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Who is afraid of Artificial Intelligence? Reflections from the Economic Margin

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Abstract

The paper discusses how different streams of thought in economics might be affected by the Artificial Intelligence (AI) technology that advances the last years. The approach taken is that of a heterodox economist, with a background in other disciplines, who works on rather marginal fields of economics, like heterodox finance and parallel currencies, feminist, ecological and solidarity economics, along with monetary history and grassroots economics. The study uses the experience gained through empirical research of various types where the data are gathered by the researcher herself (discourse analysis, field research with ethnographic methods, surveys, mapping, archival research, analysis of popular culture) in order to discuss how AI is challenged by, rather than challenging, entire fields of economics. To the contrary, it has been the model of dissociated inquiry, which predominantly serves capitalist patriarchal agendas through the economic discipline as a mainstream dogma, that made the discipline vulnerable to AI problematic uses. Therefore, AI became a mirror of and for economics. It reveals the need to bring forward pluralist perspectives about the economy and to link economic knowledge to the complexities of real life.

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1. Introduction

Artificial Intelligence has made great advances the last years and has also become available to the general public in some of its applications – which is mostly search for and combine data (text or images) that already exist in the global internet. Other applications are aspiring to be artistic, e.g. the creation of pictures out of existing pictures; and other applications are already helping people translate, write a quick message on their mobile or learn a language while practicing more the linguistic phenomena related to mistakes previously made.

There is a debate whether these applications are truly Artificial Intelligence or just advanced data compilation. For the purposes of this paper by Artificial Intelligence (AI) we mean the technology that can gather extensive amount of data, analyse it and combine it in a way that can be useful to the humans who use the technology. The technology is using algorithms, that are simple enough to accept and reject certain types of data but sophisticated enough to

accept or reject which data might match other data or not. This definition is very generic and allows for AI to be very quick or slow. The main idea is that the huge amount of this type of data collection, analysis and combination is not done by humans but by a machine. I avoid here definitions that use the concept of “learning” for AI (see for example, Helm et al, 2020) because the term confuses a lot what the machines do, because the learning experience of humans involves emotional, body and unconscious processes that machines do not perform.

This paper aspires to critically examine the use of AI technology in scholarship and education. It is not that we have all answers at this stage, but we have some perception of pathways that the dissemination of AI technologies already takes in society. In a previous study (Sotiropoulou, 2023a) I have examined the moral panic about the use of AI in universities. The class aspects of AI affect the way we perceive AI as a threat and not as a way to understand how neoliberal education systems were already at an impasse; and how the students more than the academics themselves are resisting neoliberal education though AI, even if this is done in a clumsy way.

The present paper is not focusing on worker rights issues that emerge with relation to AI (Zirar et al, 2023; Perrigo, 2023; De Querol, 2023; Kelly, 2024). It does not focus either on the intellectual property issues related to the work of workers in the AI background and of the creators of the material used to “train” the AI machines (Wachter, 2023). Those are issues that deserve studies on their own right, especially because the availability of the AI tools right now is related to free (grabbed) content on internet that is used to train the AI machines. The privatisation of the free content might be right behind the corner if not already happening (Hays, 2023), and it is related to the privatisation of the education, but we would need a separate study to discuss this question properly.

The following section explains the theoretical background of the paper and section three discusses the evolution of economics the last decades. The fourth section presents what has been happening in the heterodox fields of economics and section five examines how AI seems to be functioning in this context the last years. Section six discusses AI as a technology and the seventh section investigates how AI affects the discipline of economics right now. The eighth section explores how the experience of the heterodox fields of economics can help the economics to get a grip with the realities of the economic world. Final conclusions are presented in section nine.

2. Theoretical background and approach of the paper

This paper has been written from the point of view of a heterodox economist, with a strong disapproval of the capitalist system and even more its neoliberal forms. After all, capitalism, i.e. capitalist patriarchy, is the economic context within which AI has been invented and developed and now released to the general public.

With the term “capitalist patriarchy” we mean the social, economic and political system where the means of production are privately owned and the ownership is assigned by preference to men who have social privileges (middle class/owner of capital, white, able-bodied/minded) or to substitutes for them, like corporations. The most important form of ownership in this system is private property on accumulated wealth in monetary terms, that originates in the appropriation of surplus value or of the entire value (primitive accumulation) that workers/producers or nature produce. Capitalism is not the first economic system that has private property and inequalities between humans, especially inequalities based on gender (this is a feature of patriarchy), but it is the first economic system that prioritises capital (accumulated wealth in monetary form or accounted in monetary form) as if it was the most

productive factor in the economy (Agathangelou & Ling, 2006; Amin, 2004; Bennholdt, Mies and Von Werlhof, 1988; Blaut, 1993; Eisenstein, 1979; Ehrenreich and English, 1978; Fraser, 2013; Mies, 1998; Sotiropoulou, 2017). The paper is written from a feminist economics perspective and based on previous extensive research experience in finance and monetary theories, with a focus on parallel currencies (digital or not) and financial technologies. Apart from research, I have extensive experience working in various fields outside academia. In all those sectors technology might have various applications, from very extensive and specialised to very limited and generic. In practice, academia gets to use technologies that are usually already popular and developed in other sectors first.

This allows me to be quite critical of both the techno-enthusiasm concerning the AI, but also of the fear and defeatism that I see proliferating in academia about it. As an economist therefore, I am exploring the AI in research and learning in the discipline with rather curiosity instead of condemning it altogether. This paper is a call to open the discussion for improving economics by the occasion of AI. So to speak, capitalism is not reformable, but economics could be.

3. The case of economics

Economics is a social science, which means that it is a discipline studying social relations and structures, what humans do and what humans would like to do, in the sector of the economy. We need to stress here that the perception that the economy is an activity separate from society is very modern and Western (and European, white and capitalist and colonial, see Polanyi, 2001).

The perception that we can study and learn about this activity as separate from other social events and processes is even more recent, given that the early theorists of economics were writing with full awareness of the social character of the economy. It is neoliberalism that turned economics into something that is very different from the other social sciences and started pushing the assumption that social relations and processes are not important if they are not seen as economic, given that the existing economic theories are supposedly more than enough to understand economic activity (van Staveren, 2014).

