INFORMATION TECHNOLOGIES FOR THE NEXT FUTURE WORLD: IMPLICATIONS, IMPACTS AND BARRIERS: PART - I

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Abstract: The ever-evolving digital terrain of the 21st century is increasingly shedding light on the role of information technology (IT) in framing our reality to come. While it is undeniable that technology empowers humans and helps them improve the world, we must also consider the challenges, risks, and problems involved with this fast rate of development, among which are privacy issues and environmental sustainability. This study conducted a systematic literature review to identify the implications, impacts, and potential barriers of IT for advancing numerous fields across the globe. Analyzing cutting-edge technologies like artificial intelligence (AI), blockchain, or biotechnology, this piece explains that IT can transform our existence in the future. At last, this study aims to provoke thinking in the audience on complicated matters facing IT technologies in the world of the future by looking into the sources of power they have, as well as the ways to use them for the prosperity of society and the prevention of apparent mistakes. The second part of this study will assess the adoption of IT in social and economic growth using a hybrid PLS analysis.

Keywords – Information technology, Systematic literature review, Barriers, Impacts, Emerging technologies.

I. INTRODUCTION

During the ever-faster pace of technology, information technology (IT) has become the cutting edge of evolution, recasting human civilization and leading to a new era full of opportunities [1]. This study explores the transformational aspects of IT for the future; it looks at how IT affects different areas of human activity and how it improves the labor market and the workforce in particular. Having past and current trends as a basis in the science, and then viewing future scenarios, we aim to see how the trend in the latest technologies will raise the future world to a whole new level and may bring man's status into a journey of complete change. The realm of labor has undergone a significant digital disruption through Artificial Intelligence, with people working in distinct ways, job activities being reorganized, and jobs themselves being re-evaluated [2]. The emergence of automation, artificial intelligence (AI), and robotics technology has also been driving the automation of simple duties and transforming jobs and older desirable abilities [3].

Although robots have enhanced speed and productivity, these technologies have also caused the fear of job loss and polarization in the labor market. Nonetheless, IT has created new opportunities, enabling remote work or self-employment because of the Internet and global access to this inexpensive tool. Consequently, it helps to expand the boundaries of traditional employment models [4]. The present influence of Information Technology (IT) is multidimensional, as it can significantly alter how we think, behave, communicate, and work. Today's society is under the onslaught of information technology advancements that have developed all the areas of our lives, from work and communication to interaction. The advent of cloud computing, data analytics, and artificial intelligence (AI) introduced a digital revolution into business processes; thus, companies can now gather relevant information, maintain profitability, and foster innovations [5, 6]. In recent years, the job market has undergone significant changes. Its demand is high for IT-proficient professionals

while there is a rise in traditional jobs that embrace digitization technologies to shape their activities. People have had a mobility boost and developed more ways of communicating through the help of technology and collaboration tools. Further, IT and machine learning with advanced AI have now been extensively used in other fields like construction, management, and research works [7]. Prior research has extensively examined and analyzed the effects and obstacles of IT in many individual industries. However, there is only a tiny amount of research that specifically investigates the broader influence, consequences, and obstacles of IT on global growth in the future. In addition, this research performed a comprehensive analysis of existing literature using R-software and effectively emphasized the unique findings that contribute to the novelty of this work in the area.

This study analyses how IT has influenced people's lives, economy, and society by using systematic or bibliometric analysis. It enumerates the IT revolution's positive effects and possible downsides. The first part of our study will be a systematic literature review (SLR), which will identify and discuss the impacts, barriers, and implications of information technologies for the advanced world. The next part of our study will cover a hybrid PLS analysis of the adoption of information technologies as a driver of social and economic growth by conducting a survey.

II. LITERATURE REVIEW

Information technology (IT) has emerged as a significant driver of economic growth, contributing substantially to the Gross Domestic Product (GDP) of nations worldwide. Its impact on GDP stems from various factors, including increased productivity, efficiency gains, innovation, and the creation of new industries [8]. One fundamental way IT contributes to GDP is through productivity enhancement. IT tools and systems streamline business processes, automate repetitive tasks, and facilitate communication and collaboration, boosting overall productivity in both the public and private sectors. For example, businesses leverage IT solutions such as enterprise resource planning (ERP) systems, customer relationship management (CRM) software, and supply chain management platforms to optimize operations and reduce costs. This increased efficiency translates into higher output per worker, ultimately contributing to GDP growth.

