The Erosion of Scientific Inquiry: Economic and Ethical Aspects of Fake Knowledge and GenAI

Franciszek Kutrzeba
Department of Economics and Management, Gdańsk University of Technology, Poland

fkutrzeba@zie.pg.edu.pl

Abstract: The article explores the increasing prevalence of fake knowledge as a substitute for scientific knowledge and examines its economic drivers. It highlights the rising retraction rates of scientific papers due to fraud, and paper mills, demonstrating weaknesses in peer review. The author argues also that knowledge generated by GenAI and scientific knowledge on the other hand can be perceived as marketable goods, where the former serves as a lower-cost alternative, making it accessible despite its unpredictable lack of validity. The article presents a theoretical approach to examining recent trends in the knowledge market. It discusses economic factors and how they affect shifting consumer preferences from scientific knowledge (SK) to fake knowledge (FK) and GenAI. While top universities remain in demand, financial constraints have pushed some students toward alternative, often less reliable, sources. Apart from income polarization, the proliferation of GenAI has accelerated the spread of fake knowledge by lowering knowledge creation costs and bypassing traditional information gatekeepers, such as peer-reviewed journals or experienced scholars. Furthermore, Generative AI tools and fake knowledge are facilitated by social and psychological tendencies, as people seek knowledge—regardless of its accuracy—to reduce uncertainty. The article concludes by considering fake knowledge in the context of business ethics. It suggests that the dissemination of fake knowledge may serve political and economic interests, particularly in influencing public opinion, destabilizing and eroding trust in public figures and institutions. Given the role of digital platforms in spreading fake knowledge, AI researchers can explore how algorithms influence the visibility of misinformation and what ethical considerations should guide content recommendation systems. Research is needed to examine the interplay between income distribution, digitalization, and the propagation of fake knowledge from sociological, psychological, and economic perspectives; and to investigate the role of cognitive biases, social trust, and political motivations in knowledge preferences.

Keywords: Fake knowledge, Knowledge economics, Knowledge management, Higher education, Misinformation, Income inequality, Job polarization, Peer review, Academic fraud, GenAI

1. Introduction

There has been a drastic increase in the quantity of supplied fake knowledge in the last decades (Zhou and Zafarani, 2018; Richie, 2020; Gómez-Rodríguez, G. and González Reyes, R., 2022). Hopf et al. (2019, p. 4) claim that "*the percentage of scientific articles retracted because of fraud has increased by an order of magnitude since 2000 and high rates of retraction are seen for the most prestigious journals, illustrating both the extent to which flawed claims are perpetrated by scientists seeking prominence and weaknesses and even fakery in the current practice of peer reviewing*". Richie (2020) highlights how journals and the media sometimes fail to scrutinize sensational claims before spreading them. Richie (ibid.) presents inter alia the case of Brian Wansink, a well-known food researcher who engaged in p-hacking—adjusting data analysis until results appeared statistically significant, the misconduct by Diederik Stapel, a prominent Dutch psychologist who fabricated data for dozens of studies creating entirely fake datasets while claiming they were from real experiments. Stapel's works were published in prestigious journals that influenced social psychology before the scam was exposed.

Generative Artificial Intelligence (GenAI) has greatly affected the phenomenon of creating and disseminating fake news and fake knowledge. Fake news has been around for millenia, but GenAI has elevated it to new heights. Now, it enables the automated creation of vast amounts of high-quality and even personalized fake news. Paradoxically, Generative AI also plays a crucial role in detecting misinformation (Loth, Kappes, and Pahl, 2024).

This paper suggests a microeconomic framework to shed light on the changes in the knowledge market. It must be noted that the presented concept approximates the reality of supply-demand in knowledge acquisition. Consequently, sociological and psychological determinants are omitted intentionally and explicitly. The supply-demand model is interesting, as it applies to many of the organic aspects of life, and yet so limited, as many psychological and epistemological mechanisms are rooted either in our unconsciousness (microbiology), or subconsciousness (educational, ethnical, or socio-economic background), which makes studies on human behavior and knowledge management truly challenging. It is noteworthy to mention that sociological and epistemological, or any other than mathematical axioms are paradigmatic, and thus restrained to particular organizational and cultural settings.