Separate or not from the other social sciences, economics is a social science and by definition we would expect it to be too sophisticated to be rigged by AI, given the complexity of human societies. Yet, because economics is central to capitalism, its development created a social science with many problems that are more linked to the role it has in supporting capitalism with a normative theoretical explanation, than to any inherent characteristic of the knowledge that humans produce about the economy. Indeed, the economics we have today, because they were created in a certain geographical, class, gendered and colonial framework, inherited the characteristics of the social groups out of which the discipline that was finally published and taught in universities emerged (White, 2019; Wolfe, 2008).

As a result, for some decades now economics suffers from various traits that were used to create a way of thought that makes capitalism seem not only inevitable but also the best economic system humanity could have. In that context, economics still holds as central many 19th century perceptions about nature, humans and the economy and many other 19th century perceptions of “hard science” and linear historical progress (Edney, 2005; Wilber, 2003).

Nevertheless, since 19th century and until today, production of formal economic knowledge within a capitalist colonial patriarchal system led to an alarming cognitive dissonance with the current challenges on local, national and international levels: climate change, environmental degradation and collapse of ecosystems, acute inequalities, modern slavery,

societal collapse, use of technologies for oppression, and acceleration and expansion of warfare given the role the military industry holds in the capitalist economy. By cognitive dissonance we mean the mental state or situation in which a person, or a group, is not able, usually because the person is not willing or has been trained not to, recognise a material condition as it is, with all its characteristics and implications. Cognitive dissonance can be cultivated in a society, even if the culture of what is cognitively acceptable cannot always be completely successful about all topics, all the time, on all people and social groups (Harmon-Jones and Mills, 2019). Colonialism and how it is perceived or conveniently forgotten in the colonial metropolises is a good example of this.

Another consequence of relying and reproducing the same theories, albeit refined here and there, for more than two centuries, has been the mentality of monoculture in economics (Michaels, 2011). The more time goes by and the issues in the economy become variable, new topics emerge and new problems in society need to be addressed, the more new fields emerge in the discipline. However, the more fields emerge, the more the discipline sticks with promoting and teaching the main, initial, and probably out of date, economic theories. This is a very interesting trend, because it shows that the only way to keep the cognitive dissonance going is to deprive economists from learning about more fields, especially the emerging ones that are contingent to emerging societal problems. It also means that the economists who want to develop knowledge in those fields will have less chances to do it, less well-developed tools to work with (Spash & Smith, 2019) and less professional rewards compared to those who will continue with the main theories.

The third consequence is that the more the cognitive dissonance is necessary, the more the economic discipline requires a mental and emotional dissociation of the economist from the real economy and the society in which this economy takes place. Dissociation is a mental and emotional state that other disciplines, like psychology and psychiatry, see as pathological and a real problem for the person who experiences it and for the people around that person (Lynn et al, 2019). Cognitive science shows that humans need connection, both emotional and mental (and embodied), to reality in order to make good decisions especially socially aware, empathy-informed decisions (Goodhew & Edwards, 2022; Kirman & Teschl, 2010). The discipline of economics therefore praises and requires economists and all economic actors to get into a state in which they will make decisions that are dissociated from reality, social connections and environmental and social implications (Etzioni, 2015; Frank et al, 1993; Frey & Meier, 2003).

This gets severely aggravated when the human model is such that prioritises a very specific privileged person or social group, as we saw in section two of this paper, excluding all other social groups and peoples from being seen as actors and knowledge creators in the economy (Fuchs, 2019). It is also a replication in the ideological or scholarly sphere of the dissociation that the capitalist economy creates in space and time so that capitalist valuations (grabblings of value and wealth) take place (Ibert et al, 2019).

This dissociation of knowledge in combination with the cognitive dissonance in capitalism and for the sake of explaining and normatively supporting capitalism, turned the economic discipline into a dogma. Discipline means that people have to learn a certain body of knowledge and its methodological tools, in order to be considered that they acquire the knowledge and are able to use it. However, discipline does not mean that people are not free to think critically, correct the mistaken theory or invent a new one when the social conditions change. Dogma is exactly the opposite: it is knowledge that cannot be doubted, irrespective of its connection to reality, and cannot be challenged, not only by reality but neither by ethical or social issues, like inequality or sustainability.

Neoliberal economics was the economic approach to become the dogma in economics the last 50 years. It is the field of knowledge that covers or represents almost everything taught or accepted as established knowledge in universities, policy making offices, mass media, political parties, NGOs and even social movements in some cases. In 2024 we already know how and through which economic, political and social processes neoliberal economics became the dogma of western capitalist societies and beyond (Anderson, 2016; Blyth, 2013; Botos, 2018; McEwan, 2005; Peck, 2010).

4. What happens with heterodox fields

The trend affects the heterodox fields as well. There is tendency to dogma, but there also exists much more space for debate, deliberation and inquiry that reminds a lot of the early economists, even if the heterodox economists might work in different ways and with very different agendas (Lee, 2011).

The reason is that structurally, if the mainstream is not taken for granted, nothing can be taken for granted. In other words, if the most powerful theories are not taken as correct and unchallengeable as dogmas, there is no other theory that could be thought of as such (Garnett, 2006). Most heterodox economists de facto know that they are not alone in the discipline and they have to persuade people, instead of imposing their approaches (Dobusch & Kapeller 2012).

Another aspect that helps heterodox fields to be more flexible and more open to critique and development is that knowledge is generated with more awareness and interest in the empirical. In most cases, heterodox economists break out from the mainstream because of empirical contradictions with the established theories, or they have access to heterodox economic theories outside academia, in their communities, families or social movements (Carter, 2024). This creates a propensity to take reality very seriously and even if they do economic theory, to work with real economic situations or data as much as they can. It is not that they do not use models, it is that modelling is not the main way for them to learn, check or create a theory (Spash & Smith, 2019; Ptaschunder, 2020).

Moreover, the marginalisation in the discipline, in economics departments and in policy making procedures (Hodgson, 2019; Chester, 2019) forces heterodox economists to explain their theories in detail, and be able to make them accessible to various audiences. The arrogant idea that the everyday people or undergraduates do not need to understand advanced economics is in practice not sustainable. A heterodox economist must study mainstream and heterodox theories (Mearman, 2011) in order to explain their own field to everyone. Learning to not take as a given that people agree or understand what you say, is a major tool for economics to improve and also to diversify fields and their explaining tactics (Dow, 2008).

