

Gutenberg and the MOOC

<https://doi.org/10.3991/ijet.v17i12.31357>

Shama Urooj^(✉), Ali Sajjad, Neelam Bano, Muhammad Mukarram
Department of Business Administration and Management Science, The Superior University,
Lahore, Pakistan
shama.urooj@superior.edu.pk

Abstract—In this paper, the origin and the significant development of Massive Open Online Education (MOOC) is analyzed. The MOOC-type education has only a brief history, although today it can provide degrees both on bachelor's and master's levels. The opinion of some experts is that MOOC universities belong to the Christensen-type disruptive innovation. This article compares the welfare effects of MOOC universities with that of Gutenberg's book printing. Moreover, in connection with the provision of higher education presents the financing models of the existing MOOC platforms.

Keywords—Massive Open Online Education (MOOC), welfare surplus, traditional universities, MOOC universities, monetizing MOOC platforms

1 Introduction

Since the launch of eBay in 1995 [1], many other successful platforms started in many different areas of the economy, which offer traditional services in a non-traditional way. See for example hotel services, restaurant table reservations, taxi services, intra-group communication, etc. These new, non-traditional models can flourish due to fast communication via commercial internet. The new methods have arrived in the education system, as well. So-called Massive Open Online Education (MOOC) appeared in tertiary education.

According to the literature [2] the first realization of MOOC is an online MOOC course at the Manitoba University (Canada) in 2008, which offered education on connectives and connective knowledge. This course was attended by 25 students in a traditional way (paying fees and acquiring credits) and by 2200 “non-traditional” students (attending free of charge and not acquiring credits) from all over the world. According to the definition of MOOC, an online platform existed that connected the participants – lecturers and students who had the same rights – and made it possible to discuss problems and learn together.

Some universities have been offering online courses since 2008 – actually, before 2008 as well – permanently, but these courses were small before 2011. In 2011, Stanford University launched three online courses free of charge: databases, machine learning, and artificial intelligence [3]. More than 100 thousand students were applied for each of these three courses from all over the world. The courses included video lectures

from famous professors and exercises, automatically evaluated by machines – this created the so-called MOOC [4]. At the end of the courses, students were able to get a certificate of achievement based on their mid-course tests, and their final tests were also evaluated automatically. The only downside of the courses was that the proportion of students who achieved a certificate was below 20%. The great initial successes gave launching other MOOCs a boost, and so, the development of MOOCs since 2012 has been very quick. Since 2017, bachelor and master degrees, and micro credentials can also be achieved via MOOC courses. Micro credentials are mini-qualifications that should be collected in a pre-defined way or can be matched with traditional courses, and so grant a bachelor's or master's degree. These degree-granting courses are not free of charge - in contrast to the original MOOCs -, although the tuition fee is in most cases smaller than 10% of the fee of the traditional on-campus courses. Many of these courses can be attended via audit participation with restricted rights (shorter time, exclusion from exercises, etc.) and without receiving a diploma. Non-degree MOOC courses also seek to include items subject to charges, although, they still offer more free-of-charge opportunities.

The launch of MOOC courses was accepted with great enthusiasm by the creators and by the potential students as well. The initial economic and ethical attitude can be characterized by the so-called blue ocean theory, but it is different now. The blue ocean theory – that is terminology from marketing [5] – suggests to the new market participants that instead of dealing with saturated markets, they should find undiscovered market niches that new customers can obtain. From an ethical point of view, the blue ocean mainly refers to persons from less developed countries who have not been able to participate in education, and whose involvement in higher education can foster human development [6].

This will argue in this article that the economic aspect of the blue ocean theory is realized differently, as was originally stated, and was hardly ever realized from an ethical point of view. Despite this, MOOC is a part – moreover, an increasing part – of the higher education system. [7] argue for the MOOCs' disruptive innovative function in higher education. They believe that the traditional university model is obsolete, and its collapse is unavoidable. The financial sustainability of the old model cannot be granted anymore; the only question is who will introduce the innovative model of the MOOC: the traditional universities or some aggressive outsiders. The result will be the same: higher education will change significantly.