2. Science and Fake Knowledge

The demarcation problem in defining the quality of knowledge is a huge problem in epistemological studies which has been discussed since ancient times. Both intentionality in knowledge sharing and even the definition of what is true, and what is fake is not always easy to establish. For instance, why do some call electro-mobility fake or pseudo-ecological while others see it as a valid approach to sustainability? The scope of this article is however not to discuss the problem of verification and replicability of knowledge, cognitive bias, methodological rigors, and peer consensus, ideologies, and traditions on what is accepted as knowledge, but to conceptualize the supply-demand of different versions of knowledge.

Now, let us assume that fake knowledge (*FK*) is a substitute for scientific knowledge, a different version of information goods. As far as conventional information goods are concerned, a common strategy for producers to attract customers from distinct market segments is to create high- and low-quality variations (or 'versions') of the original good, "*thereby selling at a high price to those who have a high value for the product, and a low price to those who value it less*" Varian (1999, p. 2). Hence fake or pseudo-scientific knowledge and output produced by the GenAI could be seen as different versions of informational good, in contrast to knowledge generated by the scientific inquiry. As noted by Fanelli (2019, p. 45), scientific knowledge can be characterized as a manifestation of human cognition among many. It is a pattern-encoding activity that "*reduces uncertainty about one phenomenon by relating it to information about other phenomena*". One could argue that people use any knowledge, regardless of its quality, to reduce uncertainty. The difference between fake and scientific knowledge is that the latter is valid. This is obvious in the so-called hard (natural) sciences but less in knowledge management and social sciences. Nevertheless, any kind of knowledge – whether fake or scientific – is a manifestation of information compression as noted in Fanelli (2019), and hence the proposition to treat fake or pseudo-scientific knowledge as variations of the same good (knowledge, *K*) seems reasonable.

If knowledge has become an easily available commodity, why would people want to consume less scientifically evidenced knowledge (*SK*) if its price has fallen? Why do we so fancy easily generated knowledge, as is the case with the GenAI? Brynjolfsson and McAfee (2014) have argued that the nature of recent digital, combinatorial, and exponential technological changes undergirds the whole economic system, hence the effects can be now observed in the broadly understood knowledge market. The change in customers' knowledge preferences could be attributed to technological changes in terms of skill-biased technical change (SBTC) and routine-biased technical change (RBTC). The aforementioned phenomena have favored more educated and skilled labor causing job and income polarization by eliminating middle-paid jobs in favor of high- and low-paid jobs respectively.

2.1 The Income Effect

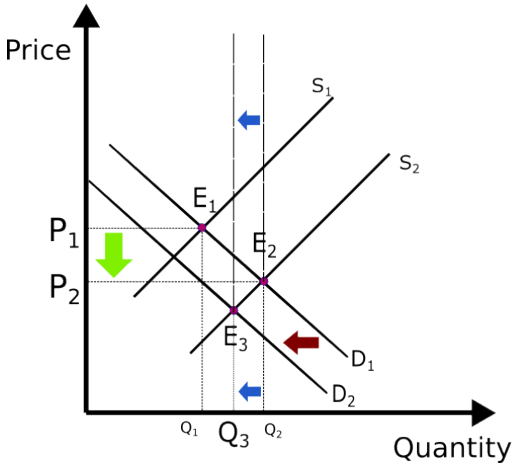
The income distribution is claimed to be the worst since the late 1920s (Alvaredo et alia, 2018), and *"in most OECD countries, the gap between rich and poor is at its highest level since 30 years"* (Cingano, 2014, p. 6). An interesting exemption from this trend can be seen in the Netherlands – a country where the gap has decreased; "*a substantial reduction of overall inequality: the bottom 50%'s share of income increases from 21 to 29%, while the top 10%'s*" (Bruil, et al., 2022, p. 2). One of the indicators for the changes in income distribution is the share of earned income by the richest 1% of the population. The development of that share for the Group of Seven (G7) countries in the past four decades has been alarming: "*The gap between rich and poor in Organisation for Economic Co-operation and Development (OECD) and European Union (EU) countries has reached its highest level over the past three decades*" (Cohen and Ladaique, 2018, p. 31). Also, the changes in household expenditures and disposable income are influenced by changes in macroeconomic factors. The impact of the global economic crisis in 2009 caused a reduction of household expenditure ca 5% and was higher in the OECD countries compared to the global average value (Varlamova and Larionova, 2015).

