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KNOWLEDGE ECONOMICS AND THE DEMAND FOR HIGHER EDUCATION

ABSTRACT

This article suggests that the decreased demand for higher education in Poland is partially caused due to the changes in consumer preferences. The appearance of a cheap and highly accessible form of knowledge offered by the massive open online courses is presumed here to have an effect on the demand for formal higher education. This article proposes an additional perspective to the research on knowledge consumption, especially in the context of different versions of knowledge. It suggests, that the appearance of a cheaper substitute to knowledge leads to the increase of its consumption. This article also argues that knowledge, in terms of ideas and innovations, is misleadingly called to be non-rival and non-excludable. Overall, the article calls for a broader understanding of the knowledge market, emphasizing the need for higher education institutions to adapt to the evolving landscape of knowledge production and consumption. The rise of imperfect informational capitalism requires us to rethink the importance of knowledge quality to the modern society.

KEYWORDS: knowledge economics, higher education, MOOCs, consumer preferences, knowledge market, imperfect competition

INTRODUCTION

Traditional models of higher education, where universities have long held a near-monopoly on knowledge production and dissemination, are being challenged by new forms of learning and knowledge creation, such as massive open online courses (MOOCs). This article seeks to explore these changes through a novel lens, treating knowledge as a commodity and students as consumers who make educational choices based on their economic preferences and limited budgets. By integrating insights from consumer theory, human capital, and signaling theories, as well as the dynamics of the knowledge economy, this work aims to provide a new approach to understand the shifts in supply and demand within higher education. The focus will be on the Polish higher education sector, with broader implications drawn from global trends. Through this exploration, the article sheds light on the factors driving the decline in traditional higher education enrollment and the rise of alternative knowledge producers, offering a fresh perspective on the future of education in a rapidly changing world.

Being aware of the profundity of the theories on consumer value of higher education (Alstadsæter and Sievertsen, 2009; Bakutyte and Grundey, 2012; Tomlinson, 2018) and the human capital and signaling theory (Spence, 1973; Becker, 1993; Psacharopoulos and Patrinos, 2004 and 2010; Strawiański et alia, 2016) and above all, while appreciating the robustness of econometric models (Solow, 1956; Arrow, 1962; Autor and Acemoglu, 2011) that have included technological change as an endogenous factor behind economic growth (Romer, 1990; Jones, 2019), I'd wish to propose yet another perspective to the assessment of changes in the supply-demand, particularly on the knowledge market and higher education (HE). The proposed approach suggests that the change in demand is caused by a change in consumer – in this case, students' – preferences. Naturally, approaches such as the capabilities approach to higher education would prefer not to regard students as consumers or costumers at all. However, this should be more than suitable within the microeconomic consumer theory (Salvatore, 2006; Varian, 2013) according to which consumers are purchasers of a service or a product; people or organizations that are making choices depending on their economic preferences and within the confines of their limited budgets. Such authors as Eagle and Brennan (2007) and Woodall et alia (2014) discuss thoroughly if students should be regarded as consumers and/or customers. Also, such researchers as Zomer and Benneworth (2011, p. 87) have argued that especially in HE teaching, students have been *increasingly regarded as individual consumers rather than as collective beneficiaries*. Thus, education is here treated as the process of acquiring and purchasing knowledge as in Wittrock and Farley (1989), Wittrock (2000), or Figurska and Sokol (2016).

CHANGES IN THE POLISH HIGHER EDUCATION

As demonstrated by Kutrzeba (2022), there has been a drop in the gross and net enrollment rate from 53,8% in 2010/11 to 46,2% in 2018/19 (gross) and from 40,8% to 35,6% (net) in the Polish HE. Also the American higher education market is facing alarming changes as both the number and share of new college graduates with a bachelor's degree in education is decreasing over the last few decades. De Wit and Altbach (2020) note that in the high-income countries, those that have already moved far beyond a 50 percent gross enrollment rate, such as in Canada, Japan, South Korea, the UK, and the US, continental Europe, and Australia, for demographic and other reasons, the supply of tertiary places is starting to exceed demand. The saturation is especially visible in the STEM fields.