Whether disagree or agree with the statement of [7], the significant spreading of MOOC education is beyond question. This presents these trends first in our article, and then this study estimates the welfare effect of MOOCs and compares it to the welfare effect of Gutenberg's book printing. Later we also explain the financing methods of MOOCs and finally conclude.

2 Fast spreading of MOOC

As mentioned in the previous section, the start of MOOC can be dated to 2011 when Stanford University launched three popular courses. Since then the number of both the

platforms collecting and universities, offering such courses has skyrocketed, and the number of students has grown even faster. The two graphs below show the number of students and the number of MOOC courses.

There are some important notes in Figures 1 and 2. First, it should be mentioned that there is no official statistical data collecting according to MOOCs. Participation data can be collected from the web pages of the different MOOC platforms. The problem is that there are a large number of small platforms with only a few thousand participants, but their aggregated number is high. So, it is almost impossible to calculate from this side. Figures 1 and 2 were designed based on data from different blog posts and articles by Dhawal Shah from Class Central, in many cases reading data points from graphs. Because these are articles without clear approach and blog posts, the methodology is not robust, and the explanation of the data is not trivial in many cases. For example, considering a shorter period regarding the MOOC courses – published also by [8]– the figures are much smaller. Surveying the above-mentioned articles and blog posts, this concluded that the data in Figure 2 refer to all the offered courses, and If a course is offered two or three times a year, then it is considered two or three times on the figures. The other dataset that contains the smaller numbers, consider a course one, even if it was announced twice or three times in a year. Following the logic of Dhawal Shah, the values of Figure 1 should be interpreted similarly: if a student entered two MOOC courses in a year, then Figure 1 contains her/him twice. Analyzing tertiary education, Study should also note that a not huge, but significant proportion of MOOC courses offers secondary educational material.

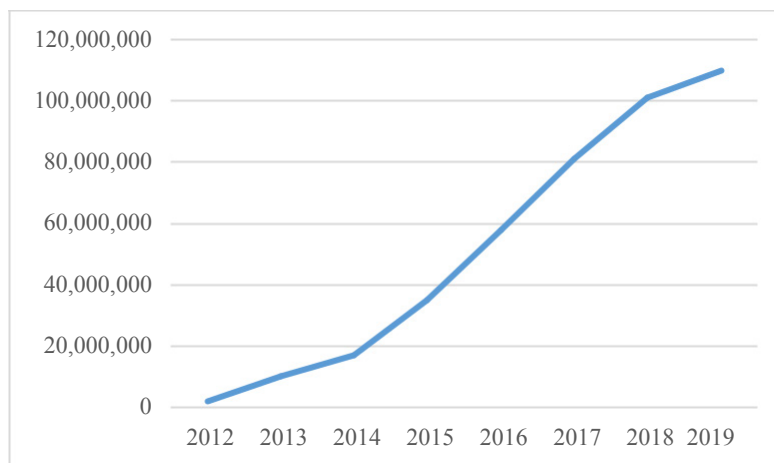


Fig. 1. Number of MOOC students (Source: Author’s collection based on data from [8])

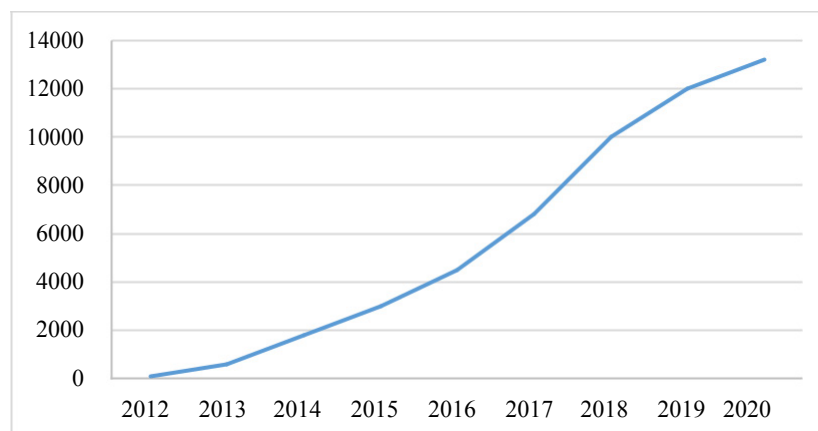


Fig. 2. Number of MOOC courses launched (Source: Author's collection based on data [8])

