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## MAPPING UNCERTAINTY: MACHINE LEARNING TO ACT HUMANLY?

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### Abstract

The human action has always and ineluctably been subjected to uncertainty. Improving some present condition or aiming some future state of want satisfaction implies a process of imaginative and purposeful reasoning – mapping uncertainty. This market process essentially defines the human entrepreneurial action. Nowadays, the reality is distinguished by the emergence of the new information technologies along with its implications on market functioning. The starting research premises were found in the recent academic discussion stressing the key role of information technology on improving resource efficiency consumption (knowledge included), that is believed to considerably diminish all costs to a point of abundance not of scarcity. Methodologically, the research was conducted through evaluative literature review and deductive reasoning. Seen through the lenses of the Austrian School of Economics, the paper analyzed the significance of entrepreneurial capability on uncertainty dealing in the information-technology-led transformed market process. The utopia of economic abundance or the post-scarcity economy driven by robotization and automation, as some research claim, are remnant of old Hegelian-Marxist ideologies. The final contour of economic development is painted by the endless individual needs, desires or wishes. The human action in searching to reach its ultimate goal is based on resource scarcity. The technological progress reduces scarcity but it also provides opportunities for emerging even more goals or ends. The single way of reaching those aims is by unrestricted market, private property and price mechanism. Thus, scarcity lies at the foundation of economic development, in particular, at human action under uncertainty, in general.

### Keywords

Human action, knowledge, entrepreneurship, scarcity, digitalization, machine learning

### JEL Classification

D80, L26, O10, O33

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## Introduction

The human action has always and ineluctably been subjected to uncertainty. In addition, the action manifests itself under limited power and control. The constraints come from the limits of the individual intellect, from the physical nature of the body or from the adversities of the nature and, finally, from scarcity.

These limits have always existed. From scarcity came a ceaselessly endeavor of uneasiness removal. To the extent that human wants and needs are endlessly growing and transforming at a pace far greater than the means at its disposal, one must take action and choose among alternatives. The outcome of the action, being placed in some nearer or more distant future, is intrinsically bounded to uncertainty. These *a priori* truths need no other justification.

Moreover, these simple facts are so deeply rooted in the fabric of human actions that there can be never overlooked. Omitting them it will may make feasible even one of the most unreal kinds of universes, one without suns to light it. Scarcity and uncertainty are defining and shaping all decisions. Thus, they give meaning and sheer light on human action.

That's why, we believe, that if humankind is meant to solve its problems, then the only rational solution is to cope with scarcity and deal with uncertainty. If "one side of the coin" may be called *scarcity*, the other we find it under the name of *uncertainty*. The explanation rests in another simple truth: action always aims at some goals placed in the unknown future for which individuals have subjective expectations.

Economics has always understood these premises and tried to find definite ways to explain them by granting them pivotal roles. Economists have discovered that improving some present condition or aiming some future state of want satisfaction implies is process of imaginative and purposeful reasoning – mapping uncertainty under conditions of scarcity. This market process essentially defines the human entrepreneurial action. Thus, entrepreneurship becomes the driving force of the market process, a fundamental mechanism of economic change. In this line of thought, scholars were concerned with the disappearance of the old way of doing things and the emergence of the new ones, along with the actors, institutions, technologies and organizations that are influenced and are influencing the process of change.

Nowadays, the reality is distinguished by continuous and powerful changing character. The emergence of the new information technologies along with its implications on market functioning are tremendously transforming the economic landscape. Moreover, the ubiquitous fact that machines and humans can now easily communicate and interact was almost inconceivable just few decades ago. Its profound impact on the economic reality could make the difference between prosperity and survival or between survival and insolvency.

A relatively new body of literature has appeared emphasizing these technological breakthroughs. Robotics, artificial intelligence or machine learning, to name just a few of them, are now able to respond to unanswered questions better than many humans can. For many, these technological advances represent the key understanding of some optimistic view of a future development of the economy and society.

They raise questions regarding the purposefulness of human action nascent in the individual decisions of the socio-economic actors. By answering these questions predictions were made on the future functioning of the economy, one not based on uncertainty and scarcity, but on abundance, liberation from uncertainty through the socialization of knowledge, arriving at a point they call digital-socialism. Are or will the machines and robots be able to learn and build the knowledge of how to better respond to human wishes and desires, e.g. to build an autonomous system of allocation of economic goods? Will them be capable of thinking for the future, e.g. mapping uncertainty?