As far as the absolute number of students can be explicitly related to the demographics (Kwiek, 2016) and less evidently because of migration (Duszczyk and Matuszczyk, 2014), enrollment rate is rather an implication of the general demand for formal higher education (HE). The low importance of formal education that respondents indicated in the survey research (Kutrzeba, 2022) could thus imply other prerequisites for the declined demand for HE than mere demographics or declined wage premium for HE compared to that offered by vocational education today. In order to challenge the existing assumptions behind the declined demand for higher education, two graphs are deployed and propositions grounded. It is of great importance to note that the suggested concept is approximating the reality of supply-demand on education from a knowledge economic perspective where the usage of econometric tools is excluded. Consequently, several determinants are omitted intentionally and explicitly.



HIGHER EDUCATION AND MOOCs IN THE KNOWLEDGE MARKET

Knowledge is here regarded as a commodity which is produced and offered to the knowledge market by various actors similarly to Carayannis and Morawska-Jancelewicz (2022) who call upon universities to produce knowledge for new technologies and social innovation. There are both controversies and difficulties in measuring knowledge and other intangibles (Van Crieelingen, Bloch and Eklund, 2022). Although the problematics of measurement of intangible assets (IA) is not within the scope of this article, it is important to pinpoint for the sake of the further discussion, that knowledge can, as used in this conceptualization, be understood as an IA which falls to the broad category of innovative property identified by Corrado, Hulten, and Sichel (2005). However, I use the approach where knowledge is treated as a commodity and not an activity – the end-product resulting from an intellectual endeavor.

My conceptualization is limited to two knowledge producers – higher education institutions (HEIs) and massive online open courses (MOOCs). It is noteworthy to state that I do not depreciate the value of the above-mentioned studies. The attempt is only to extend our understanding of the knowledge market with an additional approach, which in my opinion, has not been addressed enough by contemporary scholars. The thorough debate about the design of the knowledge market itself is beyond the scope of this conceptualization. It should be noted that I do acknowledge HEIs as *unusual* (after Marginson and Considine, 2000, p.1) not the least in the context of a market economy; instead of stating that the purpose of universities is to do research and teach, one could argue that their purpose is to produce and sell knowledge.

To simplify this conceptualization, I have chosen to define higher education's role in society simply as a *knowledge-producing agent*. Using the term omits theoretically inter alia HE's third mission but not practically because it does not exclude a knowledge-enhancing interaction that must occur if knowledge is to be transmitted between the producer, its customers and other stakeholders. Maybe referral to HE as a technology-producing agent would embrace a greater number of factors especially if the technology is to be understood in its threefold meaning as in Pacey (1983). Nevertheless, a knowledge-producing



agent can theoretically also familiarize its customers with technology by providing them knowledge of it and thus be a technology-producing agent.

The presuppositions of my approach are the following:

1. Knowledge is a commodity, hypothetically quantifiable although practically infinite in quantity (inter alia because of technological change);
2. Higher education represents a science-based knowledge-producer and operates in the knowledge market;
3. Technological progress has caused an exponential information explosion and an excess supply of knowledge;
4. People are imperfectly informed about the knowledge market due to the myopic nature of our cognition.