Moreover, IT fuels innovation by enabling the development of new products, services, and business models. Digital technologies have given rise to disruptive innovations in finance, healthcare, transportation, and entertainment [9]. For instance, e-commerce has transformed retail, allowing businesses to reach global markets and consumers to access a wide array of goods and services with unprecedented convenience.

Digital technology has revolutionized how survivors work and connect with others, even though it is accompanied by many challenges and risks that should be mitigated and used ethically [10]. One of the core issues in information technology production tasks is related to ethical problems around the privacy protection, collection and use of personal information for surveillance (or control). Amid the Internet's growth, personal data becomes more exposed to digital devices, social media networks, and online services and then more dangerous for individuals, big companies and governments to misuse their private data [11]. Similarly, AI and ML technology trigger issues of fairness from algorithmic bias to the power-taking of technology that can reproduce social inequalities [12]. Displacements of jobs, prejudice appointments and the destruction of privacy rights are just some of the problems rising, and they show that control regulations and ethical codes should have been a priority in the past.

IT generated environmental problems, with energy consumption, electronic waste, and carbon emissions all stemming throughout its life span. The output of devices, usage, and disposal of electronics, data centers, and the whole IT infrastructure comprises relatively high energy and materials usage, leading to direct environmental and climate change challenges. The data center is the most significant electricity consumer, requiring ample power to run servers, excellent systems, and other equipment [13]. This ultimately leads to emissions of carbon dioxide and pollution. Further, the fast obsolescence of electronics and the need for systems to recycle and dispose of them could create electronic waste, possibly causing health issues when managing carelessly. To overcome the environmental problems created by information online, data centers increase energy efficiency, innovate data center operations, and develop eco-friendly practices in designing, manufacturing, and disposing of electronic gadgets.

III. RESEARCH METHODOLOGY

This study presents a systematic literature review (SLR) that examines the effects and obstacles of information technology (IT) in the contemporary world. The purpose of this review is to provide an understanding of prior research and to provide guidance for future research in this field. Developing a review process is an essential and crucial stage for any systematic literature review (SLR) [14]. The next phase

involves determining the inclusion and exclusion criteria, which should be established according to the study objectives in order to categorize the studies accurately. The third phase involves implementing a search strategy, which entails a series of stages to choose and identify relevant research, followed by a thorough assessment and, ultimately, the extraction and synthesis of data to derive conclusions. Fig. 1 below shows the overall process that was used in this study to conduct our bibliometric analysis using R software.
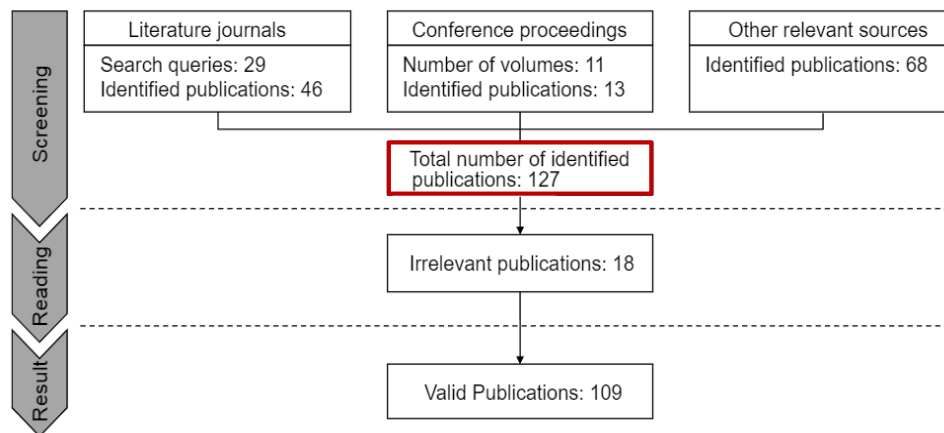

Fig. 1. SLR process used in this study.

