industry 4.0 is about integrating people and digitally driven machines with the internet and information technologies. The aim of this integration is to increase production efficiency, reduce costs, reduce environmental impact, improve and diversify manufactured goods. The main technologies driving the Industry 4.0 include: Internet of Things, artificial intelligence, blockchain, autonomous vehicles, 3D printing and advanced robotics.

The narratives describing the effects of the introduction of Industry 4.0 are heterogenous. On the one hand, one can point to a techno-optimistic narrative, which links the development of industry 4.0 with efficiency, profit, competitiveness, progress and sustainable development (Poniewierski, 2020; Kagerman et al., 2013; Manyika et al., 2013; Schwab, 2016; Morrar et al., 2017; Piccarozzi, Aquilani, Gatti, 2018), on the other hand, there is talk of technological unemployment (Kuzior, 2017; Harrari, 2017), dehumanization (Kuzior, Fobel, 2019), the power of algorithms, the extractive attention economy, capitalism of digital supervision, gender and racist stereotypes built in algorithms (Noble, 2018) and even in the most radical form about the extermination of "unnecessary" masses of the population (Frase, 2016). It is clear that such shots have the features of caricature - we are dealing either with a hyper-optimistic or hyper-pessimistic narrative. Such narratives prevail in journalistic terms, but are also found in more systematic studies. What is very often lacking in the discourses on automation of work - industry 4.0 - is the awareness that technology is to a large extent socially constructed. Meanwhile, as shown by Science and Technology Studies (STS) , which, since the 1980s, has pointed out the illusory nature of the "deterministic and linear model of scientific and technological development, in which the progress of science and technology follows a predetermined plan, written in nature, and is essentially unaffected by society, politics, the economy (this embodies the Enlightenment postulate of 'freedom of scientific research')" (Stankiewicz, 2015, p. 40). Thanks to the findings of the Science and Technology Studies (STS), not only have we begun to see "the ideological and illusory nature of such a deterministic and autonomous model of technology development" (Stankiewicz, 2015, p. 40), but we have also seen that "technological innovations are co-determined by different social groups: from users (consumers, patients), to civic organizations, industry circles, counter-cultural groups to corporations and states" (Stankiewicz, 2015, p. 40). To the factors shaping the development of technology listed by Piotr Stankiewicz, the latest take also adds the visions of the future contained in various types of technology narratives (Grunwald, 2016).

Unfortunately, in the narratives appearing in the discourse about Industry 4.0, there is a belief that technological development is deterministic, that all we can do is adapt to this development. From this perspective, the basic assumption - often not fully realized - is the belief that the creation of technology is a simple consequence of reading the laws that govern the world. This misconception is closely related to the European philosophical tradition, especially

to the Enlightenment idea of progress. This misconception can be largely responsible for today's perception of technology as directly related to the order of nature. This approach promotes passivity in our relationship with technology. If technology is the result of reading the laws contained in nature, we must as citizens accept the successive phases of its development with all its negative consequences. However, such conclusions are incompatible with the results of empirical research on science and technology. Seeing, therefore, the development of technology as a deterministic process is not only wrong, but leads to passivity, to a situation in which we as citizens recognize that we have no influence on the world around us.