Despite the problems of interpretation, Figures 1 and 2 emphasize that MOOC courses have developed a lot since 2011. The development also sheds light on the fact that size does matter. Bigger platforms and bigger universities that joined this new type of education can realize the benefits of economies of scale. On the other hand, this situation is disadvantageous for smaller universities in the competition for students [7]. The phenomenon of Christensen-type disruptive innovation is characterized similarly by [9]. Defining disruptive innovation [9] uses the term industrial mutation, originally introduced more than 70 years ago by [10]. Industrial mutation unavoidable modernizes the production structure.

With the spread of MOOCs, tertiary education has become international, even if channeling the most deprived potential students of the countries with low Human Development Index is unsuccessful [6]. Many persons who do not belong to the most deprived strata of the population, but were excluded from tertiary education before, because of financial, social, or any other problems, now can enter the tertiary education system with the help of MOOC. MOOC is extremely useful for adults who would like to develop themselves or would like to change their career path.

Those MOOC platforms – the biggest ones – which offer bachelor's and/or master's degrees as well can stand out from the crowd. This trend began in 2017 and became the second milestone of MOOCs in 2018 with the huge jump in the number of degree-granting MOOCs. Table 1 shows the number of degree-granting courses offered by the four biggest platforms. The list excludes Chinese platforms, which are huge as well since the methodology of data collection is different according to [8].

Not just degree-granting courses are popular, but also the courses that offer micro-credentials, i.e. courses that can be taken into account in traditional, offline university programs, or MOOC university programs as well. These courses in some cases are compulsory parts of traditional programs but are open to MOOC students as well. Micro master courses are also popular: master programs are broken into smaller parts, and if a student accomplishes all these parts, he/she is granted a degree.

Table 1. Number of degree-granting MOOC courses between 2017 and 2019, and the number of MOOC courses in 2019 that offer micro-credentials

	2017	2018	2019	2019 (micro credentials)
Coursera	4	11	16	420
edX	1	9	10	292
FutureLearn	4	18	23	49
Udacity	1	1	1	40
Total	10	39	50	801

Source: [8]

In the light of arguments presented so far in our article, MOOC seems to be the success story of tertiary education, at least for those students who can participate in it. Let us now consider the drawbacks! Although free-of-charge participation and free-of-charge audit participation are attractive for students, only the most determined ones achieve successful exams. According to [6], only 10% of the students finish the courses with successful exams, which can be explained by two important reasons. First, the principle of non-payment is a bad initiative; many of the students do not download even the first lectures. Second, professors' instructions are presented only via videos in MOOCs, thus students need great autonomy and dedication, and many students simply lag despite their efforts. Therefore, MOOC – the almost only form of MOOC that exists nowadays – courses tend to organize web forums for students, where they can discuss their problems, and in some cases – usually for extra service charges – their questions are also answered by teachers. The phenomenon of organizing online student groups characterizes MOOC, but due to the changing needs of the students, the dividing line between these two types of MOOC is blurring.

Even if the students of MOOC courses can follow the course instructions and can take successful exams, they should go without a really attractive characteristic of traditional brick-and-mortar universities: they cannot develop a social network that may help their future career. Web forums aim to solve this problem as well. In addition, MOOC courses are recommended for adult education, where the relevance of social networks is lower because they were able to develop them earlier.

To sum up this section: it can easily happen that MOOC universities are a realization of disruptive innovation, although they cannot substitute traditional universities in some aspects. thus, it is more likely that traditional and MOOC universities will exist side by side with cooperation, and the domination of one of them will not materialize. Anyway, it is worth it for the universities to integrate themselves into MOOC, since the ones who stay out, miss out: due to economies of scale, latecomers cannot join. The appearance of MOOCs increased the opportunities for potential students, thus their welfare effect is significant. This section estimates the welfare effects of MOOCs.