Data collection and synthesize process

In order to choose relevant research and gather information, it is important to create and adhere to a search strategy. The first phase of our search technique was creating a search query. In order to do this, we focused on and merged our keywords in accordance with the prior study inquiry. The search strings used a two-step process that included numerous inquiries. The first stage involves merging the three sets of keywords: ["barriers" OR "obstacles" OR "difficulties" OR "challenges"] AND ["information technology" OR "information systems" OR "innovation adoption" OR "IT" OR "ICT"]. AND ["effect" OR "execution" OR "sway"].

In the second phase of our search approach, we aimed to find specific terms included in the titles, abstracts, and keywords of the publications. The search technique included electronic sources such as databases, journals, books, and reviews. The chosen sources include Science Direct (Elsevier), Springer, the ACM digital library, IEEE Xplore, Emerald Insight, Taylor & Francis online, as well as research platforms like Google Scholar and ResearchGate. The systematic literature review was conducted from October 2023 to March 2024. In the first phase, we located 127 publications by using the specified keywords in various search engines, databases, journals, and books. These papers were then compiled and organized using the reference management software Endnote X9. During the second step, we identified the relevant literature for the systematic literature review (SLR) by evaluating the titles. At this juncture, articles that were obviously unrelated to IT were eliminated. In order to get relevant documents, a total of 109 papers were chosen from a pool of 127 materials.

In order to gain a deeper understanding of our systematic literature review focus, we conducted a more detailed analysis. This analysis involved classifying the identified studies based on the type of IT adoption, as well as the different fields in which these barriers were explored (Fig. 2). As shown, 53 percent of the selected research pertains to articles examining IT in a broad sense, which is the greatest proportion. This underscores the significance of the chosen studies.
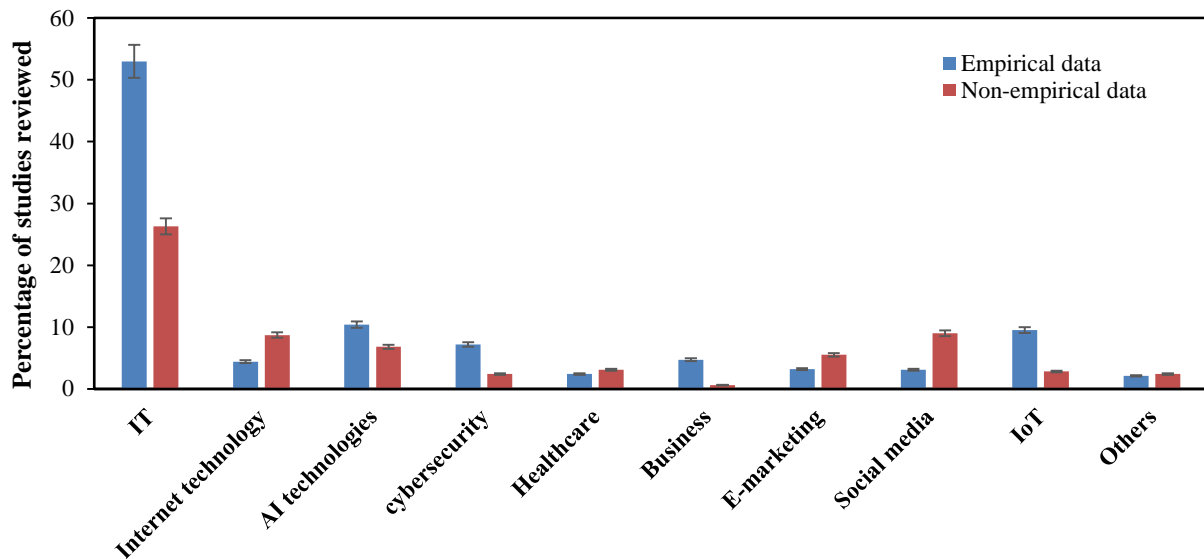
Fig. 2. Categorization of research according to the kind of IT implementation

IV. IMPLICATION OF IT

The large-scale implementation of Information Technology (IT) across various fields presents opportunities and challenges. On one hand, IT can drive innovation, improve efficiency, and offer new solutions to complex problems [15, 16]. From our systematic literature analysis, a total of six major fields have been identified that use fundamental information technology which is illustrated in Fig. 3 below. Among them, the development of software holds the highest proportion. However, data management, along with networking and infrastructure, also uses a greater proportion of IT in their tasks.