Same with debate: heterodox economists learn to debate, raise questions, receive questions and answer them. They cannot rely on any disciplinary power; they need to debate effectively in order to persuade others. Starting from a place of being overtly and wholly doubted, heterodox economists need at any moment to establish themselves and their knowledge (Akansel 2013). Mainstream economics and economists ignore a lot of heterodox approaches and in some cases they do not even consider them to be proper economics. Learning to think of your knowledge as plausible but never secure, works very well in terms of improving findings, arguments and research, but also the knowledge dissemination methods. People will learn because they agree. If it was to turn to heterodoxy because they are afraid of the leaders of the fields, they could equally well go to the mainstream and get properly rewarded for this in a capitalist academia.

Finally, exactly because heterodox fields are either emerging, or marginalised and doubted by the mainstream, the economists who serve them are more creative and inventive in the methodologies they use. The methodological pluralism in the heterodox fields comprises qualitative and quantitative methods, and several mixed ones (Lee, 2005). Economists use apart from the usual statistical analysis and modelling, various other methods like mapping, discourse analysis, ethnographic methods, archival research, or surveys to grasp fuzzy data.

They are also much more comfortable to work with experts from other social sciences or disciplines in general, ranging from engineering and environmental sciences to arts and medicine, collaborating on the methodological processes as well. In that way they use methods not only from economics but from other disciplines and have a broader methodological perspective of the uses and limitations of each methodological approach (Dow, 2018; Norgaard, 1989).

Methodological pluralism also teaches heterodox economists to learn how to find, generate, analyse and interpret data in ways that are meaningful not only to economists and to other disciplines, but also to the broader public and policy makers. They learn to mistrust official statistics, especially when they have training in original data collection and have encountered in their research projects the challenges and limitations of the process of finding reliable data.

The other trait that heterodox economists gain from their methodological pluralism is that they learn to question the epistemology and not only the methodology of mainstream economics (Dow, 2007). This is not only about economic modelling, but about the rationale of using and developing mathematical tools to understand the economy. Heterodox economists have developed powerful critique of the mathematical tools in economics but also they are able to work on how and when such tools are useful and to what purpose, instead of applying them everywhere because this is the trend in academia (Bogensneider, 2022; Mirowski and Nik-Khah, 2017; Meikle, 2000; Velupillai, 2005; Sotiropoulou, 2020).

5. And there came AI “for all” and for everyone

When the last years the applications that can combine images or text into a new one became available to the general public, they found economics, just like the entire academic sector, in the neoliberal situation it was already. It was not only the disciplinary biases and appropriations by the neoliberal dogma, but also the corporatisation of the education process and the perception that students are clients and the academics are just running the edu-factory by pressing buttons on machines, i.e. interchangeable workers who have and should not have any other practice of learning beyond what the market needs (Caffentzis and Federici, 2007; Sotiropoulou, 2023a).

With AI, economics and any discipline that has been fossilised into a dogma are in big trouble. Why? Because dogma by default exists and is structured to be replicated without modification or critique. Anything that can be replicated is a domain of AI, because AI is a machine that replicates. And it replicates better than humans in that sense, as it is able to seek information and combine it at speed that most humans would not even dream of (Scott, 2023).

Therefore, AI puts dogmatic ideas and fields at stake, because one cannot really distinguish whether a text of mainstream economics was written by a machine or by a human. For those who were already in the field, there was knowledge and recognition of the mechanisation and dehumanisation of the field, for all the reasons we explained in the previous sections of this paper. However, the critique was not given the required attention, because that is the role of

the mainstream: dogma proceeds in history exactly because it can ignore critique and opponents.

Yet, dogma cannot ignore AI. For the functions dogma was supposed to serve, AI looks like a prank or an opponent that ridiculises the very function of dogma: uncritical replication. AI does what dogma does, but better. AI can perfectly replace humans in proliferating dogma. Economic dogma, so to speak, does not need humans now, the machines can do the dogmatic work.

Is this what dogma really wants? I am not sure. Dogma wants us to behave like subservient machines but it wants that because we humans are not subservient machines. Dogma priests and chair professors want humans to adopt dogma without questions because that gives the dogma and its priesthood or professorhood immense power over the humans who adopt the dogma. Humans listen to humans and connect to them, even when there are directed to believe or do wrongful or unethical things. Therefore, literally neoliberalism needs humans to proliferate, not machines (Lanz et al, 2023).

Having power over AI machines is not the same. This technology allows students to give back the mechanised knowledge they are subjected to, while they save time from it to channel to other activities and learning. AI can become a tool of resistance depending on the economic and social context and on who has the control of the technology in each case (Sotiropoulou 2023a; 2023b).

However, within each discipline the marginalised fields are not so easy to rig with machines and replication. Take heterodox economics as an example: it does not have enough content to begin collation and mechanisation with. It would be difficult even for Marxist economics, because, guess what, even if there is a quite extensive corpus of texts in that field, the arguments are constructed in a way that does not allow easy replication of a line.

Generally, given that heterodox economists have to explain and debate views that are never taken for granted, their argumentation is always sophisticated and linked to empirical conditions that the mainstream economic theories feel they do not need to take into account. This means that heterodox arguments are too complicated to be replicated as a dogma and they are even more difficult to be read and combined by a machine into a coherent text.

The different construction of arguments in heterodox economics has also a lot to do with the prioritisation of the common good, for the planet and the human societies who live on it. It is a very associated, social and emotional connection that many heterodox economists do in order to work in their fields. This is something that no machine can replicate and no dissociated scholar can replicate either. People can copy a paragraph of ecological economics but cannot connect it to anything else if they do not understand why ecological economics emerged in the first place and what it tries to do within the economic discipline. A machine does not understand at all what that means, as we shall see in the next sections.

6. AI as a technology

AI, like all technologies, is a means of production. That is, AI is a tool for humans to use in order to produce other things and their livelihoods as a whole, in combination with all the other tools they use. AI incorporates not only the tangible tools that we all see on internet or in a computer, but also human intellect that has been integrated into the machine as knowledge that makes the machine work the way we want it or aspire it to work. This holds for all human technologies, from the wheel and writing to meteorological models and high technologies used in the Intensive Care Units.