The income growth pattern has differentiated dramatically especially in the United States over the last four decades. Whereas the lowest quintile - the families in the bottom 20 percent of the income distribution - had an increase by only 2.3 percent between 1980 and 2016, the middle quintile saw their real incomes rise by ca 25 percent over the same period. Meanwhile, the incomes of the top 20 percent grew by 75 percent (Frank et alia, 2019). According to another measure of the income distribution, the Gini coefficient, the income inequality in the United States was significantly lower (0.39) in 2019 (OECD, 2020) than the estimates for the World average (0.634-0.684), based on the 2005 data (Hillebrand, 2009). It is noteworthy to say, that the Gini coefficient among other indicators has its limitations. For instance, countries with similar Gini coefficients might have different income distributions and thus ranking countries with it can be misleading (Bellù and Liberati, 2006).

Goos et alia in (2014) have observed that job polarization has been pervasive across studied 16 advanced Western European economies in the years 1993-2010 and offshoring has been identified as one of the reasons to cause middle-paid work to disappear from the United States (Banister and Cook, 2008). Simultaneously, the share of low-paid service work and highly paid managerial/specialized work has increased and this has given rise to the increasing income inequality in the rich OECD countries since the 1980s. The reasons for increased income inequality according to e.g. Salvatori and Malfredi (2019) is not job polarization per se but rather that some (even high skilled) jobs that have traditionally been associated with certain income have failed to deliver it the way they used to. This might be linked to what Brzezinski (2017, p. 9) suggests meaning "*that growing income inequality in Poland is correlated with the decline of trust in political institutions*".

As far as Central and Eastern Europe (CEE) is concerned, there is evidence indicating the possibility of a substantially higher increase in wealth inequality than previously thought. The largest increase in wealth inequality during the transition from central to market economy occurred in the "*Baltic countries (by more than 10 percentage points), while somewhat less significantly for countries such as Hungary, Poland and Slovakia*" (Brzezinski, Sałach and Wroński, 2019, p. 17; Sawulski, Brzeziński and Bukowski, 2024). Also, Brzezinski's earlier (2018) study shows statistically significant increases in Gini for disposable incomes throughout 2008–2012 for Bulgaria, Estonia, Hungary, and Slovenia, only small changes were observed in income distribution in Poland. Nonetheless, Poland's income inequality is still considerably higher than the average of the wealthier EU member states and in line with the average level of highly developed countries. However, the income inequality is smaller compared to countries of a similar level of affluence. Poland is also the only CEE country that did not experience a drop in GDP per capita during the financial crisis of 2008, and the country's unemployment rates are now among the lowest in the OECD. However, there are doubts that the official figures are far worse than thought and the problem lies in their correctness - the access to valid data (Sawulski et alia, 2024). Furthermore, also the degree of accumulation of ICT capital and robot stocks plays an important role in the future development of income distribution. ICT deployment should press down technology prices further enhancing automation of jobs and de-routinization of the Polish labor market. If SBTC and RBTC will continue, further technological advancements can bring forth wage polarization.