2. Hermeneutical Approach to Technology Assessment

As an antidote to this erroneous and harmful image, we propose the concept formulated by Armin Grunwald in the work entitled *Hermeneutic side of Responsible Research*. Grunwald shows that the way we talk about technology largely influences its shape. In this approach - it can be called the hermeneutic approach to technology assessment - it is recognized that one of the main factors determining the development of technology is the narratives of the future. According to Grunwald, assessing new and emerging technologies and research (NEST - New and Emerging Science and Technology) can be done through narrative assessment. As Grunwald believes: the main sources of creating and assigning meaning to scientific and technological innovations are related to technological visions of the future. This means that by analyzing and interpreting NEST-related narratives, we can evaluate a specific technology or specific research programs before they are applied to society. This is important because once a technological innovation has been introduced, it is extremely difficult to withdraw - even when the balance of social losses and benefits clearly indicates the harmfulness of a given solution (Bińczyk, 2012, p. 27). In this sense, Grunwald's proposal seems to overcome the so-called the control dilemma framed by David Collingridge. This dilemma shows a specific difficulty related to the control of innovation - "either it is too early to effectively predict the impact of a given technology, or it is too late, because innovation is already so closely related to other elements of culture and society that it cannot be transformed" (Bińczyk, 2012, p. 27). Grunwald points out that science and technology are associated with elements of culture and society at a very early stage. That is why analyzing the content of culture is so important for the control of science and technology. Bernard Reber - the publisher of the Responsible Research and Innovation Set series - points to the possibility of building anticpatory governance based on Grunwald's concept, which could be an alternative to the precautionary principle of Hans Jonas.

According to Armin Grunwald the impact of futuristic visions can be realized in two ways:

- "Techno-futuristic stories and images can change the way we perceive current and future development of technology (…). Frequently, the societal and public debate about the opportunities and risks associated with new types of technology revolves around the stories to a considerable extent, (…). Positive visions can contribute to fascination and public acceptance and can also attract creative young scientist to engage themselves there, just as negative visions and dystopias can cause concern and even mobilize resistance as was feared in particular in the early debate on nanotechnology.

- Techno-futures exert a particular great influence on the scientific agenda which, as a consequence, partly determines what knowledge will be available and applicable in the future. Directly or indirectly, they influence the views of researcher and, thus, ultimately also exert influence on political support and research funding" (Grunwald, 2016, p. 9).

3. Fictions and metaphors as powerful forces

3.1. Early intuitions in the philosophy of Giambattista Vico

The first intuitions about the key role of narratives in shaping the civilization process can be found in the philosophy of Giambattista Vico (1668-1744) in the form of the concept of the imaginative universals. According to Vico mythological figures (imaginative universals) in early stages of developing civilizations were principles by which societies build its culture, those figures were permeating every aspect of their life. According to Paolo Fabiani who is explaining philosophy of Vico, the key to understanding this approach is concept of epistemological function of fantasy. "Fantasy is what controls our existence for the most part of our life; only a minimal part is concerned with the meditation on immaterial entities, and even less is turned to the consideration of ideas thought in their pure essence. Human beings have formed the habit of believing real what is familiar to them (their fantasies). This has meaning only if considered in an analogical and metaphorical sense. In this case, human beings should be truly conscious that what they believe are analogies and metaphors, maintaining the planes of the ineligibles and of the fantasies constantly distinct" (Fabiani, 2009, pp. 197-198). It is important to notice that this power of fantasy was embedded in the forms of myths, stories and legends. In that sense Fabiani can write that: "The myths are the production of the creative human faculty, of fantasy; myths are poetic works. All techniques, all the actions performed with a precise aim are myths; the progressive dominion over nature, the clearing of forests, hunting, the cultivation of fields become myths. These are not actions in the same way we understand them; they are not done for an advantageous finality, though they may carry final

usefulness. These are ritualized operations that an imperfect mind has produced and that through the myth tries to structure itself shaken as it is by violent passions and with an intellect lenient in imagination" (Fabiani, 2009, p. 115) For our purpose to reveal the meanings behind techno-optimistic metaphors of Industry 4.0 it is important to notice that for Vico the natural form of *fantasia* is the fable, and as Vico says, every fable is a metaphor in brief. If we will remember that in Vico's philosophy *fantasia* is the power to form transcendental intelligibilities necessary for all thought and custom, we will also be able to shift this insight in to the cultural conditions of XXI century and to recognize the power of metaphors to shape the current technological development.

