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The digitalization of Indian Education System: A Macro Perspective

*[1]Ravi Kant and [2]Monika Gaur

[1]Assistant Professor at Sri Ram College of Commerce, University of Delhi (India)
[2]Doctoral Fellow at Faculty of Management Studies, University of Delhi (India)

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***Corresponding Author**
Email: ravinirvana87[at]gmail.com

ABSTRACT

Rapid digitalization in the modern world has been transforming almost every aspect of human life. It has also entered the education system worldwide. The countries predominantly populated one and their education institutions needed to manage this emerging challenge rationally. In the case of India, the benefits of digitalization in higher education about affordability, high quality, employability, and inclusiveness exist but, whether the higher education would enormously be benefited from the extensive use of digitalization or not is a question. The answer to this question should not be evaluated only within the territory of the education system but also on the front of the aggregate economy. The challenges, such as inaccessibility of the internet, digital illiteracy, and language barriers, would hamper the process of the digitalising education system. In addition to that, the rapid digitalization process, on the front of the macro-economy would create unemployment, inequality of income, and poverty in highly populated countries. This study specifically focused on the digitalization of Indian higher education and its impact on the system and on the aggregate economy.

1. Backdrop

The development of education has positive externalities not only at the micro-level but also at the macro level. The broad spectrum of education is an investment in human capital since it augments individual earnings, productivity, consumption, savings, and investment and contributes to national income through direct and indirect channels. Besides, it significantly contributes to the front of expanding social capital and environmental awareness of the community. There exist significant reverberations of education on the productivity of an individual. Several socio-economic researchers and thinkers have identified the significance of education. Higher education is considered explicitly as one of the significant factors for a robust and efficient economic scenario in the medium and long run. The education, specifically higher education, is aligned to discovery, application of knowledge, and appropriate dissemination of knowledge. The positive outcomes of the invention and research and development have been harnessed by most developed economies worldwide through the higher education system. Economies with better-educated citizenry are more equipped to deal with new technological and other challenges. It has also been observed that an educated person tends to exhibit awareness of his/her health, higher civic involvement, and less involvement in crimes, contributing to higher development and less cost for the economy.

In the recent era, economies across the globe have been facing numerous challenges in front of the education system. The challenges are not only observed in the context within the education system but also at the macro level. Indian education system has been facing challenges such as lack of public expenditure, backward infrastructure, low accessibility, and poor management and governance.

The red-hot challenge that has been emerging is the digitalization of the education system. The recent era of industrialization 4.0 and digitalization has considerable cost and benefits at the individual level and macro level. Digitalization in education has many benefits, such as affordability, quality, employability, and inclusiveness. On the other side, it has new emerging challenges also. In order to reap appropriate benefits from digitalization, the economy should be well-equipped in terms of infrastructure (power and telecommunication), internet accessibility, digital literacy, and solving the problems of language barriers.

The presented study has been categorized into five parts: the subsequent section deals with the significance of education on economic growth and development. Section three discusses the digitalization, higher education, and its challenges. Section four comprehends macro externalities of higher education, and section five provides the policy and conclusion.

2. Significance of education on economic growth and development

The education system has been witnessed a sharp increase in terms of volume and quality. The rapid expansion of the system has been changing globally in the wake of new learning methods through digitalization. From the past twenty years, engagement in higher education has been expanding rapidly globally (Dohmen, 2018). Some recent studies focused on the significance of education and higher education, which suggest that it is both a result and a factor of income and has the ability to enhance income at the individual and aggregate level. The positive externalities of education are numerous from the perspective of population control, economic benefits, and socio-environmental awareness. Higher education can be observed as a basis of research and development and their further consequences. The theory of Human Capital is based on human resource development through education. In the 1950s, some economists discovered that the investment of human capital was the primary element to raise individuals' wages compared to the quantitative input of other components such as

land, financial capital, and labor force (Salamon, 1991). A number of economists and educationists have already identified the benefits of higher education on economic growth and development. The study by Pancavel (1991), Bassanni ve Scrapetta (2001), Barro and Sala-i-Martin (1995), T.C Lin (2004), Wolf and Gittleman (1995), Nelson and Phelps (1965), Theodore Schultz (1960, 1963), Jacob Mincer (1958, 1974), Becker (1975), have identified the role of education or human capital in economic growth and development. It implies that investment in human capital is more productive in terms of increasing the income of individuals as compared to investment in other inputs like land and financial resources.