The question is then, could the disappearance of middle-income jobs and the income polarization be largely responsible for not only the declined demand for scientific knowledge but also the increased quantity demanded and consequently the supply of fake knowledge (*FK*)? Mostagir and Siderius (2022) found that communities with limited access to accurate information are more vulnerable to misinformation. They suggest that income polarization can compromise the overall quality of information consumed across different societal segments. Also, Glenski, Weninger, and Volkova (2018) suggest that users with lower income and education levels are more likely to share content from deceptive news sources. The study concluded this based on an analysis of 11 million Twitter posts. Their (ibidem, p. 1) "*analysis by demographics showed that users with lower annual income and education share more from disinformation sources compared to their counterparts.*" If the decreased income is the cause of increased fake knowledge supply and consumption it should also have a negative impact on the scientific knowledge demand as depicted below in Figure 1.



Source: Own elaboration

Figure 1: The income effect decreases the demand for scientific knowledge

2.2 The Substitute Effect

The argumentation above implies that the demand curve for scientific knowledge produced will be shifting left to a new equilibrium reinforced to a certain extent by 1) the emergence of a substitute commodity offered by the GenAI, the MOOCs (the substitute effect) and due to 2) the increase in demand-supply of fake knowledge (caused by the income effect). These changes are depicted in Figure 1 above which illustrates hypothetical changes in the supply-demand of scientific knowledge. It shows both the reduction of knowledge production cost (from P_1 to P_2), increased aggregated supply (AS_1 to AS_2), and how a negative shift in income (I_1 to I_2) leads to a decrease in the aggregated demand for scientific knowledge, represented as a downward shift of the demand curve D_1 to D_2.

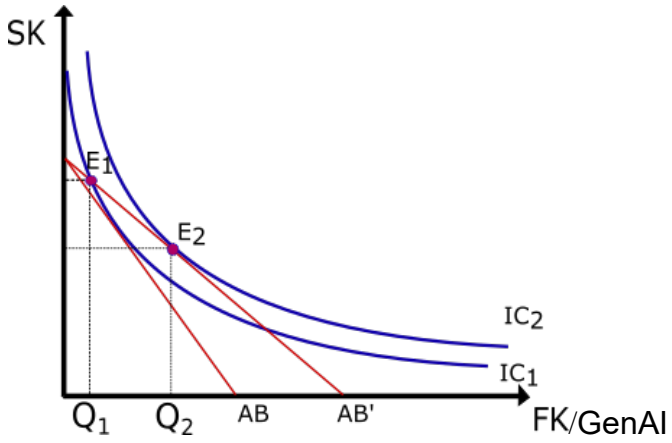
Another possible factor in facilitating fake knowledge production can be technological. Namely, digital technologies – Gen AI and the social media – have made it cheaper to produce and distribute fake/fabricated knowledge. According to Hopf et alia (2019, p. 3), fabricated knowledge is cheaper to produce than scientific knowledge because of "*the Internet and the capacity it provides for anyone in the world to be a publisher—to communicate any information they wish, true or false, instantly and globally"* while *"avoiding the gate-keeping role of the traditional press"* (Meddaugh, 2010, p. 377). In other words, the production cost of scientific knowledge is higher than the production of any other kind of knowledge (Kutrzeba, 2024). Consequently, as far as the market economy is concerned, the price for *FK* should be lower than the price of *SK* and this might have led to a change in consumer preferences due to the plummeting prices of *FK* relative to the prices of *SK*. The price for *SK* could be represented e.g. by the opportunity cost of investing in HE, the money invested in Research Institutions (data collection, instruments, grants etc.) and – where applicable – the tuition fees. The opportunity cost should be understood as "*… the income that would have been earned while a student is in school instead of working*" (Bloom and Rosovsky, 2007, p.447).