However, just like all other technologies, AI cannot reason on its own. After all, what means of production can? By reasoning we mean that someone has a capacity not only to understand the information they have at hand and analyse it, but also to reorganise it in a way that makes sense to them and others and also that it is coherent not only with the needs that the information is required to cover, but also with all other needs the person who reasons has to cover. An example is that medical reasoning says that one needs to operate and stitch a wounded leg instead of cutting the leg to avoid the wound. A machine cannot decide that on its own: it needs an algorithm that says that when a leg is wounded, the machine will recommend stitches first because this is the reasoning a human would do.

Under these premises, AI has already some good uses, especially in medicine, meteorology, piloting or acquiring a certificate from a public service instead of spending a day waiting in a queue. So, in that respect, we are already using AI extensively, but we know about it when we pay attention to the technology that is used to provide us with any assistance, like looking the weather forecast on our mobile phone. AI cannot recognise whether the weather is bad, we do. But it can give us enough information with a lot of accuracy to judge this on our own, provided we know what temperature metrics and weather icons represent in real life.

From the above, one understands that AI is a probabilistic tool based on what is known from the past (Wachter, 2023). That is, the machine incorporates algorithms that have previous data on a question and probability models running them to track patterns. When a question is raised to the machine, the question is answered based on the probability of the question data to be similar to previous data that have already been analysed. The AI machine gives answers with this logic or process of information combination. The idea is that any question is probably similar to a previous one that the AI software designers thought of in advance (Beetz et al, 2007; Taleb and Hacopian, 2023).

This means of course that if the AI software designers did not think of a question, the AI will find it difficult to find a good answer. It will use the probability models to match as much as possible the unknown question to a previous one and invent an answer that the probability is the highest to be correct. Therefore, the more unknown the question or parts of it are, the higher the probability that the machine will give an absurd or completely made-up answer or that it will not be able to answer the question if its algorithm was made to be smart enough to say at least “I do not know”. Seems that admitting ignorance is not easy to be integrated in the AI we have until now, as you probably have learned already, because “I do not know” is not a good answer in western European capitalist colonial knowledge systems. It is in most cases considered a defeat or a deficiency of the person who answers and it is often avoided in western academic contexts.

There are more problems in AI than that, though. One is that, even if the software designers knew how to ask all the questions they can think of, they cannot beat in practice the fact that humans have no good perception of the unknown and the unexpected. They are very good in delivering good results in a routine but they need special training in order to deal with new or unknown situations. Sometimes a lot of the unknown and the unexpected has no matching training at all. In other knowledge systems than the capitalist one, societies were at least cultivating some perception of the unknown through their cultures. However, the positivist and extremely arrogant idea of capitalism that humans can get to know everything and forecast everything is central in the economic and social system within which AI is created. Thus, the AI is made with this assumption, i.e. that if humans know everything, the machine does too.

Another issue that humans have is that they cannot really perceive accurately any phenomena of extreme magnitude, whether on the big or the minuscule side of the magnitude continuum.

Humans see the world at their own scale and everything else is replicated in symbolic terms, so that humans can at least think of phenomena they want to understand and deal with, like viruses or earthquakes. Even less can humans identify in advance the risks those extreme phenomena entail. This inability to understand extreme levels of scale passes to AI that cannot understand extreme levels of scale.

The issue is not theoretical only, but mostly practical: if one has a meteorological model that gives at some point forecasts at one extreme point of the scale or beyond it, the humans have to understand what to do to protect themselves from the extreme weather, while their model does not have any previous or understandable examples what the extreme weather will bring (Taleb, 2005). AI in weather forecast might give results but not a picture of what the weather will mean for humans and animals, housing needs, food distribution, medical care or transport services. This is something that the humans have to figure out on their own.

In other words, AI is like humans with all their limitations. And as a machine, it is worse than them, because the unknown, unexpected, or of extreme magnitude does not exist for AI machines as a lived experience and as a social situation that one needs to connect and deal with. This is what humans do, whether they like it or not, and AI cannot do, whether humans would like AI to do it or not. This is why AI, when prompted with a demanding or tricky question, can create fake things to cover up its lack of information and of adequate models of probability, without understanding that the results the AI has given are fake. It is humans who have the obligation and need to check the results of the AI and after establishing that they are accurate and meaningful, to see what they have to do with them.

A very everyday example is the auto-correction or auto-text function on one's computer or mobile. This is AI as much as it gets and sometimes it can be quite handy. Just like all other AI tools, it builds words and sentences based on what it was fed with. Therefore, it tends to not recognise folk wordings or new words or even older forms of the language one is using, and corrects perfectly correct words or phrases. It also does not correct perfectly mistaken words if the auto-fill user writes something incorrectly and uses it a couple of times. AI "reads" the use as "my human knows better" and then it suggests mistaken forms of the word as if they were correct. How would it know better?

For the same reasons, AI machines have a very bad relationship to the future in general. Their predictive capacity, especially about phenomena with effects that are of extreme magnitude, is very limited or needs to be taken with many pinches of salt. For phenomena the graphic representation of which is convex (i.e. the results of the incident can be indefinitely extreme, when seen in advance), this can be catastrophic because the perception of the effects of the phenomena and the risks human activity brings in combination with them is very limited (Taleb 2005). Because AI cannot understand the implications of a strong earthquake, it is humans who have to act quickly if such a calculation is given to them.

An everyday example is the current climate crisis (or collapse). Since last year (2023), when the temperature data started reaching and persisting at the extreme end of the measuring tables (McGrath et al, 2024), everybody was asking why the sophisticated scientific models that climate experts use failed to predict how quickly the climate crisis would happen. One reason is that the models did not calculate-in the aggressiveness of capitalism as a trait of the climate situation, so they kept a factor that aggravates the situation and is expressed in the data, outside the models. This is really a mistake of model making that is biased in favour of capitalism, in which people do not want to see its aggressiveness, disaster or violent destruction of livelihoods. The other major reason is that all models were built on data from the past, that is, we have no past information what happens when we keep a rampant capitalist system running the planet for so long. All meteorological earliest data coincide with

the era of established colonial capitalism (mid-19th century). In other words, we have no idea what is truly happening compared to the past and what will happen next and when, because this economic system never existed before on this planet.

Thus, AI is the expression and the outcome of the predictable accumulation of information in an unpredictable world. It cannot do more than what it is designed to do, no matter how good the software designers are and how much they want to accurately understand the system of climate as it dynamically changes. Collectively as humans, we cannot create any means of production and any technology that can help us understand the unknown better than we can as humans. To that, one should add the in-built bias of the persons who make a machine or who collect and organise the data that the AI will use to analyse and connect it to answers it is supposed to construct (Nishant et al, 2023; De Querol, 2023).