The most significant and revolutionary change in technology is information and communication technology. This revolution forged a split between everything old yesterday. Still, it would have no relevance tomorrow as what was trendy and appealing is no longer popular in the twinkle of an eye. Although such modification takes place, the usage of this technology becomes more needed at that moment. Thus, these technologies, with the power of collection, analysis, and decision-making with the involvement of machines, have become the fact standard compared to classical resources. These have engendered an enhanced interest in new-age information and communication technologies by companies and individuals. It is true that, at present, the world is experiencing a swift changeover in the requirement for information systems in terms of quantity, quality and access to information sources, thus giving human beings a wide range of choices from which they can make the best decisions based on dynamic changes in the environment for enterprises. This vividly depicts the growing significance of information systems and their power to grasp the information requirements of thriving enterprises [17, 18]. These systems are the reason for their development, making them more effective and efficient. The success of these systems is mainly attributed to the fact that they have adopted and become very tech-savvy, with the help of such technologies, which have greatly facilitated access to information and have lowered the cost of access.

The telecommunications industry experienced a time of accelerated change during the period that is mentioned because the spark for the transformation was technological. This infrastructure has created the platform for what we now call the information age or knowledge economy. This expression means an economy that rises on information dissemination and its technological means of delivery past the time and at lower costs. This is explained by the massive growth in the technology sector and the size of its contribution to other aspects.
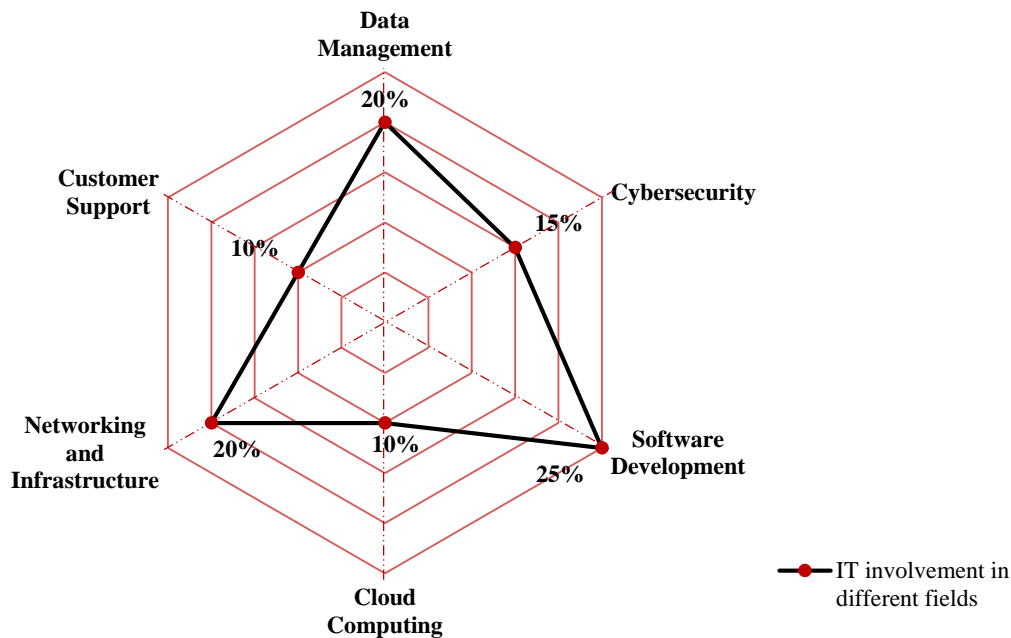
Fig. 3. Different sectors that use fundamental information technology

V. PAST AND PRESENT IMPACTS OF IT

IT has molded the life of humanity both directly and indirectly from the past to the present. Hence, it plays a crucial role in setting a trajectory for the future. It is less about bass likes here but instead centered on historical and modern times context, showing how it shapes the work market, workforce, and the future. By examining the actual and potential positive and negative results of IT progression, this paper strives to present findings on how IT has changed holistically and whether or not the effects of IT evolution can be beneficial. However, the influence of Information Technology on global networking is only partially positive. The evolution of information technology can be challenging to identify the beginning due to the development of computers and the Internet. Cutting corners with IT over the past may have led to the automation of tasks, improvement of processes, and enabling global interconnectedness. The digital revolution was initiated in the mid-20th century when mainframe computers were introduced, which resulted in growth and boost of efficiency and productivity in many sectors of the economy [19, 20].