3. Digital Transformation

In a recent trend, industry 4.0, artificial intelligence, and big data analysis are now a new linchpin in the global growth and development process. The digitalization of the economy is assumed to fetch high efficiency, growth, competitiveness, and profitability in the economy. It has entered almost all sectors and systems of the economy, and the education system is not left behind. With the significance of digitalization of the education system, most reputed institutions of developed and developing economies have been reaping the benefits from the digitalization process. It is now a persuasive instrument in respect to the modernization of the global education atmosphere. Digitalization implies the transformation of information types into digital language. Various analysts and experts have noted the phenomenon of digitalization (mostly British, including Tim Berners-Lee, one of the inventors of the World Wide Web (Stuart, 2014)) regards the transition of education cognition into the digital stage as the turning point in the history of education.

3.1 Significance of Digitalization of Higher Education

The digitalization of education is assumed to fetch several benefits to the individual and the overall economy. In the case of India, where educational infrastructure is not so developed in most rural areas, the digitalized education through the internet would reach every people who demand and is interested in getting an education. The enhancement of high-quality education opportunities can also be disseminated through the internet or digital system. The significance of digital education is the following:

3.1.1 **Affordable:** Online education is assumed to be less costly as compared to other modes of teaching methodology with more outstanding quality and low infrastructural cost.

3.1.2 **High Quality:** The lectures from online education is created and delivered by the best teachers, which assure high quality in providing information and knowledge.

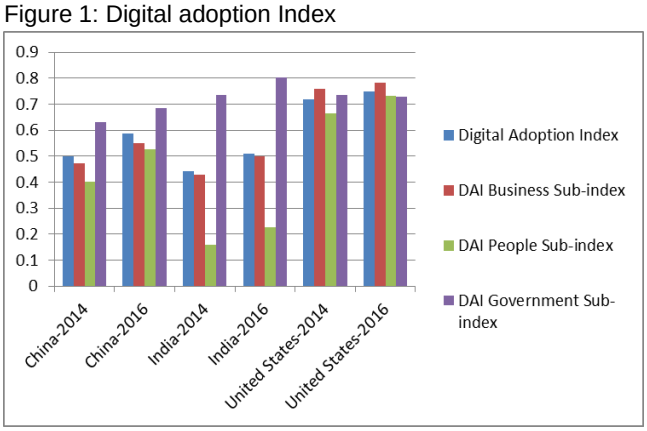
3.1.3 **Inclusiveness:** Online education is assumed to be more inclusive in nature, which has the potential to reduce the rural-urban divide, gender divide, and class divide in the form of accessibility and quality of education.

3.1.4 **Employability:** The online education and teaching method are also be assumed to enhance employment opportunities for the youth. It can create job opportunities in the IT sector, software, and smartphone industry. On the other hand, online education would have a more flexible curriculum to cope up with market requirements.

3.2 Issues and challenges of digitalization of higher education

With the several importance of digitalization of the education system, there are numerous issues and challenges, also mainly in the context of populated and developing economies. In the discourse of this expansion and efforts to widen participation, people in medium and low-income countries are not left behind both in the debate on developments and in their opportunities to participate (Salmi 2017). The developing economies, such as India, have been facing numerous bottlenecks not only in the context of the education system but also at the aggregate level. The low per-capita income, poor infrastructure, high level of unemployment, income inequality, and poverty have been instrumental in fuelling high inequality in the accessibility of quality education. The regional imbalances in power supply, telecommunication, and internet connectivity are crucial for the digitalization of the education system. The majority of the population in rural India, where around 70 percent of people live, has still not had proper internet accessibility. In order to access and online education, digital literacy is also required, and the majority of rural people are still not very much equipped with it. Figure 1 depicts that digital adoption remains lowest in India amongst the United States (US) and China. However, the performance of Digital adoption has improved in India since 2014. India's performance in the Government sub-index remains satisfactory since it outperforms the US and China.

Figure 1: Digital adoption Index



Source: World Bank, 2020. Link accessed. https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index

In some of the academic institutions, specifically in the rural areas, a school teacher and college professors themselves are not interested in using digital tools for conducting classes. Language and content-related challenges also jeopardize the online delivery of education.