Even about the present, however, AI is not always handy. We already mentioned that it cannot distinguish wrong from right in an argument or answer and just gives the answer that is probable. Probability is not good enough when ethical questions are involved, as we saw in the example with the wounded leg. The machine might be able to assess whether the wound infection is curable with simple antibiotics, but the human behind the machine can only see divergence of the main symptoms and decide whether this needs another treatment or whether the wound is a collateral symptom of a more serious disease that is not truly located in the leg in the first place.

In general, relying on AI or past-dependent knowledge for things that are not easy or simple is neither a wise nor an ethical choice. Economics is a good example for this too.

7. AI or economics?

A discipline or a field of knowledge is also a technology that is created by a society in order to deal with needs that refer to a certain phenomenon or activity. This is not the only similarity observed between AI and economics as they are known to be now. We also see a lot of dissociation of the knowledge and of the information this contains from the persons who create the knowledge or the information, use it or receive the results of or suffer from it. For example, the abuse of economics to impose disastrous economic policies on entire societies because the economic technocrats (presented to supposedly) know better but never suffer any consequences of their policies, reminds very much the use of AI in order to put entire populations under surveillance or conduct war and even genocide against them. Those who use AI to impose violence against people distance themselves from any risk or repercussions because they do not need to be present when inflicting the violence and often they are not even members of the communities whom their technologies (policies or machines) harm (Taleb, 2018; Razavi, 2018: 95-97; Agenjo, 2024).

Moreover, there is no personal or collective connection to ideas and arguments, in mainstream economics and in AI. The people who use mainstream economics from the dissociated position of a modeller or a policy maker that lives far away from the poor neighbourhoods where the policies are implemented, not only have a distance from the communities the economy of which they claim to study and also to administer; but they are required to have no feelings, emotions or any other connection to the policies and the implications those will have on real communities, people, and ecosystems. Taking into account other extra-economic contexts of life is the obligation of the economist although it seems that it has been long forgotten (Knight, 1946).

This dissociation is fundamental for economics and obviously a factory setting of AI. AI is a means of production, so no-one would expect a software to have the connection a human

would have to the information it handles. But if humans do not have that connection, their decision-making might end up in deeply flawed and problematic results. Economists are known to be trained to think as the economic agents of their models, so what is interesting is to see how both the researcher and the learner or student are required to develop dissociation as part of their knowledge, irrespective of their backgrounds and their personal or collective histories.

We also see the demand for this dissociated-from-reality economic ideas and knowledge to be raised by politicians and mass media and be addressed to the communities who will have to live under the assigned economic policies. That is, even if the policies bring poverty, the people who suffer still have to like them because the policies are supposed to resolve an issue (e.g. inflation) or bring more prosperity in the future.

Dissociation, whether it is coming from us while receiving information or from the creators of the information or from both ends, affects our ability to properly place an argument in social reality and check its implications. In other words, dissociating knowledge from reality makes us bad decision-makers and perpetrators or complicit to disastrous or even criminal decisions, that might harm us and other people and the nature around us. An example is the cost-benefit analysis and how it ended up creating social and economic disasters (DeMartino, 2022 especially pp 177-220). By relying so much on dissociation as a structural trait of analysing data, it ended up in bad ethics, bad economics and even worse policy-making.

Therefore, economics, at least in its mainstream form, was already an AI in the social sciences, having similar problems and limitations as a new, rough technology that is used out of context. AI exposed what mainstream economics was trying to hide under the flashy carpet of power and monoculture in capitalist, neoliberal academia, but it did not shake at all disciplines, e.g. meteorology or medicine or even law, which use the AI technology for many years now without anyone thinking that we need less health experts because of that (Jiang et al, 2017).

8. Discussion: What can AI and economics learn from heterodox approaches?

As a heterodox economist I do not feel threatened by AI as a technology in terms of how it might affect economics. My worries are mostly directed to the problem of having such a powerful technology in the hands and under the control of capitalists and warmongers rather than what it might do if it is in the hands of students. Because as we see the technology being accessible to everyone, we also have to reconsider our discipline and its accessibility: who has access to economic knowledge, which parts of it and what power they have to use it.

First, we all need to get to know and admit our ignorance and limitations. We need to admit our knowledge limits and ignorance not only to ourselves and to our colleagues and students but to our communities and societies. Making our limits of knowledge public protects not only us but also our communities from charlatans and from policy makers that unethically will use any argument to promote what they think it is good (for the society or their careers, intentions are not enough anyway).

AI is unable to ignore things, it has no self-awareness of its limitations, and even less any awareness of knowing or not knowing. It is just a machine that collects information and collates it following some basic rules (algorithms) that make the information plausible to have a sequence, based on probability. In that way, AI makes things up, even the correct ones, and it is only because of human probability knowledge that some of the made-up things are correct and meaningful for humans to use.

Mainstream economics is very similar: it uses assumptions to create theories and construct models and then run them. Sometimes the assumptions are outrageous, albeit useful to understand an economic concept. If the assumptions are taken as true, i.e. the economist has no continuous awareness that the assumption is only there to facilitate thought and inquiry, the economist has no awareness anymore what out of their theories and models is knowledge and verifiable or refutable, and what is assumption and hypothesis that needs to be researched and tested, especially before used for policy-making.

Second, economics might have a huge problem with AI, but other disciplines are different. The mental impasse economics has, with or without AI, is one of a kind. In law for example, there is no lawyer who is not trained to carefully examine empirical facts. There is no legal reasoning without good grounding in reality and then without sound argumentation concerning what law says and does not say. So, the limitations not only of empirical data but also of the legal concepts are parts and parcel of reasoning. You cannot invent a fact or a law or a court decision, and you cannot alter law's wording to fit your case. Sound reasoning is everything, which is also what AI cannot do and probably will never be able to do.

In politics, in particular in international politics in which a lot of advisors have to support policy-making that affects the lives of millions of people, mistakes are not easily acceptable. To avoid mistakes and disastrous decisions with long-term implications, politics experts and policy-makers, at least those who truly care to find solutions instead of creating more on a global scale, avoid groupthink as much as possible. Groupthink is the process by which people in a group or community tend to adhere to the views of most people or of the most powerful in order to continue to belong to the group and not become outcasts and face isolation. It is also a process of tackling self-doubt, i.e. people rely on the assumption that if the majority or the powerful have a certain opinion, they must have checked it and it must be the correct one (Janis, 1972; Güner Gültekin, 2024; Pol et al, 2022; Whyte,1952; Whyte 1989).