3.2. The role of metaphors in our lives – conception of George Lakoff and Mark Johnson

Contemporary the most important conception showing the metaphor as a tool of cognition and action is "Metaphors We Live By" – book written by George Lakoff and Mark Johnson (published in 1980). According to Lakoff and Johnson metaphor is not only a stylistic ornament, but a central component of everyday language use - it influences the way we perceive, think and act. This means that, as the authors note, metaphors guide our lives.

In an epistemological context, metaphors can be described as rationality enriched by imagination, since the categories of our everyday thinking are mostly metaphorical and reasoning is based on metaphorical implications and inferences, everyday rationality therefore requires imagination. In addition, the metaphors we use are not a matter of chance, but are deeply embedded in our experience, forming coherent systems organised around certain concepts, which receive a certain structure only by virtue of the fact that we only understand them through metaphors.

Among the types distinguished by Lakoff and Johnson, structural metaphors occupy a special place. These metaphors organise and reflect the way we comprehend whole classes of phenomena, which is systematically and coherently reflected in language.

4. Techno-optimistic narrative of industry 4.0 - main metaphors

Ever since the Fourth Industrial Revolution was announced at the Hanover Fair in 2011, an intense discourse has been taking place in the public sphere regarding the social impact of Industry 4.0. In addition to substantive arguments, metaphors are also emerging which, by appealing to our deeply ingrained perceptions of technological development, influence the way the Fourth Industrial Revolution is perceived. By unveiling these metaphors and juxtaposing them with the results of the reflection on the social impact of technology carried out within STS, we seek to point out the conventionality of the assumptions on which the rhetoric of techno-optimism is based. In this way, it becomes possible to think of future

technological development not as a pre-set scenario for which there is no alternative, but as a variety of possibilities that we can pursue in accordance with the values we care.

We have narrowed our analysis of the metaphors that organise thinking about Industry 4.0 to Alexander Poniewierski's book 'Speed. No limits in a digital world'. We did so for several reasons. Firstly, Poniewierski's book is so far the only book written in Poland about Industry 4.0 that is not aimed at scientific analysis, but rather at popularising knowledge. This means that one of the aims of this book is to reach the widest possible audience. At the same time, it is difficult to find another position that is so highly rhetorical in nature. The very large number of metaphors and other stylistic devices makes it easy to grasp its persuasive character. As we will try to show, the persuasiveness of this book is related to naïve techno-optimism.

4.1.   Industry 4.0 is like an exciting car race

The numbering Enthusiasm: "Technological change is much more than the implementation of a specific solution in the company. It is, in fact, a journey that aims to redefine or even reinvent the organization - with the use of modern technology - in order to realize lasting value in wider dimensions than often before " (Poniewierski, 2020, p. 11). Poniewierski uses positive terms to describe the upcoming technological revolution. He talks about streamlining, optimization, acceleration. The entire book on the fourth technological revolution is based on the metaphors of race, acceleration, speed and travel. In the introduction we can read: "I will help you join the fastest race in the world." And further: "I am taking you on a journey to the world of technology and business. To a world where everything happens very quickly. So fast that as a rule you won't even notice inventions appear and you will use them the next day as if nothing had happened" (Poniewierski, 2020, p. 19).

Until now, creating technology took time and work, now "you will not even notice how inventions will appear (...)". Choking on the pace of change, a book that resembles Marinetti's futuristic manifesto with its rhetoric. Reading this book, one has the impression that Poniewierskie, like Marinetti at the beginning of the 20th century, wants to praise the aggressive movement. Although many authors point out that our collective imagination does not keep up with the pace of technology development (hence the lagging behind the entire sphere of culture, which fails in terms of technology control), Poniewierski excitedly writes: "It will be faster than you can imagine, and it will become it's sooner than you think". No doubt there is a fetish for speed and rapid change in this passage. Within a civilization, however, too much rapid change can lead to disaster, especially if it negatively affects systemic risk. If we consider the enormous scope of change that Industry 4.0 is introducing, its profound impact on culture, we should rather postulate some kind of slowdown. At least enough so that we are able to develop some kind of social innovation that, in the spheres of education and economics, could offset the adverse effects of Industry 4.0 (Osika, 2019).