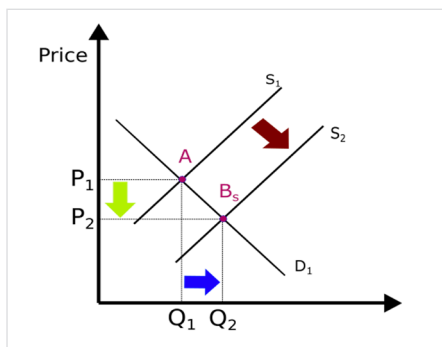
Despite the excessive supply of knowledge – information explosion (Ungar, 2000) or the ‘knowledge glut’ (Fuller, 2002) – why would people continue to produce new knowledge if there is too much knowledge chasing too few buyers? One possibility is that an ever-larger number of people are now producing new knowledge *especially* because its production cost has decreased and the barriers to entry have diminished. Another reason could be that of a cultural transfer of societies from industrial economies into attention/sharing/creative economies, in which production of knowledge is attractive at a very low marginal revenue or even with zero marginal revenue. In other words, we are living in economies where a significant amount of knowledge is produced for free or in exchange for attention as it is the case with open collaboration projects and the work, User-Generated Content (UGC), submitted to social media; value is created from novel imaginative qualities instead of classical resources as land, labor and capital. In other words, we live in a time with a gradual convergence of commercial and non-commercial sectors (Porter and Kramer, 2006) where the culture of knowledge promotion is nurtured (Hackett, 2000). Interestingly, creating UGC is not explicitly considered a part of the informal economy and omitted in Dell’Anno (2021) and ILO (2021), UGC can yet be implicitly included in ‘own-use production’ and ‘other work activities’.



Further assumptions are derivable from the 3rd presupposition, according to which:

5. The price of knowledge has decreased from P_1 to P_2 due to technological advancements, which has led to
6. An increase in quantity demanded of knowledge from Q_1 to Q_2 and to a shift in aggregated knowledge supply from S_1 to S_2 (Figure 1 below).

Figure 1. Decrease in the price of knowledge leads to an increase in the supply of knowledge



Source: Own elaboration

The graph above (Figure 1) illustrates how a decrease in the price (P_1 to P_2) of knowledge makes the quantity of demanded knowledge to rise from Q_1 to Q_2 . According to the basic economic principles of supply and demand of commodities, a downward shift of the supply curve (increased production) can be caused either by the decreased price of production or materials needed for it, increased quantity demanded or by such non-price determinants as technology improvements (Frank et alia, 2019). I have first assumed that the production cost P_1 of knowledge has declined to P_2 which in turn has led to an increased quantity of demanded knowledge from Q_1 to Q_2 . Now, given the decrease in price, increased quantity demanded and technological improvement, the knowledge market should find itself in the new equilibrium B_s as presented in Figure 1 above.

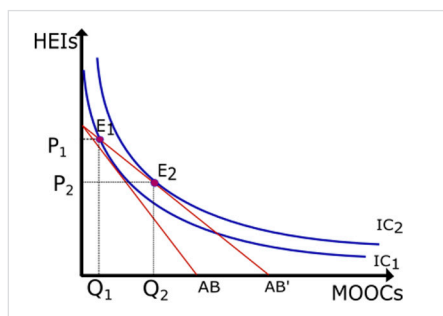
The propositions are the following:

7. Technological progress and **benevolence** of people have led to the emergence of free-culture and made it blossom through open-source movements and online learning (Massive Open Online Courses, MOOCs;
8. The knowledge produced by MOOCs constitutes a cheaper substitute to scientific knowledge produced by the formal HE.

Figure 2 below illustrates how the decrease in the price of knowledge presented above (in Figure 1) influences consumer preferences. Provided by further technological progress and benevolence of people, the excess of quantity demanded (from Q_1 to Q_2 in Figure 1 above) has led birth to a competitive scientific knowledge-producing agent – the MOOCs. The changes in consumer preferences of knowledge-producing agents can be depicted on an indifference curve which shows how a combination of two commodities provides equal utility and satisfaction to a consumer. The quantity of each substitute is depicted on XY-axes and the line AB is a consumer's budget line. Given the goods are close substitutes and the prices stable, the consumer is indifferent about which point on the indifference curve IC_1 to consume. According to the substitution assumption of consumer preference theory (Salvatore, 2006; Varian, 2013), consumers should consume E_1 to maximize their utility but the theory also says that given no changes in the budget, consumers want to be on the highest indifference curve possible, i.e. people want the best things they can afford. Furthermore, at least as far as well-behaved preferences are concerned, averages are preferred to extremes meaning that a mixed consumption bundle of goods is generally preferred – the further away from the axes the better. Now the price P_1 of knowledge (depicted in Figure 1 above) has declined to P_2 causing quantity demanded to rise from Q_1 to Q_2 which is represented in the indifference curve below in Figure 2. According to the convex preferences, a negative change in the price of MOOCs makes it a preferable substitute to HEIs as consumers can now buy more knowledge for the same budget (AB stretches to AB') which means they will consume at new equilibrium E_2 shifting the indifference curve to the right (IC_2). HEIs and MOOCs are treated here as close substitutes making the consumer indifferent about which point on the indifference curve IC_1 to consume at, given the budget AB.