History is also a very good example, because it works with past data, just like AI. One would expect historians to be in panic. Not at all. Historians would tell you that the past is not "stable" nor fully known. We know only the data that survived through time and despite the erasure of information by conflicting parties, because usually the victors of a conflict impose the narrative about it. It means that the historians do not take the data and their combination into a story or history as a given – which is what AI does or what mainstream economics does with its core theories. Historians, instead, study to understand how the history we know or the history that forgotten data transmit might make sense to us today.

It is even more interesting concerning the arts, given that a lot of debates exist concerning AI-generated artworks. Apart from the question of intellectual property of individuals and communities whose artworks are used to "train" AI and make it able to create "new" art, the question art has is that humans do not stay with the art which has been done in the past only. One thing is to cherish, protect, learn and disseminate artwork that was done until now. And another thing is to create art. Art has nothing to do with staying with what has been done so far, this is mere copying. Artists do not copy only, they also create original, new artworks that AI cannot create.

Third, AI is by default a machine that groupthinks, even if the AI as a machine has no perception of belonging to a group. However, the people who create and feed AI with information belong to various groups with various interests, ideologies and collective histories. Given the past-dependence (and path-dependence) of AI, the technology is an example of groupthink, even if we could ever include in AI all knowledge of humanity.

Mainstream economics is also a field of knowledge that groupthinks. We economists know very well how groupthink gives degrees and makes careers and how those who have diverging views are in serious trouble to have their assessments properly valued and their work properly rewarded.

As it has been mentioned before, groupthink is extremely dangerous in times of crisis, that is, when we handle phenomena the effects of which have or may have extreme magnitude. It is equally dangerous to groupthink when there are unknown factors or situations that can happen but we ignore even the existence of them, like the way climate adapts to the conditions the capitalist activity created for the planet. We truly do not know much about climate change and how it works, and still economics groupthinks about it, persisting on theories that glorify that very same economic system that creates the problem.

Groupthink in art for some time can lead to boring art. Art has inherent traits that protect it from long-term stagnation, but even if that happened, the dangers of boring art are not the same as of those of collapsed climate systems. Groupthink concerning the climate or the economic system that creates so much poverty and inequality might be disastrous for the planet and humanity. AI will not help us in that respect and economics as it is today will not help us either.

9. Conclusion: Economics in the AI mirror

Economics met with a technology that the system economics supported to proliferate (capitalism) appropriated in order to make it more profitable for capitalists to copy information and combine it. In that way, economics is looking itself into a mirror through AI and what it sees is horrifying. Economics is losing to a technology that does better what mainstream economics does and at much lower costs, indeed.

However, there are some good news too. Groupthink as good practice in economics is over. Originality of ideas and arguments and research is what helps any discipline grow and also not to be possible to be rigged by replicative technologies. Dogma is not sustainable anymore in scholarship with AI around. Even if economists can sustain it for their own purposes, let's say because they achieve to keep AI outside the economics departments (which I doubt they can do), it is not sustainable in climate or societal terms, because dogma and the mainstream theories are harmful. Heterodox theories might also be harmful if they end up beyond inquiry and a subject of groupthink. Yet, with AI around, those too have to remain critical of themselves and of other theories, if they want to survive the mirroring.

Knowledge generation and dissemination needs critical engagement with reality. Reality is messy, fuzzy, contradictory, or even conflictual, asks scholars to take a stance or to question their knowledge and ideas and is not under the control of any economist like a model or a theory is. Economics have to deal with reality even if that means they will have to reduce their know-all assumption and attitude (Uhliq, 2012).

Finally, given that heterodox economics use a lot of qualitative methods as well, anyone who has any experience with them knows that those cannot be rigged by AI in any substantial manner. There are economists who tried to prove that field research with AI is possible (Chopra and Haaland, 2023), because field research and qualitative inquiry require enormous amounts of time and work for anyone to be able to gather any tiny amount of meaningful, corroborated data.

However, my experience with doing research with communities and with archival research has shown that it is not so easy to learn from humans if you do not treat them as humans and

if you revert them to a machine or software. Especially about economics at a critical time of history with all those global challenges that human societies face, learning from each other and working with communities for a better economy will require a lot of innovative solutions and steps that go beyond what academia thinks or needs for its projects. AI might not be able to help much but economics could, if it takes the challenges, and AI, seriously.

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References

- Agathangelou, A. M. and Ling, L. H. M., 2006. “Fear and property: why a liberal social ontology fails postcolonial states.” International Affairs Working Paper 2006–07. Paper for a panel on ‘Contesting modern state: Stateness in the postcolonial world’, International Studies Association, 22–26 March 2006, San Diego, California.
- Agenjo, A., 2024. Lavender Unveiled: The Oblivion of Human Dignity in Israel’s War Policy on Gaza. *Opinio Juris*, 12.4.2024. Available at <https://opiniojuris.org/2024/04/12/lavender-unveiled-the-oblivion-of-human-dignity-in-israels-war-policy-on-gaza/> [accessed at 27 April 2024]
- Akansel, I., 2013. The Dilemma Between the Heterodox-the Orthodox Economics and Its Ideology. *Chinese Business Review*, 12(4).
- Amin, S., 2004. The new Agrarian Issue: Three billion peasants under threat. In In Polet, F. and CETRI (eds) (with translations by V.Bawtree) *Globalizing resistance – The state of struggle*, Pluto Press, London, 226-242.
- Anderson, B., 2016. Neoliberal affects. *Progress in Human Geography*, 40(6), 734-753.
- Beetz, M., Buss, M. and Wollherr, D., 2007. Cognitive technical systems—what is the role of artificial intelligence?. In *Annual Conference on Artificial Intelligence*, Springer Berlin Heidelberg, Berlin, Heidelberg, 19-42.
- Bennholdt-Thomsen, V., Mies, M. and Von Werlhof, C., 1988. *Women: The last colony*. Zed Books.
- Blaut, J.M., 1993. *The colonizer's model of the world: Geographical diffusionism and Eurocentric history*. Vol. 1. Guilford Press.
- Blyth, M., 2013. *Austerity: The history of a dangerous idea*, Oxford University Press, Oxford.
- Bogenschneider, B.N., 2022. Epistemology in Heterodox Economics?. *SMU Science and Technology Law Review*, 25, 127.
- Botos, K., 2018. Horizontal Development of Science—Can financial dogma be sustained?. *Public Finance Quarterly- Pénzügyi Szemle*, 63(3), 335-344.
- Caffentzis, G. and Federici, S., 2007. Notes on the Edu-Factory and cognitive capitalism. *The Commoner*, 12 (Value Strata), 63-70.
- Carter, C.E., 2024. Reconnecting with the social-political and ecological-economic reality. *Environmental Values*, 33(2), 103-121.
- Chester, L., 2019. Judging heterodox economics: a response to Hodgson’s criticisms. *Economic Thought*, 8(1), 1-21.
- Chopra, F. and Haaland, I., 2023. Conducting qualitative interviews with AI. SSRN papers.
- De Querol, R., 2023. Gemma Galdón, algorithm auditor: ‘Artificial intelligence is of very poor quality. *El País* 25.12.2023. Available at <https://english.elpais.com/technology/2023-12->