Defining the correct type of substitutability between such intangibles as knowledge is complicated though. Ungar (2000, p. 308) assumes "*that most of the public is not motivated to be scientifically literate*" but that such variables as the need-to-know perspective have a positive effect on knowledge acquisition – people with heart diseases tend to be more interested in the state of the art technologies around treatments for heart conditions in comparison to those that have not encountered heart diseases themselves. Apparently, the demand for HE is far greater than the supply, in other words, there are more applicants than places available as far as top European, Asian, African, and American universities are concerned (Trow, 2007; OECD, 2022). However, the reasons why people choose to invest in higher education (HE) seem to be explicitly linked to instrumental values such as employability factors (Sulkowski, 2016; Tavares, 2017) or parental expectations (Sojkin et alia, 2012) rather than educational ones (Tomlinson, 2018) and therefore the demand for HEs cannot constitute a sole indicator for the general preferability of *SK* over *FK* nor HE over the Massive Open Online Courses (MOOCs) as presented in Kutrzeba (2024). The latter was treated as a close substitute in the discussion above but MOOCs could be also treated as complementary goods as both of them are tuition-free in the EU yet there are still significantly more people (in the official total numbers) 'consuming' at traditional HE. Obviously, there must be something else than the price of the HEIs that makes them preferable to the MOOCs. The total amount of consumers at public HE in the EU is estimated at around 19,6 mln and 21,9 mln (Educationdata, 2019) in the US whereas MOOE had around 220 mln users worldwide in 2021, excluding China (Shah, 2021). Yet, the completion rate is 10 times greater for HE than for MOOE (Eurostat, 2016; Rothkrantz, 2017; Lee et alia, 2018).

Taking into account that the biggest decline in the demand for HE in Poland has been observed in the private sector, where tuitions apply, in contrast to the public sector where knowledge is provided 'free of charge', one could argue that the demand for scientific knowledge is relatively elastic. The situation is somehow different in the US and the UK where people are still massively attending costly universities even when the tuition fees have skyrocketed (Trow, 2007; Wilkins, Shams, and Huisman, 2013) although certain decreases in the overall enrollment rate might be inevitable in the forthcoming decade especially due to the falling demographics in the US (Grawe, 2018). In Germany, Bahrs and Siedler (2019, p. 118) have found evidence suggesting *"that even modest tuition fees of €1,000 per academic year can have considerable adverse effects on the educational plans and choices of high school students."* Consequently, the problem of defining the substitutability between the HEIs and the MOOCs becomes far greater as one considers that additional costs of education are associated with higher quality (Lima, R., Sampaio, L. M. B., and Sampaio, 2024). Hence, as far as higher education, scientific knowledge and the quality of Gen AI are concerned, it would be interesting to examine knowledge as a type of luxury good in its own right.

Taking into account the natural human inclination to seek and use scientific knowledge - which traditionally results from the scientific method - it could be assumed that fake knowledge is more likely to be a close rather than a perfect or complement substitute to scientific knowledge. Knowledge generated by GenAI on the other hand resembles a complement substitute because of its staggering accuracy, although easily distorted by eg. deliberately prompting fake data by the user. Consequently, fake knowledge could be 'a bad' as understood by knowledge economics, which according to Varian (2010, p. 41) "*is a commodity that the consumer doesn't like*" unlike the knowledge provided by Gen AI, whether true or fabricated. The exception here would be jokes that often rely on fabricated information, yet there are 'liked'.

As far as consumer preference theory (Varian, 2013) is concerned, the theory works well with a bundle of several goods too, but it cannot be drawn with more than two at a time. Given no change in the consumer's overall budget, Figure 2 below depicts a situation where the price reduction of *FK* (from P_1 to P_2, see Figure 1) results in the change of consumer preferences in disfavor of *SK* thus increasing the quantity demanded of *FK* from Q_1 to Q_2.