On the other hand, he writes about technology: "it is an amazing source of creative energy and business opportunities." This sentence reveals that the main addressees of Poniewierski's book are people who are looking for ways to monetize this technological breakthrough. And although this position is quite common in analyses of the adaptation of innovations in organizations (Ober, 2022, p. 8), it is worth noting that the potential victims of the new technological revolution may be people from lower social classes, less educated, with lower cultural capital. In this context, the optimism expressed in the task under analysis seems unjustified.

4.2.   Industry 4.0 and insatiability

The narrative formulated by Poniewierski resembles the way of thinking of a drug addict. In chapter two, "My world of SPEED", the opening paragraph combines the rhetoric of a car race and the insatiability characteristic of a person addicted to drugs. The following is an excerpt from the introduction that sets the tone for the entire book: "You pressed the Start button and started the engine. A bold decision, but I promise you will not regret it. I took it myself once and I don't regret it. I will say more: I still can't get enough!". It is difficult to reconcile such an attitude with the tradition of the golden mean, moderation, self-control, "keeping the appetites on a leash", which is valuable from the perspective of social stability. We are rather an example of a greedy way of being, insatiable, which is associated with hyper consumption, extractivism, and therefore strongly criticized phenomena from various perspectives (e.g. from an ecological perspective, but also from a conservative perspective).

4.3.   Industry 4.0 ceases limitations

Additionally, it should be remembered that the 21st century is the age of limitations awareness - it is the age of planetary boundaries, the concept of postgrowth, awareness of limited resources. Poniewierski, on the other hand, writes: "I respect rights and obligations, but not limitations. People who keep saying that something can't be done hinder progress." (Poniewierski, 2020, p. 23.) On the other hand, the first chapter begins with the motto: "The only limitations are your mind. (…) Everything is possible".

Moving beyond thinking in terms of a world for which boundaries are constitutive is also the assertion that 'the fourth revolution has a beginning but will not have an end'. The author suggests that unlike earlier industrial revolutions, whose beginning and end can be determined in time, the fourth industrial revolution will not give way to another revolution, but will only progress ever further. It is worth noting that the assertion that we are living in an age that will have no end (thanks to Industry 4.0) activates metaphysical and eschatological scripts - associations with existence at the end of time or the concept of an eternal present come to mind.

4.4. Industry 4.0 and fetish of speed

Poniewierski recognizes the speed fetish - everything fast is good: fast changes, fast algorithms, fast processors. However, from the perspective of the adaptations that culture - education, symbolic order, etc. - must make - slow changes are positively valued. It is worth noting that for some social science scholars authors and philosophers speed can be seen as the engine of destruction. Good example is Paul Virilio's book "Speed and Politics" in which speed is not only primary force shaping civilization but also permanent assault on the world and on human nature.

4.5. Industry 4.0 and fetish of technology

Poniewierski also recognizes the fetish of technology. Technology always appears to him as a positive force. He sees even the horrors of the two world wars, which - as he rightly notes - exploited the achievements of the second industrial revolution, in the context of further technological advances, "many of which were used in a positive way, if only to save lives". With such remarks, Poniewierski admits that technological progress is a value in itself, that the effects of science and technology are problem-free goods. It is worth noting that in the context of science and technology studies, the thesis that the effects of science and technology are unproblematic goods is widely questioned.

5. Summary

As shown by Science and Technology Studies (STS) deterministic model of technology development has illusory nature. Technology development is not autonomous from the influence of culture. Not only different social groups are influencing technological development, but also narratives are important factors in shaping technological development. By analyzing metaphors and similes present in the discourse about Industry 4.0 we point out the main aspects of the techno-optimistic vision present in the way in which the automation of production is talked about. At the same time, we note that this way of talking about the automatisation of production leads to social passivity and makes future technological developments not seen as a challenge, but as a solution. This, in turn, makes us neither prepare our social institutions for the technological challenges of the future, nor consider the possibility of including different social groups in the process of shaping technology. By uncovering the metaphors used in the discourse on Industry 4.0, their naïve techno-optimism, their non-critical approach to the practical successes of technology, their belief in the redemptive power of technology, we aim to open up the search for more nuanced narratives.