- 25/gemma-galdon-algorithm-auditor-artificial-intelligence-is-of-very-poor-quality.html# [accessed at 27 April 2024]
- DeMartino, G.F., 2022. *The tragic science: how economists cause harm (even as they aspire to do good)*. University of Chicago Press.
- Dobusch, L. and Kapeller, J., 2012. Heterodox United vs. Mainstream City? Sketching a framework for interested pluralism in economics. *Journal of Economic Issues*, 46(4), 1035-1058.
- Dow, S.C., 2007. Pluralist Economics. In J.Groenewegen (ed.), *Teaching Pluralism in Economics: International Perspectives on a Textbook Science*. Edward Elgar, Cheltenham, 22-39.
- Dow, S.C., 2008. Plurality in orthodox and heterodox economics. *Journal of Philosophical Economics*, 1(2), 73-96.
- Dow, S.C., 2018. Pluralist economics: is it scientific?. In S.Decker, W.Elsner and S.Flechtner (eds), *Advancing Pluralism in Teaching Economics: international perspectives on a textbook science*. Routledge, London, 13-30.
- Edney, Julian. *Greed: A Treatise in Two Essays*. iUniverse, 2005.
- Ehrenreich, B. and Deirdre, E., 1978, 2005. *For her own good*. Anchor books, New York.
- Eisenstein, Z., 1979. *Capitalist patriarchy and the case for socialist feminism*. Monthly Review Press, New York and London.
- Etzioni, A., 2015. The Moral Effects of Economic Teaching, *Sociological Forum*, 30 (1), 228-233.
- Frank, R.H., Gilovich, T. and Regan D.T., 1993. Does Studying Economics Inhibit Cooperation?. *Journal of Economic Perspectives*, 7(2), 159-171.
- Fraser, N., 2013. *Fortunes of feminism – From state-managed capitalism to neoliberal crisis*. Verso Books, London and New York.
- Frey, B.S. and Meier, S., 2003. Are political economists selfish and indoctrinated? Evidence from a natural experiment. *Economic Inquiry*, 41 (3), 448-462
- Fuchs, T., 2019. Empathy, group identity, and the mechanisms of exclusion: an investigation into the limits of empathy. *Topoi*, 38, 239-250.
- Garnett Jr, R.F., 2006. Paradigms and pluralism in heterodox economics. *Review of Political Economy*, 18(4), 521-546.
- Goodhew, S.C. and Edwards, M., 2022. The relationship between cognitive failures and empathy. *Personality and Individual Differences*, 186, 111384.
- Güner Gültekin, D., 2024. Groupthink in contemporary decision making: A failure to dissent. In E.Siniksaran (ed) *Overcoming Cognitive Biases in Strategic Management and Decision Making*, Pennsylvania, IGI Global yayınevi, 91-106.
- Harmon-Jones, E. and Mills, J., 2019. An introduction to cognitive dissonance theory and an overview of current perspectives on the theory. In E.Harmon-Jones *Cognitive dissonance: Reexamining a pivotal theory in psychology*. American Psychological Association.
- Hays, K. 2023. Andreessen Horowitz would like everyone to stop talking about AI's copyright issues, please. *Business Insider*, 7.11.2023. Available at <https://rb.gy/uhqt0g> [accessed 27 April 2024]
- Helm, J.M., Swiergosz, A.M., Haeberle, H.S., Karnuta, J.M., Schaffer, J.L., Krebs, V.E., Spitzer, A.I. and Ramkumar, P.N., 2020. Machine learning and artificial intelligence: definitions, applications, and future directions. *Current reviews in musculoskeletal medicine*, 13, 69-76.
- Hodgson, G.M., 2019. The meaning and future of heterodox economics: a response to Lynne Chester. *Economic Thought*, 8(1), 22-29.
- Janis, I.L., 1972. *Victims of groupthink: A psychological study of foreign-policy decisions and fiascoes*. Houghton Mifflin Company, Boston.
- Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H. and Wang, Y., 2017. Artificial intelligence in healthcare: past, present and future. *Stroke and vascular neurology*, 2(4).
- Ibert, O., Hess, M., Kleibert, J., Müller, F. and Power, D., 2019. Geographies of dissociation: value creation, 'dark' places, and 'missing' links. *Dialogues in Human Geography*, 9(1), 43-63.
- Kelly, J., 2024. Workers Who Use Artificial Intelligence Are More Likely To Fear That AI May Replace Them. *Forbes* 8.1.2024, available at <https://www.forbes.com/sites/jackkelly/2024/01/08/workers-who-use-artificial-intelligence-are-more-likely-to-fear-that-ai-may-replace-them/> [accessed 27 April 2024]