The purpose of this paper is, firstly, to identify some aspects concerning the impact of the artificial intelligence emergence phenomenon on the uncertainty handling ability into a scarcity driven world that can be explained using the lenses of the Austrian's School of Economics. Secondly, the paper aims to approach the digital transformation of the economic

landscape as driven by the catalytic entrepreneurial function. The starting research premises were found in the recent academic discussion stressing the key role of information technology on improving the resource efficiency consumption (knowledge included), that is believed to considerably diminish all costs to a point of abundance not of scarcity.

### **Entrepreneurship - a key concept of Austrian Economics**

It is not in our intention to supply a comprehensive analysis on the economic history of thought regarding entrepreneurship. We only intend, eclectically, to draw some few lines around the concept, emphasizing its Austrian 'pedigree'.

The current scientific understanding of entrepreneurship is the natural outcome of one long-lasting and complex gnoseological process. However, its essence and limits are not yet definitively marked. Through time, the concept bore so much different significations. It was noticed that the most difficult and enigmatic aspect concerning entrepreneurship remains its definition (Shane and Venkataraman, 2000). The scientific endeavors made to uncover the entrepreneurship enigma (Foss and Klein, 2012) gathered around two main dimensions: one was trying to find out *what entrepreneurship is* and the other tried to discover *what it creates* (Gartner, 1990).

Along these lines, the two perspectives intersected in what literature suggests: sometimes entrepreneurship emphasizes the traits of individuals and sometimes it describes his or her actions (Koppl and Minniti, 2005). However, the diversity of thoughts around the subject never managed to find a unified theoretical paradigm (Acs and Audretsch, 2005).

Mainstream economics, neoclassical in its nature, mainly analyses the decisions made by the economic agents (Huerta de Soto, 2008). This was not in the thoughts of the founders and proponents of the Austrian School of Economics. For them, economics is about human action, a concept far beyond individual decision. Human action embraces the hypothetical process of decision-making and adds it to the context of *ex-ante* known means and expected ends (Kirzner, 1973). Further, the *Austrians* are more concerned with the pattern of the process that ends with decision-making, creating along the way a network of individual interactions, finally coordinating the plans of all economic actors (Hayek, 1945).

It could be argued that the essence of the message sent by the Austrian Economics is as following: the economy – a complex structure of production coordinated by entrepreneurs through economic calculation on a monetary basis (Topan, 2018). The same message tells us further that economics it is not just a multiplication of one homogenous substance (e.g. value, profit or wealth). The factors of production and the scarce resources are put to use in a continuous process of heterogenous wants satisfaction. It also implies the structure build upon these subjective individual evaluations.

On these premises, the economic process should be understood only in terms of human action, teleology and purposefulness. The outcome is a complex structure of production resulted from entrepreneurial actions and decisions regarding the allocation of scarce resources. The entrepreneurial motivation comes from the correct anticipation of profit and losses. The dynamic of the process comes from within, because it is based on the individualistic understanding of specific market situations. It could never be described in deterministic or mechanistic (*Verstehen*) terms (Mises, 1921). It is rather speculative and founded on alertness, the creation or the discovery of opportunities in an uncertain future. A future that is shaped by the *judgmental entrepreneurial decisions* (Foss and Klein, 2012) animating the entire economic landscape.

In a context defined by uncertainty, as anticipated by Carl Menger his *Principles of Economics* (Menger, 1871), the entrepreneurial gains could be regarded as outcomes of individual decision-making under condition of foreseeable (risks) and unforeseeable future. Entrepreneurial judgement clearly delineates risks from uncertainty, because only the risks can and will be objectively measured (Knight, 1921). Uncertainty has a non-measurable

character considering the unpredictability of the market forces due to the subjective evaluations of billions of consumers.

On this premises lays the central tenets of the entrepreneurial function in the market process seen through the lenses of Austrian Economics. The net departure from the neoclassical economic paradigm is definitively described taking into account the hypothetical concept of pure and perfect competition. From the Austrian perspective, competition becomes dynamic in nature, being founded on the discovery or the creation of *ad-novo* knowledge and information (Hayek, 1978). The orderly mechanism for the usage of such specific and tacit knowledge is sparked by competition among human ideas in searching for gaining or profit opportunities (Holcombe, 2014). Ultimately, it is this entrepreneurial learning process by which entrepreneurs learn, discover, create and adapt to new knowledge, conditions and opportunities (Harper, 2003).

### **Entrepreneurial knowledge and Artificial (un)intelligence**

The scientific debates around the economic and social impact of the new information technologies highlight the rapid development of the digitalization phenomenon driven by technological innovation involving the artificial intelligence. The literature stresses out its tremendous impact on the process of creation, dissemination, distribution of knowledge and information.