The curve is strictly convex which means that consumer's marginal rate of substitution (MRS) is diminishing and constantly changing along the curve; people are not totally indifferent about the combination of two goods on the XY-axes. In reality, people are consuming a combination of MOOCs and HEIs. As consumers are ill-informed (or not perfectly informed according to the 4th presupposition) and characterized by different adoption styles of innovations (MOOCs) as noted by Rogers (1981; 1995) – the IC_1 excludes a situation where HEI is not consumed at all. This could have been the case when the MOOCs were launched in the first place, i.e. had just entered the knowledge market.

Figure 2 *Convex preferences between HEI and MOOC*



Source: Own elaboration

The question to what extent MOOCs and HEI are substitutes is beyond the scope of this paper yet several factors affecting the interrelation of these knowledge-producing agents can be considered here briefly. Before we go there, it should be noted that as far as people and their knowledge exchange models are concerned, things become supposedly way too complex to be explained by a simple modeling of two variables, *for most things are differently valued by those who have them and by those who wish to get them* (Aristotle, 1893, p. 206). My stance to consumer preferences is generally inclined into the heterodox approach according to which people's decisions and behaviors are affected by an indefinite number of other non-economic factors such as culture, status, gender, education, prejudices, profession (Mitchell et alia, 2019) and attitudes or *affective valuation* (Kahneman et alia, 1999). Despite this, a convex indifference

curve is serving the cause in conceptualizing hypothetical changes in knowledge consumption preferences as the point here is to bring wider insight into the problematics of declined demand on HE and increased supply of MOOCs; to expand *the understanding of economically consequential behavior* (Ibidem, p. 231). In my opinion, it might be that these commodities are complements for some people while others treat them as substitutes or even as ‘bads’. Similarly, Wikipedia has been treated generally as a rather ‘bad’ (or of low credibility) and has only recently started to gain credibility as a decent knowledge-producing agent, for instance among high-tech professionals (Chen, 2009).

I would now wish to briefly examine some aspects that may affect the way we perceive commodities provided by various knowledge-producing agents in the context of the indifference curve. First of all, the primary role of producing and transferring knowledge today lies within the competence of several agents. Apart from HEIs and MOOCs, there are numerous science and technology institutions, research institutions, knowledge transfer offices, and science parks that in certain situations turn into hybrids as they engage in bilateral interaction with their stakeholders such as the government and/or other agents in the industry. In other words, knowledge is created through institutional interaction – between academia, government and industry as far as the Triple Helix model of innovation is concerned – and social interaction (Glassman, 2001; Etzkowitz and Leydesdorff, 1995; Wenger et alia, 2002; Nonaka and Toyoma 2003; Klineciewicz, 2008). Practically this means that the aggregated supply of knowledge is provided in a combination and an average on the convex indifference function graph is preferred. In our example, customers should thus consume at E2. This would practically mean that HE students do not only consume knowledge at universities but acquire it in a combination through MOOCs and/or from UGCs.