Source: Own elaboration

Figure 2: Convex preferences between *SK* and *FK/GenAI*

3. Conclusion

Changing consumer preferences, or the changing trends and the nature of the knowledge market is far more complex than it has been examined here. It would be interesting to examine it for example in the context of such political agendas as the sustainability goals promoted by the United Nations, the geopolitical conflicts and the info-war, or historical and scientific lies as posted by regular social media users (Pennycook and Rand, 2021), prominent politicians and scientists (Richie, 2020). A suggestion for further study is to research the causes of increased fake knowledge supply both from the sociological, psychological, and economic perspectives. It could be instructive to understand if gender, level and type of education, income, ethnical background (for instance based on one's mother tongue), or even personality with inter alia Cloninger's Temperament and Character Inventory (TCI), and see whether these results would have any correlation with the inclinations towards fake-knowledge consumption. From the cognitive perspective, Pennycook and Rand (2021) suggest that the reason why people share fake news is largely driven by inattention rather than by purposeful sharing of misinformation. Social media users have become mere puppets in the greater info war. From the business perspective, one of the causes could lie not only in the income shift but in rent-seeking, unproductive, or determined destructive activities as posited by Baumol (1990) which in business ethics could be attributed to egoism (Kutrzeba, 2024) and/or ignorance - lack of careful reasoning and relevant knowledge (Pennycook and Rand, 2021). What is morally challenging, as some researchers maintain, is that egoism *"is not necessarily evil"* (Werhane, 2000, p. 193) in certain contexts, and as Smith (1776/2007, p. 16) suggested, "*it is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest*". Nevertheless, Smith also noticed that even the egoism of merchants and manufacturers can lead to unethical actions; he (ibidem) observed that it lies in their interest to restrict the competition which is contrary to the public interest. The distribution of obvious lies to the public, whether intentionally or mistakenly is depriving and deteriorating trust. Hence mistakes and fake knowledge offered by public figures must be perceived as degenerative, and those provided by Gen AI, as morally legitimate - as long as the applications are programmed to serve the science.

4. Limitations and Future Directions

A huge although relentlessly undermined problem in the sciences in general is the demarcation problem of the phenomena researched. Especially from the knowledge management perspective, the definition of truth, or the concepts concerning what is fake or what is true is one of the most difficult parts for rigorous and critically constructive minds to settle. As long as the economic and psychological mechanisms behind the change in consumer preferences are quantitatively measurable, the qualitative part shall always remain disputable. This is due to the paradigmatic nature of science, especially when the social sciences are concerned.

Further research into how income disparities and technological advancements influence the demand for different types of knowledge is needed. The tension between the convenience of GenAI-generated content and the value of scientifically produced knowledge will most probably escalate. Hence, raising awareness, skills, and competencies in the use of technological marvels will be on demand - both for the integrity of the scientific community, the morality of public institutions and consequently for the sake of the general population's well-being.

Ethics Declaration: This study was conducted by all applicable ethical guidelines.

AI Statement: AI tools were used in writing the abstract for the article. The author confirms that generative artificial intelligence was not used in the writing of the manuscript or the creation of graphs or their corresponding captions.

References

Arjan Bruil (CBS) & Céline van Essen & Wouter Leenders & Arjan Lejour & Jan Möhlmann & Simon Rabaté (2022). Inequality and Redistribution in the Netherlands, CPB Discussion Paper 436, CPB Netherlands Bureau for Economic Policy Analysis.

Baumol, W. J., (1990). Entrepreneurship: productive, unproductive and destructive. Journal of Political Economy 98 (5), 893–921.

Bloom, D.E., Hartley, M., Rosovsky, H. (2007). Beyond Private Gain: The Public Benefits of Higher Education. In: Forest, J.J.F., Altbach, P.G. (eds) International Handbook of Higher Education. Springer International Handbooks of Education, vol 18. Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-4012-2_15

Brzezinski, M. (2018). Income inequality and the Great Recession in Central and Eastern Europe, Economic Systems, Volume 42, Issue 2, Pages 219-247, ISSN 0939-3625, Retrieved 12.09.2019 from https://doi.org/10.1016/j.ecosys.2017.07.003.