- Kirman, A. and Teschl, M., 2010. Selfish or selfless? The role of empathy in economics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1538), 303-317.
- Knight, F.H., 1946. Immutable law in economics: its reality and limitations. *American Economic Review*, 36(2), 93-111.
- Lanz, L., Briker, R. and Gerpott, F.H., 2024. Employees adhere more to unethical instructions from human than AI supervisors: Complementing experimental evidence with machine learning. *Journal of Business Ethics*, 189(3), 625-646.
- Lee, F.S., 2005. Grounded theory and heterodox economics. *Grounded Theory Review*, 4(2), 95-116.
- Lee, F.S., 2011. The pluralism debate in heterodox economics. *Review of Radical Political Economics*, 43(4), 540-551.
- Lynn, S.J., Maxwell, R., Merckelbach, H., Lilienfeld, S.O., van Heugten-van der Kloet, D. and Miskovic, V., 2019. Dissociation and its disorders: Competing models, future directions, and a way forward. *Clinical psychology review*, 73, 101755.
- MacEwan, A. (2005). Neoliberalism and democracy: Market power vs. Democratic power. In D. Johnston and A.Saad-Filho (eds.), *Neoliberalism: A critical reader*. Pluto Press, London & Ann Arbor, MI, 170-178.
- McGrath, M., Poynting, M. and Rowlatt, J., 2024. Climate change: World's oceans suffer from record-breaking year of heat. *BBC*, 8.5.2024, available at <https://www.bbc.co.uk/news/science-environment-68921215> [accessed 28 August 2024]
- Mearman, A., 2011. Who Do Heterodox Economists Think They Are? *American Journal of Economics and Sociology*, 70(2), 480-510.
- Meikle S., 2000. Quality and quantity in economics: The metaphysical construction of the economic realm. *New Literary History*, 31(2), 247-268.
- Michaels, F.S., 2011. *Monoculture: How one story is changing everything*. Red Clover Press.
- Mies, M, 1998. *Patriarchy and accumulation on a world scale: Women in the international division of labour*. Palgrave Macmillan.
- Mirowski P. and Nik-Khah E., 2017. *The knowledge we have lost in information: the history of information in modern economics*. Oxford University Press, Oxford.
- Nishant, R., Schneckenberg, D. and Ravishankar, M.N., 2024. The formal rationality of artificial intelligence-based algorithms and the problem of bias. *Journal of Information Technology*, 39(1), 19-40.
- Norgaard, R.B., 1989. The case for methodological pluralism. *Ecological economics*, 1(1), 37-57.
- Peck, J., 2010. *Constructions of neoliberal reason*. Oxford University Press, Oxford and New York.
- Perrigo, B., 2023. Gig Workers Behind AI Face 'Unfair Working Conditions,' Oxford Report Finds. *Time* 20.7.2023. Available at <https://time.com/6296196/ai-data-gig-workers/> [accessed 27 April 2024]
- Pol, O., Bridgman, T. and Cummings, S., 2022. The forgotten 'immortalizer': Recovering William H Whyte as the founder and future of groupthink research. *human relations*, 75(8), 1615-1641.
- Polanyi, K., 2001. *The great transformation: The political and economic origins of our time*. Beacon press.
- Puaschunder, J.M., 2020. Heterodox Economic Cycles Theory during the COVID-19 economic crisis: Social volatility, affect and the finance market-real economy gap. In *Proceedings of the 20th International Research Association for Interdisciplinary Studies (RAIS) Conference on Social Sciences and Humanities*, 108-118.
- Razavi, V. 2018. *Ethics in tech and lack thereof – Sleeping under the cell tower*.
- Scott, B. 2023. Tech doesn't make our lives easier. It makes them faster. 4.20.2023.
- Sotiropoulou, I., 2017. Commons and private property as a patriarchal trap, *Workshop on the Commons and Political Theory* (Thessalonike, 13-15.9.2017), research project 'Heteropolitics: Refiguring the Common and the Political' (ERC COG 2017-2020)
- Sotiropoulou, I., 2020. Quantity and Social and Solidarity Economy: A quest for appropriate quantitative methods. *Review of Economics and Economic Methodology*, 4, Special Issue: The Methodology of Economics: How Mathematicians Explain – Or Should They?, 131-156.
- Sotiropoulou, I., 2023a. Artificial Intelligence in the Edu-factory: A revenge of the invisible working classes in Higher Education, *2023 SOLSTICE & CLT International Conference* (14-15.6.2023), organized by Edge Hill University.

- Sotiropoulou, I., 2023b. *Machines against measures*. Bloomsbury, London & New York.
- Spash, C.L. and Smith, T., 2019. Of ecosystems and economies: Re-connecting economics with reality. *Working/Discussion Paper, WU Working Paper*.
- Taleb, N.N., 2005. *The black swan: Why don't we learn that we don't learn*. Random House, New York.
- Taleb, N.N., 2018. *Skin in the game: Hidden asymmetries in daily life*. Random House.
- Taleb, N.N. and Hacıoğlu, E., 2023. How the social fabric works: A conversation with Nassim Nicholas Taleb. *CivilNet*, 4.12.2023, Available at https://www.youtube.com/watch?v=YgHQZH_49cI&t=4s [accessed 27 April 2024]
- Uhlig, H., 2012. Economics and reality. *Journal of Macroeconomics*, 34(1), 29-41.
- van Staveren, I., 2014. Alternative ethical perspectives on the financial crisis: Lessons for economists. In DeMartino G.F. & McCloskey D.N. (eds). *The Oxford Handbook of Professional Economic Ethics*. Oxford University Press, Oxford.
- Velupillai, K.V., 2005. The unreasonable in effectiveness of mathematics in economics. *Cambridge Journal of Economics*, 29(6), 849-872.
- Wachter, S., 2023. How AI disrupts the law?. Lecture at the Gresham College, 11.10.2023. Available at <https://www.gresham.ac.uk/watch-now/technology-law> [accessed 27 April 2024].
- White, M.D., 2019. More harm than benefit: the ramifications of the neglect of rights in economics. In: Dolfsma W. & Negru I. (eds) *The ethical formation of economists*. Routledge – Taylor & Francis Group, London and New York, 77-91.
- Whyte, W.H., 1952. Groupthink. *Fortune*, 1-15.3.1952. Available at: <https://fortune.com/2012/07/22/groupthink-fortune-1952/> [accessed 27 April 2024].
- Whyte, G., 1989. Groupthink reconsidered. *Academy of Management Review*, 14(1), 40-56.
- Wilber, C.K., 2003. Ethics in economic theory, *Post-Autistic Economics Review*, 20.
- Wolfe, A., 2008. Hedonic Man. *Real-world economics review*, 351.
- Zirar, A., Ali, S.I. and Islam, N., 2023. Worker and workplace Artificial Intelligence (AI) coexistence: Emerging themes and research agenda. *Technovation*, 124, 102747.