3 Welfare effects of MOOC

The appearance of MOOC is somehow similar to the spread of Gutenberg's book printing. Although there are 570 years between the two actions, both of them can be interpreted as a new way of knowledge dissemination. The invention (in fact, re-invention, since the methods were originally developed in ancient China) of the printing press in 1439 made information spread much faster [11] first in Europe, then on the other continents as well. Printed books in addition significantly accelerated the advancement of higher education. On the other hand, MOOCs also helped to increase the number of students in tertiary education (which was already high at the beginning of the 2000s) and made it international. Reading books is a good way to study, although video lectures with instructions and exercises are even more efficient.

The importance of the printing press for the contemporaneous British population is quantified by [12] using welfare estimations¹. This estimation methodology uses the techniques of neoclassical microeconomics, therefore ignores all normative aspects. It quantifies welfare effects based on changes in prices and quantities, not on exogenously determined principles. It connects welfare effects to consumer surplus². This method does not state that the more people read the better the society is, and it does not distinguish between "good books" and "bad books", nor defines who has to read, etc. This method simply draws conclusions based on market prices and the number of books bought by an average customer.

A detailed description of the methodology is presented by [12] that uses utility functions with relative risk aversion to studying the effect of price changes on the consumer's decision. He analyzes net consumer surplus from two aspects using price decomposition. First, he calculates the amount of extra income, i.e. compensating income that is necessary to reach the new level of utility from the old utility level, after the price decreases. This is the so-called compensating variation estimation of welfare. Second, he calculates the amount of income the consumer sacrifices at the new level of utility with new prices to get back to the old level of utility. This is the so-called equivalent variation estimation of welfare.

Both methods stem from the estimation of the parameters of the Hicksian utility function, and these parameters are estimated with regression models using quantity and consumers' budget ratio data. This method is data-intensive. Dittmar collected the data with a lot of work for contemporaneous England and estimated the welfare effect of the printing press for two periods: 1540-1590 and 1630-1690. It is beyond question that such precise calculations cannot be made in the case of MOOC. Not only due to the short period of the existence of MOOC (only three years) but also due to the previously mentioned data problems. Moreover, MOOC universities do not significantly differ from traditional universities, therefore cannot be treated differently, thus to calculate with a basket of composite educational good, which has a decreasing price due to the increasing weight of MOOC universities.

¹ The welfare estimation method used by [12] is a relatively old methodology, and it is based on the Hicksian price decomposition [13]. This kind of welfare effect estimation became popular at the beginning of the 2000s, when researchers from many fields used the methodology in their publications. See for example [16] for vans, [17] for the internet, [18] for the colonial import of sweets, [14] for personal computers, and for automation.

The calculations based on the Hicksian decomposition can be approximated using two alternative methods [12, 14]. This article uses the calculations based on the price index of [15] and calculates only the equivalent variation estimation.

The equivalent version of welfare surplus using the Törnqvist-methodology can be characterized with the following equation:

$$\lambda_{EV} = \frac{1}{(p_t/p_0)(s_t+s_0)/2} - 1 \tag{1}$$

where p_0 and p_t are the prices in the starting (0) period, and in the last (t) period, while s_0 and s_t are the proportions of tertiary education in the consumer’s budget, more precisely the logarithmic ratio of the proportions. Here in after, the result of equation (1) is the welfare surplus.

Net consumer surplus is the aggregated sum of the difference between the market price and the reservation price (the highest price the consumer is willing to pay for the given good).

Quantifying equation (1) data required on the price of bachelor's and master's programs (hereinafter: university), and the proportion of tertiary education in the consumer’s budget. authors did not have the opportunity to collect all the necessary data, therefore, this applied simulation methods. It should be noted that equation (1) – and in the case of the Hicksian utility function as well –calculates the welfare surplus of the representative consumer for only one given country. This fact distorts the results since a MOOC service offered in one particular country is analyzed only according to that country, whereas in MOOC education people from many other countries from all over the world took part.