Brzezinski, M.; Sałach, K. and Wroński, M. (2019). Wealth inequality in Central and Eastern Europe: evidence from joined household survey and rich lists' data. Working Papers 2019-09, Faculty of Economic Sciences, University of Warsaw. Retrieved 22.10.2019 from https://www.wne.uw.edu.pl/files/3015/6034/4619/WNE_WP294.pdf.

Cingano, F. (2014). Trends in Income Inequality and its Impact on Economic Growth. OECD Social, Employment and Migration Working Papers, No. 163, OECD Publishing. http://dx.doi.org/10.1787/5jxrjncwxv6j-en.

Cohen, G., & Ladaique, M. (2018). Drivers of growing income inequalities in OECD and European countries. In R. M. Carmo, C. Rio, & M. Medgyesi (Eds.), Reducing inequalities (pp. 31–43). Palgrave Macmillan.

Fanelli D. (2019). A theory and methodology to quantify knowledge. R. Soc.opensci.6: 181055. http://dx.doi.org/10.1098/rsos.181055.

Frank, R. H., Bernanke, B., Antonovics, K. and Heffetz, O. (2019). Principles of economics. 7th ed. McGraw-Hill Education, New York, NY 10121. ISBN13: 9781260111088.

Glenski, M., Weninger, T., & Volkova, S. (2018). Propagation from deceptive news sources who shares, how much, how evenly, and how quickly?. IEEE Transactions on Computational Social Systems, 5(4), 1071-1082.

Gómez-Rodríguez, G. y González Reyes, R. (2022). The construction of a hemerographic literature review. An example from the concepts fake news, post-truth and misinformation in the web of science (WoS) environment. Vivat Academia. Revista de Comunicación, 155, 69-90. http://doi.org/10.15178/va.2022.155.e1335

Grawe, N. D. (2018). Demographics and demand for higher education. Baltimore: The Johns Hopkins, University Press, ISBN: 9781421424132.

Hillebrand, E. (2009). "Poverty, Growth, and Inequality over the Next 50 Years". FAO, United Nations – Economic and Social Development Department. Retrieved 14.03.2025 from https://wayback.archive-it.org/all/20171020065423/ftp://ftp.fao.org/docrep/fao/012/ak968e/ak968e00.pdf.

Hopf H., Krief A., Mehta G. and Matlin SA., (2019). Fake science and the knowledge crisis: ignorance can be fatal. R. Soc. open sci. 6:190161. http://dx.doi.org/10.1098/rsos.190161

Kutrzeba, F. (2024). Knowledge economics and the demand for higher education. Journal of Modern Science, 56(2), 625-643. https://doi.org/10.13166/jms/189428

Lima, R., Sampaio, L. M. B., and Sampaio, R. M. B. (2024). Relationship between school expenditure and educational outcomes: A systematic literature review. Education Policy Analysis Archives, 32. https://doi.org/10.14507/epaa.32.8680