Secondly, all of the above-mentioned knowledge-producing agents are regulated and funded by either governments or NGOs or private investors or a combination of these. This, in turn, excludes them from operating under the circumstances of perfect competition. Naturally, there is a considerable gap between the infrastructure (both in physical and cultural terms) offered by traditional universities and such newcomers as MOOCs. The latter is striving for prestige while, other than digital resources, lacking technical infrastructure

(in terms of laboratories, tools and devices) and has therefore barely any other competitive advantage other than accessibility, price and flexibility. Rigorous scientific research within other disciplines than social sciences can be very challenging for MOOCs – according to Gasevic et al. (2014) calculations, 75% of submitted research proposals to MOOC Research Initiative (MRI) in 2013 were from the field of education. Zomer and Benneworth (2011, p. 81) posit that new potential roles for universities have been created and their *traditional societal privileges and monopolies* have been now challenged due to the increasing importance of knowledge production for economic life. Alyoussef (2023) suggests that above all accessibility to knowledge offered by MOOCs and other cloud computing for educational purposes is of crucial value to engineering students. Arpaci (2019) proposes that *employing the mobile cloud computing services for personal information management should be supported and encouraged in the higher education by designing authentic learning environments and scaffolding the students in using such services* (ibidem, p. 1).

UNDERSTANDING THE KNOWLEDGE MARKET

Basing on the discussion above the following hypothesis is grounded:

The character of the knowledge market is volatile although relatively price inelastic; it has traditionally resembled a market of imperfect competition, an oligopoly with a handful of producers (monasteries, universities, guilds, polytechnics, associations, companies, the cultural and the political elite) and high entrance barriers but has now experienced a transition towards an **imperfect coopetition market** where various versions of knowledge are close substitutes and low primary barriers to entry prevail;

A barrier to entry is a cost of producing (at some or every rate of output) that must be borne by firms seeking to enter an industry but is not borne by firms already in the industry (Stigler, 1968 p. 67). I would modify Stigler's 'firm' into 'actor' because in the broadest sense any cognitive actor – including artificial intelligence [AI] – is a potential knowledge producer, as knowledge

can be perceived as a *resource produced by the interaction between living matter and non-living matter* (Lin, 2019, p. 1754). Finally, the definition of the market in this context also calls for a remake. One could hypothesize that ‘attention’ is a close substitute for money on the knowledge market.

The suggestion is to understand the knowledge market as an *imperfect co-opetition* because, apart from the interaction necessary for innovations to arise, a certain dose of competition between knowledge producers is maintained; being first to create value-added commodities such as ideas, patents, and other technologies is yet generally preferred. This is derived from the observation that knowledge producers – universities, researchers, scientists, tech and medical companies – are particularly keen on being the first to create innovations since it generally involves increased exposure on the market, temporary monopoly, and the advantage of the network effect. My second argument is that once inventions get spread in the society, their nominal value decreases as knowledge gets outdated either by falsification – by scientific research (Popper, 1963) – see e.g. usage of electroshocks in psychiatric treatment or morphine as a pain killer among other ‘blunders’ (Pasachoff, 2014) and/or development – e.g. DOS versus Windows10 or the evolution of programming languages. This could explain why such development patterns as leap-frogging (Lechman, 2017) occur; why to implement outdated knowledge to build outdated technologies if more efficient solutions are at hand?

Knowledge, in terms of ideas and innovations, is generally accepted to be non-rival and partially non-excludable (Jones, 2019). A commodity is non-rivalrous when it is undiminished by the consumption of it which implies increasing returns to scale (Jones, 2019). My suggestion is that knowledge is *partially* non-rivalry or imperfectly non-rivalry because it tends to get outdated over time. Whereas new knowledge can have a tremendous market value, once distributed to the society it becomes a taken-for-granted knowledge and eventually gets outdated by falsification; state of the art knowledge is generally preferred to the outdated one. A typical argument for the non-rivalry idea is that *firms do not need to reinvent the idea for a computer each time a new computer factory is built. Instead, the same idea (i.e., the detailed set of instructions for how to make a computer) can be used in the new factory, or indeed in any number of factories, because it is nonrival. Because there is constant returns to scale in the rival inputs*