This measures the price of traditional universities using the prices of Massachusetts Institute of Technology (MIT) courses by collecting their data published online. On the other hand, this uses the prices of edX (which is the MOOC platform for MIT) for MOOC universities. Both price datasets are for 2020. Data shows that MIT courses cost at least ten times more than the edX universities’ fees. This study normalized the 2016 prices (which does not include MOOC courses) to 1, and later introduced MOOC prices to 0.1. In our simulation, this study considered an “education basket” where the weight of MOOC is 0.1 in the first, and 0.2 in the second specification. This study set the weight of tertiary education spending in the consumer’s budget to 12% in both periods (taking into consideration student loans according to [19]). This made the calculations using a much higher income share – 30% – as well. Table 2 shows the results.

Table 2. Welfare effect of MOOC universities in the USA – simulation results

	Education spending is			Education spending is	
	12% of the budget			30% of the budget	
Weight of MOOC					
universities in the	10 %	20 %		10 %	20 %
“education basket”					
Equivalent variation	0.052206	0.113026	Equivalent variation	0.072137	0.157854
welfare estimation			welfare estimation		

The results presented in Table 2 are calculated via simulations, thus they cannot be treated as robust figures from real statistical data. At the same time, it articulates the relevance of MOOC: the welfare increasing effect of MOOC is 5% if the education spending is 12% and the weight of MOOC in the “education basket” is only 10%. Comparing the results presented in Table 2 with the results of [12], signifies that the effect of MOOC is significant.

Table 3. The welfare effect of Gutenberg’s printing press in England calculated in [12]

	Printing press	Printing press
	1540 - 1590	1630 - 1690
Equivalent variation welfare	0.145	0.123
Estimation		

Notes: Dittmar’s calculations are based on the Hicksian utility function. The table presents only the equivalent variation welfare estimation.

According to Dittmar’s estimation, the minimum welfare effect of the printing press in England is 0.123 (12.3%). In the light of this figure, our result of 0.052 (5.2%) seems to be relevant. The future size of MOOC’s welfare effect depends on many factors, and upon our calculation, it can reach even 15%. Considering the welfare effects, this should be aware that the results measure the consumer surplus only. Although, the existence of a product or service depends not only on the consumer surplus but on the profit-seeking behavior of producers and service providers as well. And the latter does not depend only on the price and bought a quantity of the product, but on the financing of the costs as well. In the next section explain the financing methods used so far by the MOOCs.

4 MOOC financing

Financing is a key question for MOOCs, as for other universities as well. Traditional tertiary education has problems almost everywhere [7]. Due to the financial problems, self-financing was introduced in many universities even if they offered publicly funded programs before. Where self-financing existed before, the fees are increasing continuously. Traditional universities are competing for students, and in many cases, post-secondary training also attracts potential students from universities. Publicly funded universities face hardships due to the decrease in the budget, but for-profit universities also operate in difficult environments due to the increasing costs.

Economic literature considers public education and in certain aspects tertiary education too as a public good [20]. Dozens of papers argue that knowledge gained in higher education generates benefits not only for the former student but the whole society as well. This argument is used to explain why to publicly finance tertiary education. However, public financing of higher education can be realized in a decreasing proportion due to hardships affecting the market economy. Public financing of MOOC platforms is even more complicated. The platforms and their services are owned by a well-defined entity and their home country can be easily defined. On the other hand, their students, i.e. the consumers come from all over the world, thus it is hard to tell which country

should publicly finance a particular MOOC. There is a term, global public good – see for example [21] – which means in the tertiary education context that an educated person can produce welfare benefits for many employers in many countries. So, the activity of an educated person does not produce welfare only for his/her employer, but promotes the education level of the whole society, and even more the whole world, and increase the GDP of multiple countries. MOOCs made the meaning of the global public good more general because a course offered by a given country could be attended by foreigners as well. If the students of the MOOC course start to work in their home country – which is different from the host country of the MOOC – then welfare transfer starts right after the course: knowledge offered by one country is used in another country. Due to the common action plans of the European Union [22], some publicly financed MOOC courses were realized earlier in the EU, but there are hardly any nowadays. The two most popular European platforms, the England-rooted Future Learn and the Germany-rooted Iversy, have the same financing tools as the world’s biggest (mainly USA-based) platforms.