Moreover, it is widely believed that nowadays technical advances could reach its full embodied potential only by the deep understanding and acceptance of its impact. The reason behind this thoughts comes from idea that the discovery and usage of knowledge must embrace the right combination stemming from the economic, technological and social spheres (Morrar, Arman and Mousa, 2017).

In yet another line of thought, the literature suggests that digital technologies powered by artificial intelligence are irreversibly changing the evolution of humanity. It impacts the development of diverse field of human activities an play a growing and increasingly dynamic role in the hole society (Kaczorowska-Spychalska, 2018). By analyzing this evolution in the context of globalization, due to the contribution to its existence and for the dependency of its functioning, some studies are emphasizing the need for widening the access to *useful knowledge* and information (Mokyr, 2005).

Nowadays, many scientists are concerned an study the ubiquitous fact that huge data and information are to be found in the on-line medium (Roblek, Mesko and Krapez, 2016; Li, Hou and Wu, 2017; Wielki, 2017). The widespread availability of information, any time and place, creates impressive opportunities for billions of individuals to gather and purposefully use the knowledge. This aspect is hardly measurable, due to its intangible form, but is tremendously affecting and generating value (Brynjolfsson and McAfee, 2011).

In the digital era information systems, machine learning and machine-to-machine communication, Internet of Things or Cyber-physical systems are now uniting the ‘virtuality’ with reality (Xu, Xu and Li, 2018; Liu and Xu, 2017). Research on this field shows that humanity in on the verge of the Fourth Industrial Revolution, upon which the information technologies are playing pivotal roles. For example, the literature on business process modelling and management places artificial intelligence, robotics, cloud computing and machine learning at its core. They show how equipment integrating information technologies with cognitive abilities (data analytics, automation an so on) are used to evaluate dynamic and complex factors contributing to production and efficiency (Bi, Xu and Wang, 2014).

From such a perspective, it could be noticed that the relevance of the *information revolution* comes not from the fact that people are now reading previously hardly available knowledge from bigger screens, but from the dramatic fall in the marginal costs of almost instantaneous access to general and specific knowledge. For example, the relative low costs of access to internet browsers grants the opportunity for finding and acting upon useful individual

knowledge. In other words, *tacit knowledge* becomes widely *codified* (Polanyi, 1959), being easily stored, accessed and transmitted. It could be argued that the problem F.A. Hayek identified in finding the most suitable way of knowledge distribution in society has found its answer. Although Hayek's own thought and explanation were about the freedom of price mechanism, nowadays it seems like we could supplement his thinking with the freedom of knowledge diffuse through information technologies.

All tacit knowledge, pragmatic and unique, are vital for the scientific one. In addition, the entrepreneurial actions of every individual are founded on a personal, unique and subjective interpretation of knowledge and information. This is because the motivation of the entrepreneurs is to be placed on the causality relation between individual means and ends that are in correspondence with a subjective world view. The relevant knowledge it is not 'given' and accessed, but on the contrary, it is only found in the minds of every individual who acts entrepreneurial and, thus, contributing to development (economic, technological, social) (Huerta de Soto, 2008).

We find the artificial intelligence concept gathered and studied around the information technologies. People rely more and more exclusively on computation power trying to solve complex social and economic issues. This fact could create the impression that humans are not intelligent enough to solve problems. We argue, by contrast, that a more adequate term will be artificial unintelligence (Broussard, 2018). Artificial 'intelligence' is doing to the best of its abilities and responds to all commands given, but does not have the entrepreneurial abilities of uncertainty mapping or risk-taking ones. In the final analysis, humans act and decide over events and facts. What it is true is the fact that 'artificiality' can help human entrepreneurs make better decisions about scarce resources, manage knowledge and information, and dealing with uncertainty.

### **The fallacy of digital socialism**

Another vain of 'new' knowledge that can be identified in the recent literature is trying to link the digital phenomenon with socialism, decoupling the knowledge and prosperity that entrepreneurial capitalism has brought to humanity from the digital society. Some of the analysis of these studies have their starting premises in well-known concepts like knowledge economy or sharing economy (Peters, 2020). For this writers, information and knowledge, being some other kind of commodities not pertaining to the scarcity argument, can grow indefinitely through shared use. And since the world in our times is more and more about knowledge and information, we are entering the 'post-capitalist era', a sharing economy that arise from the now old capitalism system of production (Mason, 2016).

We are told that the signs are here and we just need to see them. The central argument rest in Marx's *Grundrisse*, namely the 'Fragment on Machines'. The 'Postfordist' production system, due to its autonomy, will prevail and will finally liberate the human condition. The information economy is here and it brings social goods produced with virtually no costs.