(the factory, workers, and materials), there is therefore increasing returns to the rival inputs and ideas taken together: if you double the rival inputs and the quality or quantity of the ideas, then you will more than double total production. (Jones, 2019, p. 861) However, what use would it be to produce and consume computers basing on their *idea* from the 1990s if a better version for the same price would be available on the market? With all due respect, today the idea of Windows 95 not to mention Commodore 64 seems to have more historical than commercial value. Therefore, I would argue that knowledge is not a perfectly non-rivalry good due to the falsification (R&D) processes but also as consumption of other versions of knowledge diminishes consumer's ability to maximize the utility from generally preferred up-to-date knowledge; there are opportunity costs no matter where and what knowledge is consumed. Khumalo (2017, p. 1535) goes further and argues that *all knowledge is a commodity as there is a cost to having it*. In conclusion, outdated knowledge is non rival as it does not compete in the same niche of the knowledge market. Finally, knowledge that is accumulated, produced and provided through such artificial intelligence services as the ChatGPT also made it clear, that these goods are excludable in practice – the more people consume the more difficult it is to access the model due to the server overload. Similarly to public roads, which are non-excludable only to certain extent; they become exclusive during the traffic overload. The ones who consume innovations first tend to reap the largest utility from it. Epistemically, following the logic behind Khumalo's (ibidem) statement, consuming substitute knowledge from MOOCs excludes us from the utility that the knowledge produced and offered by the higher education could provide. This is because consuming any knowledge, takes up the capacity of our memory and practically hinders us from consuming any other versions of it.

LIMITATIONS

The presented conceptualization relies on several presuppositions, such as the idea that knowledge is a commodity and that people are guided by a moral imperative. These assumptions are not universally accepted, and may not hold true across different cultural and socioeconomic contexts, but also due to the great difficultness to measure the real causes of consumer's choices. Especially the difficulties in measuring intangible assets like knowledge is acknowledged but is a controversial approach to knowledge management, although used by a number of scholars. Furthermore, the discussion on consumer behavior and preferences relies heavily on the assumption of rational choice theory. Incorporating behavioral economics perspectives, which account for irrationalities and biases in consumer behavior, could provide a more realistic picture. A more thorough discussion on how to measure these intangibles could strengthen the paper's arguments and provide more practical insights.

The conceptualization is limited to higher education institutions (HEIs) and massive online open courses (MOOCs), which narrows the analysis. Other significant knowledge producers, such as private sector research and development, think tanks, and informal knowledge exchange platforms, are mentioned, but not considered in the actual analysis of the supply-demand changes on the knowledge market, which is certainly limiting the validity of the conclusions. Finally, the paper lacks substantial empirical evidence to support its claims, as it serves as an introduction to a following research, which would be interesting to conduct to verify its theoretical suppositions.



CONCLUSIONS

The article proposes a new perspective on understanding changes in the demand for higher education by suggesting that these changes are driven by shifts in consumer preferences, particularly among students. The paper frames students as consumers who make educational choices based on their economic preferences and limited budgets, aligning with microeconomic consumer theory. Basing on the enrollment rates to Polis HE, it can be assumed that a decline in the enrollment rates in Poland and other high-income countries have taken place due to demographic shifts but possibly also to other factors such as the appearance of a cheaper substitute – the MOOCs but the theory can be extrapolated also to other educational content offered on the Web – to knowledge offered by the Academia. This substitution effect is driven by technological advancements and cultural shifts towards free and open-source knowledge production. This substitution effect is illustrated using economic models of supply and demand and consumer preferences where knowledge is conceptualized as a commodity produced by both HEIs and MOOCs, influenced by technological progress that has reduced production costs and barriers to entry. The indifference curve model is used to show how consumers balance their consumption of HEIs and MOOCs.

The final suggestion of this article is the one concerning the character of the knowledge market. The knowledge market is described as volatile and characterized by imperfect competition. Technological advancements have led to an oversupply of knowledge, causing prices to decrease and demand to increase. The market for knowledge is transitioning from an oligopoly with high barriers to entry to a more cooperative and competitive environment (*cooperation*), where various forms of knowledge production coexist and interact.

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