MOOC platforms try to benefit from economies to scale. Despite this, monetizing the platforms is problematic in many cases, as the best solution has not developed from the many methods of financing. Nowadays financing depends on the type of the course and the opportunities. The existing financing models are similar to models of other types of platforms, which is not a surprise, as all the platforms that have evolved since the launch of eBay are two- or more-sided. A common way of financing is that advertisers guarantee the operation of the platform, or the services of the platform are cheaper or even free of charge for some consumers, while other consumers cover the costs. Another way is that the services offered by a platform are available for another service provider, so the platform owner can offer free of charge services for its consumers, and costs are covered by the customers of the other provider. Another possible solution is that there are basic-level free-of-charge services, while extra services have fees. Most platforms use more techniques simultaneously. Now, this describes the different monetizing methods for MOOC. This part is built on the work of [9] and [23], but also contains our views.

4.1 Certificate model

This model is the opposite of the financing model of traditional brick and mortar universities where the students pay tuition fees, but in the end, they are granted the degree free of charge if their exams are successful. MOOC courses using the certificate model offer the course free of charge, but in the end, the students should pay for the certificate. The certificate signals the knowledge and dedication of the students. MOOC courses, especially in the first some years after their launch in 2011, had no accreditation, and have not developed such fame that their certificate would be precious. However, bachelor's and master's degrees offered by MOOC universities nowadays are accredited, and so their value is much higher.

As mentioned before, only a small part of the students acquires a certificate, so this model is dangerous since MOOC institutions are interested in lowering the standards to motivate students to acquire a certificate and so pay for it. Although, the introduction

of MOOC university courses reduces this danger, especially in the case of MOOC courses offered together with traditional courses.

4.2 Fermium model

The name of the model comes from the combination of the words free and premium. In this model, some services are offered free of charge, some other ones for a fee. This could mean that audit participation is free of charge, but not for the whole course period, just for a shorter time. It has a common feature with the certificate model: students should pay for the certificate. Furthermore, many other payment services are offered by the platform: direct communication with teachers, participating in student forums, extra tuition, lengthening of the course period, etc. While many internet-based service platforms (e.g. antivirus programs, streaming services) use this model, in the case of education platforms a significant problem arises: the small degree of differentiation of the knowledge offered. A platform can ask for an extra fee only if another platform with a similar service does the same. If the other platform offers that particular service free of charge, then students will choose that platform instead of the other one.

However, increasing the attractiveness of the fermium model allows deferred payment as well. Deferred payment works in such ways that for example audit participation could be chosen at the beginning, and then later students can ask for extra time or services for payment.

4.3 Advertising model

This is the most often used method for electronic platforms. The owner of the platforms allows a third party to place an advertisement on the platform and asks for it some fees. The advertisements that appear in MOOC courses are consistent with the areas of interest of the students. On one hand, this is beneficial for the students because the tuition fees can be lower, or courses are offered even free of charge, but on the other hand, they should suffer the ads. As in the case of other platforms, in most cases MOOCs cannot generate enough income by advertising, thus it is just an additional way of financing.

4.4 Job matching model

Like the advertising model, this model also builds on the homogenous areas of interest of the students. Potential employers are interested in getting extra information about the students, and therefore they can offer more adequate job opportunities to the best students. The platform allows employers for some charges to check the detailed results of the students. This is also beneficial for the students, since they can pay lower tuition fees, and the most skillful ones can get a job immediately at the end of the course.

4.5 Subcontractor model

In this model a platform allows other universities to offer their courses on that particular platform. Traditional universities can use this model to offer MOOC courses without owning a platform. Hence, the most important element of this model is that the platform grants universities to launch their courses, but does not interested in how the particular university or subcontractor finances its course. Coursera is a good example of this financing method: it offers infrastructure, but is not owned by a university, only works with them with contracts.