In this construct, knowledge is being socialized in an open-source manner. The 'intellectual' becomes 'in common', because there is a big transformation of the participatory media. The creation and sharing of ideas are now widely spreading and, thus, the 'intellectual commons' provides the real revolutionary alternative to the now dominating 'knowledge capitalism'.

They claim is that once information migrates to cloud computing, socialism is on the right and only feasible path to take. While capitalism is based on profit, capital and action, private property, efficiency and exploitation, digital socialism draws its power to overthrow capitalism from social relations, the socialization of knowledge through the openly free exchange of ideas.

In addition, there are those who think that the development of today's economy raise questions on the purposefulness of human action (Mizerak, 2019). The disruption caused by artificial intelligence have impacted labour markets and made it possible for the machines to replace

humans in the process of decision-making. They dream of a society with no inequalities and privileges and that the new technologies and artificial intelligence are capable of making this real (Kurzweil, 2001; Folgieri, 2016).

The utopia of economic abundance or the post-scarcity economy driven by artificial intelligence are new forms of socialist ideologies. The echoes of Marx's and Hegel's writings are to be heard even if history has proved them fallacious. They depict the world as a battleground between diverse ideologies that stem from the social class's divergent interests. The victories and the defeats are consequences of some providential historical intervention. This mythical entity guides humanity in some preordained plan to the final beatitude of socialism. Every step humanity makes to its final destination (socialism) is the outcome of its technological development. Individuals discover the technologies at the right moment, as determined by the *Geist*. Human will and entrepreneurial judgement are being exorcised. They play no role in this very near future of the digitalized socialism. How could individuality and subjectivism survive in a world of equality, eternal peace, abundance and perfect equilibrium?

These fallacies were rightly and finally dismissed by the thinkers of The Austrian School of Economics as being entirely mystical and erroneous. Human entrepreneurial action that gave birth and vitality to capitalism is one proof counterargument. The knowledge embodied in the technological development of the information age is primarily specific and constitutes the object of the market process managed by the consumer's wishes and commands. Knowledge could never be socialized in the way Marxist depict. It is just shared in a globalized market driven by entrepreneurial opportunities, scarcity and uncertainty. Of course, the proponents of this kind of digital transformation, will much be pleased to live in a world with no scarce knowledge. But this utopian world will plunge in decay if its driving force and source of motivation will be held socially. Dispersed knowledge discovery, creation and use makes capitalism harsh, but vivid.

### **Conclusion**

The complexity of the digitalization phenomenon is revealed by its multidimensional impact (economic, social, and technological) on the day-to-day life of individuals. The economists tried to find answers to certain dilemmas in the face of the emergence of artificial intelligence. We find this concept rather, ironically, reversed. The term created the false impression that machines are learning and becoming smarter. We argue, by contrast, that artificial intelligence is not capable of a such humanly task as mapping uncertainty. Nevertheless, many questions remain still unanswered. But there are losing ground when technology, regardless of its complexity, is seen as a simple tool. What humanity knows for the time being is the simple fact that the instruments are not able to reason or decide, yet. Only individuals do. Consumers are those who finally reward the success of the 'smart' machine development process. However, the human action and the entrepreneurial decisions are remaining intrinsically exposed to uncertainty.

The implications on the market process and on the understanding of the entrepreneurial function are based on challenges imposed by a series of changes regarding risk taking decisions under uncertainty, opportunity discovery, innovation process or the access to knowledge and information. The spillover effect of information technology is one of its main futures, thus creating new entrepreneurial opportunities. By adding to this the widening and almost costless access to knowledge and information for a growing number of individuals, regarded as potential users or competitors, then the process of opportunity discovery, constantly guided by alertness and judgmental decision, modifies its complexity and future outcomes.

We showed how the recent development of information technologies can re-spark old fallacious and utopic Marxist ideologies. The teachings of the Austrian's School of

Economics are powerful tools for the ultimate dismantle of such erroneous thinking, especially in our times. The message transmitted is that human action in searching to reach its ultimate goal – satisfying individual needs, desires or wishes, is based on resource scarcity. The technological progress reduces scarcity but also provides opportunities for emerging even more goals or ends. The single way of reaching those aims is by unrestricted market, private property, price mechanism and entrepreneurship. Thus, scarcity lies at the foundation of economic development, in particular, at human action under uncertainty, in general.