Loth, A., Kappes, M., and Pahl, M.-O. (2024). Blessing or curse? A survey on the impact of generative AI on fake news.
Meddaugh, P. M. (2010). Bakhtin, Colbert, and the Center of Discourse:Is There No "Truthiness" in Humor?, Critical Studies in Media Communication, 27:4, 376-390, DOI:10.1080/15295030903583606To. Retrieved 03.04.2020 from https://doi.org/10.1080/15295030903583606.
Mostagir, M. and Siderius, J. (2022). Social Inequality and the Spread of Misinformation. Management Science 69(2):968-995. https://doi.org/10.1287/mnsc.2022.4380
OECD (2022), Education at a Glance 2022: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/3197152b-en.
Pennycook, G., and Rand, D. G. (2021). *The psychology of fake news.* Trends in Cognitive Sciences, 25(5), 388–402. https://doi.org/10.1016/j.tics.2021.02.007
Richie, S. (2020). Science fictions: how fraud, bias, negligence, and hype undermine the search for truth. First edition. Metropolitan Books.
Rothkrantz, L. (2017). Dropout Rates of Regular Courses and MOOCs. 25-46. 10.1007/978-3-319-63184-4_3.
Salvatori, A., Manfredi, T. (2019). Job polarisation and the middle class: New evidence on the changing relationship between skill levels and household income levels from 18 OECD countries. OECD Social, Employment and Migration Working Papers, 232. Paris: OECD Publishing. DOI: 10.1787/4bf722db-en.
Sawulski, J., Brzeziński, M., and Bukowski, P. (2024). Nierówności po polsku. ISBN: 978-83-67805-90-2. Krytyka Polityczna, Warszawa, 2024.
Shah, D. (2021). A decade of MOOCs: A review of MOOC stats and trends in 2021. https://www.classcentral.com/report/MOOCs-stats-and-trends-2021 .
Smith, A. (1776/2007) An Inquiry into the Nature and Causes of the Wealth of Nations. Edited by S. M. Soares. MetaLibri Digital Library. Retrieved 09.05.2018 from http://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf.
Sojkin, B., Bartkowiak, P. and Skuza, A. (2012). Determinants of higher education choices and student satisfaction: The case of Poland. Higher Education - HIGHER EDUC. 63. 10.1007/s10734-011-9459-2.
Sulkowski, L. (2016). Kultura akademicka. Koniec utopii? Warszawa: Wydawnictwo Naukowe PWN.
Tavares, O. (2017). The role of students' employability perceptions on Portuguese higher education choices, Journal of Education and Work, 30:1, 106-121, DOI:10.1080/13639080.2015.1122180.
Tomlinson, M. (2018). Conceptions of the value of higher education in a measured market. Higher Education, 75 (4), 711-727. (doi:10.1007/s10734-017-0165-6).
Trow, M. (2007). Reflections on the Transition from Elite to Mass to Universal Access: Forms and Phases of Higher Education in Modern Societies since WWII. In: Forest J.J.F., Altbach P.G. (eds) International Handbook of Higher Education, pp. 243-280. Springer International Handbooks of Education, vol 18. Springer, Dordrecht.
Ungar, S. (2000). Knowledge, ignorance and the popular culture: climate change versus the ozone hole. Public Understanding of Science, 9(3), 297–312. https://doi.org/10.1088/0963-6625/9/3/306.
Varian, H. R. (1999). Market Structure in the Network Age. In proceedings, Understanding the Digital Economy Conference, Department of Commerce. Cambridge, MA: MITPress, 137–150. Retrieved 10.03.2020 from https://pdfs.semanticscholar.org/d19c/03f7135af1befab0b15003be776ce3005d89.pdf.
Varian, H. R. (2010). Intermediate Microeconomics. A modern approach. Eighth edition. W. W. Norton & Company, New York, London. ISBN 978-0-393-93424-3.
J. Varlamova, N. Larionova (2015). Macroeconomic and Demographic Determinants of Household Expenditures in OECD Countries, Procedia Economics and Finance, Volume 24, 2015, Pages 727-733, ISSN 2212-5671, https://doi.org/10.1016/S2212-5671(15)00686-3.
Werhane, P. (2000). Business Ethics and the Origins of Contemporary Capitalism: Economics and Ethics in the Work of Adam Smith and Herbert Spencer. Journal of Business Ethics 24: 185–198. Kluwer Academic Publishers.
Wilkins, S. Shams, F. and Huisman, J. (2013). The decision-making and changing behavioral dynamics of potential higher education students: the impacts of increasing tuition fees in England, Educational Studies, 39:2, 125-141, DOI: 10.1080/03055698.2012.681360.