There are several different languages in the different states; publishing all the digital content in all these regional languages sometimes becomes challenging for the agencies. In addition

to that, in rural areas, the lack of on-time up-grading digital equipment and tools has further fuelled the problems related to the digitalization process. Because of the low per-capita income and high poverty level in rural areas, the self-sustainable mechanism of digitalization of education is not wise to assume. The state and central government needed to step in for that. The regional gaps in the digital education funds further fuelled inequality in education in quantitative and qualitative aspects. The variations in the number of hours of internet accessibility and its speed and digital literacy tend to create inequality in the quality of education. In highly populated developing economies such as India, the digitalization process of the education system requires a profound observation and appropriate cost-benefit analysis in order to recover the several related issues and challenges.

4. Macro externalities of digitalization in higher education

The significance and challenges of the digitalization of the education system have been reviewed in the earlier part of the study. The impact of the digital process in the education system can not be confined to within the education system, but it holds some externalities in the overall economy.

It is crucial to analyze the macro perspective of the digitalization process of the education system. The process of Industry 4.0, artificial intelligence, big data, digital and online education, etc. have been implemented in advanced economies at the onset. Such economies are characterized by low population level, better infrastructure, high per-capita income, good governance, high literacy level, and low unemployment compared to developing economies such as India, China, and Brazil. The implementation of digital technology through associated production of devices, tools, and services can be aligned with the increase in efficiency, competitiveness, income, profits, and investments, and augments employment in the economy. However, its impact is not uniform in each economy. Advanced economies enjoy higher economic growth originating from digitalization as compared to emerging and highly populated economies because they are labor-intensive.

The issues and challenges at the macro front that have been facing by highly populated economies are not similar to advanced economies. These economies may face several new challenges in the process of digitalization of the education system, such as the paucity of funds, educated unemployment, and inequality in income.

4.1 Disparity in Public Investment

The regional imbalances in the public expenditure on the digitalization process of the education system by State and Central government can be observed in the country such as India. The paucity of public investment and regional imbalances in providing digital tools and services would further lead to inequality in quantity and quality education across the states.

4.2 Impact on Employment-the digital divide

With the introduction and dissemination of Information and Communication Technology (ICT), the change in the employment situation is inevitable. The rapid process of digitalization in education may have a mixed impact on employability. The highly digitally skilled and technologically advanced people in the education system may earn higher income as compared to less digitally skilled. There would be an increase in employment for the technically equipped workforce, but on the other hand, the less digitally skilled may face the stress of losing employment. The impact of the digitalization of education, particularly in the highly populated economy like India, needed a sound and appropriate policy mix in respect of employment.

4.3 Inequality in Income

It has been noted that a digitally skilled and advanced person tends to have more opportunities and earn higher income as compared to a less skilled and advanced one. The increase in income of urban digitally skilled persons may snatch the job of the rural digitally unskilled person. The recorded lectures and online classes would reduce employment opportunities in the education sector in rural areas to fuel educated unemployment in rural areas. Low employment opportunities and retrenchment in rural areas may further lead to high-income inequalities in the overall economy.

4.4 Fiscal Crunch

In order to introduce and disseminate the digitalization process in the education system, the State and central governments require massive fiscal funds. The regional and state imbalances in terms of infrastructure, and public revenue, would further enhance the problem of fiscal space. The availability of funds, proper management, and appropriate policies are much required to digitalize the education system adequately. Since, in India, few States are backward, where per-capita income is meager, the digital education system would not be self-sustained by the market. The Central and State government have to intervene through proving fiscal packages.

5. Epilogue

The significance of the digitalization of the education system is pioneered and practised in the developed and high-income countries. They have appropriate infrastructure (power, telecommunication), low population density, and high digital literacy levels compared to developing countries. The highly populated countries where issues of inappropriate infrastructure, low literacy and digital literacy, high unemployment, and poor management persist, they have been facing several challenges while implementing digitalization in different sectors. The digitalization of the economy is assumed to bring efficiency and competitiveness in the production process, which further leads to positive externalities in higher profitability, capital formation, and investments. The introduction and implementation of digital technology in the education system in the country, such as India, is a mammoth task, and it requires effective implementation of policies in respect of public investments and proper governance. In addition to that, in order to reap the benefits of digitalization, the economists and policymakers are required to do a proper cost-benefit of the digitalizing education system in the medium and long rung run with the perspectives of its impact on employment, income inequality, and quality of education. The digitalization should be used as a hack to alleviate illiteracy, poverty, and should bridge the knowledge gaps in order to create more egalitarian and robust social capital.

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