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### **References/Bibliography**

- Acs, Z. and Audretsch, D.B., 2005. *Handbook of Entrepreneurship Research - An Interdisciplinary Survey and Introduction*. Boston: Kluwer Academic Publishers.
- Bi, Z., Xu, L. and Wang, C., 2014. Internet of Things for Enterprise in Modern Manufacturing. *IEEE Transactions on Industrial Informatics*, 10(2), pp.1537–1546.
- Broussard, M., 2018. *Artificial Unintelligence. How computers misunderstand the world*. London: MIT Press.
- Brynjolfsson, E. and McAfee, A., 2011. *Race against the machine – How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*. Massachusetts: Digital Frontier Press.
- Folgieri, R., 2016. Technology, Artificial Intelligence and Keynes’ Utopia: A Realized Production. In: *Utopian Discourses Across Cultures: Scenarios in Effective Communication to Citizens and Corporations*. Frankfurt Am Main: Peter Lang AG. pp.73–86.
- Foss, N.J. and Klein, P.G., 2012. *Organizing Entrepreneurial Judgement*. Cambridge: Cambridge University Press.
- Gartner, W., 1990. What are we talking about when we talk about entrepreneurship? *Journal of Business Venturing*, 5(1), pp.15–28.
- Harper, D., 2003. *Foundation of Entrepreneurship and Economic Development*. New York: Routledge.
- Hayek, F.A., 1945. The use of knowledge in society. *The American Economic Review*, 35(4), pp.519–530.
- Hayek, F.A., 1978. Competition as a discovery procedure. In: *New Studies in Philosophy, Politics, Economics and the History of Ideas*. Chicago: University of Chicago Press. pp.179–190.
- Holcombe, R.G., 2014. *Advanced Introduction to The Austrian School of Economics*. Cheltenham: Edward Elgar.
- Huerta de Soto, J., 2008. *The Austrian School - Market Order and Entrepreneurial Creativity*. Cheltenham: Edward Elgar.
- Kaczorowska-Spychalska, D., 2018. Digital Technologies in the Process of Virtualization of Consumers Behaviour - Awareness of New Technologies. *Management*, 22(2), pp.187–2013.
- Kirzner, I.M., 1973. *Competition and Entrepreneurship*. Chicago: University of Chicago

- Press.
- Knight, F.H., 1921. *Risk, Uncertainty and Profit*. New York: Augustus M. Kelly Bookseller.
- Koppl, R. and Minniti, M., 2005. Market Processes and Entrepreneurial Studies. In: Z. Acs and D. Audretsch B., eds. *Handbook of Entrepreneurship Research - An Interdisciplinary Survey and Introduction*. Boston: Kluwer Academic Publisher, p.85.
- Kurzweil, R., 2001. *The Singularity Is near: When Humans Transcend Biology*. Penguin Books.
- Li, G., Hou, Y. and Wu, A., 2017. Fourth Industrial Revolution: Technological Drivers, Impacts and Coping Methods. *Chinese Geographical Science*, 27(4), pp.626–637.
- Liu, Y. and Xu, X., 2017. Industry 4.0 and cloud manufacturing: *Journal of Manufacturing Science*, 139(3).
- Mason, P., 2016. *Postcapitalism: A guide to our future*. Farrar, Straus and Giroux.
- Menger, C., 1871. *Principles of Economics*. Alabama: Ludwig von Mises Institute.
- Mises, L. von, 1921. *Human Action*. Chicago: Henry Regnery.
- Mizerak, M., 2019. Comparison of transitional theories to post-scarcity in science-fiction literature. *European Journal of Business Science and Technology*, 5(1), pp.107–123.
- Mokyr, J., 2005. *The Gifts of Athena - Historical Origins of the Knowledge Economy*. Princeton, Oxford: Princeton University Press.
- Morrar, R., Arman, H. and Mousa, S., 2017. The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective. *Technology Innovation Management Review*, 7(11), pp.12–20.
- Peters, M.A., 2020. Digital socialism or knowledge capitalism? *Educational Philosophy and Theory*, 52(1), pp.1–10.
- Polanyi, M., 1959. *The Study of Man*. Chicago: University of Chicago Press.
- Roblek, V., Mesko, M. and Krapez, A., 2016. A Complex View of Industry 4.0. *Sage Open*, April-June, pp.1–11.
- Shane, S. and Venkataraman, S., 2000. The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), pp.217–226.
- Topan, M.V., 2018. Prefață. In: *Acțiunea Umană - Tratat de teorie economică*. București: Editura Institutului Ludwig von Mises România. pp.vii–xxvi.
- Wielki, J., 2017. The Impact of the Internet of Things Concept Development on Changes in the Operation of Modern Enterprises. *Polish Journal of Management Studies*, 15(1), pp.262–275.
- Xu, L. Da, Xu, E.L. and Li, L., 2018. Industry 4.0: state of the art and future trends. *International Journal of Production Research*, 56(8), pp.2491–2962.