4.6 Campus-imitating model

This method did not exist at the time of the publishing of [9] and [23], the name was created by ourselves. It refers to bachelor's and master's programs that welcome students in return for remuneration, like traditional universities. This category contains mixed courses also, which are partly online, partly offline, i.e. on-campus courses. This financing method is becoming more and more popular.

Although students in some cases can involve themselves in these programs without any fees not requiring a diploma, the program is designed for students who would like to get a degree. These courses signal that the relevance of MOOC universities will increase in the future, and traditional universities should consider involving themselves in this new trend.

5 Conclusion

MOOC is an internet-based, dynamically developing education method that is used mainly in tertiary education. Although it has not been able to conquer those less developed parts of the world, where it was impossible earlier to participate in tertiary education, in the future it could change. Collecting and synthesizing MOOC data is hard despite MOOCs being in the online space and the platforms collecting all the important data. The most serious hardship in collecting data is the absence of robust statistical systems and statistical reporting requirements. The welfare effect of MOOC is like the welfare effect of Gutenberg's printing press, although the quantitative results are not robust and reliable due to the sensitivity of data stems from the fact of not having precise data collection methods. Surely, MOOC universities offer bachelor's and master's degrees much cheaper than traditional, brick-and-mortar universities. On the other hand, MOOC has some problems, especially in the case of a first degree: despite the existence of online forums, it cannot grant the evolution of social networks that are created at traditional universities. Such a network requires the physical presence of the students. MOOC is a good example of Christensen's disruptive innovation: those universities which stay out, miss out, and will suffer disadvantages in the competition. It is necessary to evaluate the situation of different countries, outside the main trends of MOOC as well, like in Hungary: how should traditional and MOOC education relate to each other.

6 Acknowledgment

Authors would like to thank the editor-in-chief and the reviewers for their valuable comments.

7 References

- [1] C. A. Haryani, A. N. Hidayanto, and N. F. A. Budi, "Sentiment Analysis of Online Auction Service Quality on Twitter Data: A case of E-Bay," in *2018 6th International Conference on Cyber and IT Service Management (CITSM)*, 2018, pp. 1-5. <https://doi.org/10.1109/CITSM.2018.8674365>
- [2] T. R. Liyanagunawardena, A. A. Adams, and S. A. Williams, "MOOCs: A systematic study of the published literature 2008-2012," *International Review of Research in Open and Distributed Learning*, vol. 14, pp. 202-227, 2013. <https://doi.org/10.19173/irrodl.v14i3.1455>
- [3] B. Zheng, D. Tong, M. Li, F. Liu, C. Hong, G. Geng, *et al.*, "Trends in China's anthropogenic emissions since 2010 as the consequence of clean air actions," *Atmospheric Chemistry and Physics*, vol. 18, pp. 14095-14111, 2018. <https://doi.org/10.5194/acp-18-14095-2018>
- [4] A. Ng and J. Widom, "Origins of the modern MOOC (xMOOC)," *Hrsg. Fiona M. Hollands, Devayani Tirthali: MOOCs: Expectations and Reality: Full Report*, pp. 34-47, 2014.
- [5] W. C. Kim, "Blue ocean strategy: from theory to practice," *California management review*, vol. 47, pp. 105-121, 2005. <https://doi.org/10.1177/000812560504700301>
- [6] J. Reich and J. A. Ruipérez-Valiente, "The MOOC pivot," *Science*, vol. 363, pp. 130-131, 2019. <https://doi.org/10.1126/science.aav7958>
- [7] C. M. Christensen and H. J. Eyring, *The innovative university: Changing the DNA of higher education from the inside out*. John Wiley & Sons, 2011.
- [8] D. Shah, "Year of MOOC-based Degrees: A Review of MOOC Stats and Trends in 2018," 2019.
- [9] R. M. Baker and D. L. Passmore, "Value and pricing of MOOCs," *Education Sciences*, vol. 6, p. 14, 2016. <https://doi.org/10.3390/educsci6020014>
- [10] J. A. Schumpeter, "II. Capitalism, Socialism, and Democracy, 1942," 1976.
- [11] M. Korey, "The Elements of Typographic Style. by Robert Bringhurst; A Short History of the Printed Word, by Warren Chappell; revised and updated by Robert Bringhurst," *Papers of The Bibliographical Society of Canada*, vol. 39, 2001. <https://doi.org/10.33137/pbsc.v39i1.18206>
- [12] J. E. Dittmar, "Information technology and economic change: the impact of the printing press," *The Quarterly Journal of Economics*, vol. 126, pp. 1133-1172, 2011. <https://doi.org/10.1093/qje/qjr035>
- [13] J. R. Hicks, "Value and Capital, Oxford: Oxford University Press," *Hicks Value and Capital 1946*, 1946.
- [14] J. Greenwood and K. A. Kopecky, "Measuring the welfare gain from personal computers," *Economic Inquiry*, vol. 51, pp. 336-347, 2013. <https://doi.org/10.1111/j.1465-7295.2011.00447.x>
- [15] L. Törnqvist, "The Bank of Finland's consumption price index," 1936.
- [16] A. Petrin, "Quantifying the benefits of new products: The case of the minivan," *Journal of political Economy*, vol. 110, pp. 705-729, 2002. <https://doi.org/10.1086/340779>
- [17] A. Goolsbee and P. J. Klenow, "Valuing consumer products by the time spent using them: An application to the Internet," *American Economic Review*, vol. 96, pp. 108-113, 2006. <https://doi.org/10.1257/000282806777212521>