References

1. Bińczyk, E. (2012). *Technonauka w społeczeństwie ryzyka. Filozofia wobec niepożądanych następstw praktycznego sukcesu nauki.* Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.

2. Fabiani, P. (2009). *The Philosophy of the Imagination in Vico and Malebranche*. Firenze: Firenze University Press.

3. Frase, P. (2016). *Four Futures: Life After Capitalism.* London-New York: Verso.

4. Grunwald, A. (2016). *The Hermeneutic Side of Responsible Research and Innovation*. London: ISLE ltd, John Wiley & Sons, Inc.

5. Harrari, Y.N. (2017). Reboot for the AI revolution. *Nature, 550*, 324-327, https://doi.org/10.1038/550324a.

6. Kagerman, H. et al. (2013). *Recommendation for implementing the strategic initiative Industrie 4.0. Final report of the Industrie 4.0 Working Group*; https://www.din.de/blob/76902/e8cac883f42bf28536e7e8165993f1fd/recommendationsfor-implementing-industry-4-0-data.pdf, July 2, 2022.

7. Kuzior, A., Fobel, P. (2019). *The Future (Industry 4.0) is closer than we think. Will it also be ethical?* International Conference of Computational Methods in Sciences and Engineering. ICCMSE 2019, Rhodes, Greece. Melville: American Institute of Physics.

8. Kuzior, A. (2017). Problem bezrobocia technologicznego w perspektywie rozwoju Przemysłu 4.0. *Etyka Biznesu i Zrównoważony Rozwój. Interdyscyplinarne Studia Teoretyczno-Empiryczne*, *Vol. 4*, pp. 31-39.

9. Manyika, J. et al. (2013). *Disruptive technologies: Advences that will transform life, business and the global economy.* McKinsey Global Institute, https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Disruptive%20technologies/MGI_Disruptive_technologies_Full_report_May2013.ashx, July 7, 2022.

10. Morrar, R. et al. (2017). The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective. *Technology Innovation Management Review, 7/11,* 12-20.

11. Noble, S. (2018). *Algorithms of Oppression: How Search Engines Reinforce Racism.* New York: New York University Press.

12. Ober, J. (2022). *Adaptacja innowacji w świetle zachowań organizacyjnych. Wybrane aspekty*. Gliwice: Wydawnictwo Politechniki Śląskiej.

13. Osika G. (2019). Social Innovation as Support to Industry 4.0. *Zeszyty Naukowe. Organizacja i Zarządzanie, vol. 141.* Politechnika Śląska, pp. 289-301.

14. Piccarozzi, M., Aquilani, B., Gatti, C. (2018). Industry 4.0 in management Studies: A Systematic Literature Review. *Sustainability, 10,* 3821, https://www.mdpi.com/journal/sustainability, July 2019, doi:103390/su10103821.

15. Poniewierski, A. (2020). *Speed. Bez granic w cyfrowym świecie*.

16. Schwab, K. (2016). *The Fourth Industrial Revolution*. Cologny-Geneva: World Economic Forum, https://luminariaz.files.wordpress.com/2017/11/the-fourth-industrial-revolution-2016-21.pdf, July 7, 2022.

17. Stankiewicz, P. (2015). Klasyczna i partycypacyjna ocena technologii. *Studia Biura Analiz Sejmowych*, *3(43),* pp. 35-55.

18. Synowiec, A. (2013). W stronę analizy tekstu – krytyczna teoria dyskursu. *Zeszyty Naukowe. Organizacja i Zarządzanie, vol. 65*. Politechnika Śląska, pp. 383-396.