- [18] J. Hersh and H.-J. Voth, "Sweet diversity: Colonial goods and the rise of European living standards after 1492," 2009. <https://doi.org/10.2139/ssrn.1443730>
- [19] B. Efron, T. Hastie, I. Johnstone, and R. Tibshirani, "Least angle regression," *The Annals of statistics*, vol. 32, pp. 407-499, 2004. <https://doi.org/10.1214/009053604000000067>
- [20] S. Marginson, "Higher education and public good," *Higher education quarterly*, vol. 65, pp. 411-433, 2011. <https://doi.org/10.1111/j.1468-2273.2011.00496.x>
- [21] P. Kanowski, D. Yao, and S. Wyatt, "SDG 4: Quality Education and Forests—'The Golden Thread'," *Chapter*, vol. 4, pp. 108-145, 2019. <https://doi.org/10.1017/9781108765015.006>
- [22] D. Jansen and R. Schuwer, "Institutional MOOC strategies in Europe," *Status Report Based on a Mapping Survey Conducted in October-December 2014*, 2015.
- [23] P. Belleflamme and J. Jacqmin, "An economic appraisal of MOOC platforms: Business models and impacts on higher education," *CESifo Economic Studies*, vol. 62, pp. 148-169, 2016. <https://doi.org/10.1093/cesifo/ifv016>

8 Authors

Shama Urooj working as a lecturer at the Department of Business and Administration and Management Sciences, Superior University Lahore. She has done her master's from the University of Management and Technology Lahore. Her research mainly focuses on accounting and finance, entrepreneurship, and leadership (Email: shama.urooj@superior.edu.pk).

Ali Sajjad Ph.D. scholar at the University of Utara Malaysia and working as a Senior Lecturer at the Department of Business and Administration and Management Sciences, Superior University Lahore. He has done his master's from Superior University Lahore. His research mainly focuses on Banking and finance, Islamic finance, entrepreneurial finance, and leadership (Email: ali.sajjad@superior.edu.pk).

Dr. Neelam Bano is an assistant professor at the Department of Business and Administration and Management Sciences, Superior University Lahore. She has done her Ph.D. from the University of Management Technology. Her research mainly focuses on Islamic Studies, Islamic finance, and ethics (Email: neelam.bano@superior.edu.pk).

Muhammad Mukarram working as a lecturer at the Department of Business and Administration and Management Sciences, Superior University Lahore. He has done his master's from the University of Management and Technology Lahore

Article submitted 2022-04-01. Resubmitted 2022-05-08. Final acceptance 2022-05-09. Final version published as submitted by the authors.