The spreading of personal computers during the eighties and nineties did much to ensure that individuals and businesses could hold computing power as a promising self-empowerment tool. The Internet was an invention that changed how communication and information were sent to places, thus shifting the Internet era. E-commerce became a new trend that replaced traditional retailing and changed the commerce standard. Additionally, blockchain revolutionizes global trade by offering a secure and immutable way of exchange. Smart contracts, included in the blockchain platform, automate operations, such as trade document tracking and insurance payments, to meet predefined conditions. It is viewed as the "sleek engine" of the 21st century, for it rapidly impacts societies' economic, social, and cultural aspects. IT has transformed, and continues to transform, all aspects of our lives: trade, finance, education, jobs, power generation systems, health care, factories, budgets, national security, transport, communications, the entertainment industry, research, and engineering [21, 22]. IT, as the sector that is both directly and indirectly (other sectors partly related to IT) linked to the development of the economy, still increases in size and influence.

From this perspective, the information-communications-technology industry has grown by 16.3% since 2010, contributing nearly 5% to the country's overall gross domestic product or GDP. In 2011, an article by the McKinsey Global Institute considered the ratio of economies directly related to the Internet in 2009, adding up to an average of 3.8 percent of each country's GDP [23]. Interestingly, while federal funding for networking and information technology research and development in the fiscal year 2010 constitutes approximately 0.03 percent of the US GDP (which sums up to roughly $4.3 billion), the total contributions of the IT sector to the U.S. Economy were much higher than that, strapping at 417 billion dollars by 2008 [24].

A day without individualized media content excludes television, HDTVs, MP3 audio, cable or internet distribution for videos, parties done with animation software, and computer games. For instance, when there were no flights, passengers could not travel with being less fortunate to use the GPS, meteorologists had no models, monetary transactions could not be maintained electronically, and factories had to work manually without automation. It would become a time when the United States military did not have the capabilities to

strike precisely because it lacked the equivalent of intelligent munitions, could not fight a network-based war, and had no technological dominance. The arriving astronauts would almost certainly be greeted by excited folks throughout the United States and the rest of the developed world. Everyone would have what for them, the "the day the Earth stood still."

The comprehensive literature evaluation revealed that the average annual GDP growth rate for the global economy increased from 2.97% to 3.74% for the periods of 1983-2003 and 2003-2023, representing an acceleration of 0.77%. Simultaneously, the annual labor productivity (ALP) growth rate increased by 1.43%, specifically from 0.98% to 2.41% (Table 1).

Table 1. GDP and ALP growth acceleration from the period of 1983-2003 to the period of 2003-2023

Indicator	1983-2003	2003-2023	Growth acceleration
GDP growth			
Average country	2.76%	3.55%	0.79%
Total world economy	2.97%	3.74%	0.77%
ALP growth			
Average country	0.91%	1.28%	0.37%
Total world economy	0.98 %	2.41%	1.43%

VI. BARRIERS IN IT ADOPTION

IT has made many positive changes, making our lives modern. However, among its great benefits, it also brings forth a vast area of detriments that should be carefully considered. Here, we discuss how digital technology is negatively influencing our lives in the modern age from the perspective of three main aspects, which are social, economic, and ethical.

The systematic literature review undertaken in this research has shown that Information Technology (IT) plays a crucial role in the growth of all nations. This study focuses on the SLR conducted to get insights into IT adoption in the future world and the factors that hinder IT adoption in the context of modernization. While IT-driven innovations create new job opportunities in emerging sectors and occupations, they also lead to the automation of routine tasks, resulting in job displacement and shifts in labor demand. Technology has as their job creator feature by driving the demand for services of experts in software development, data analysis, cybersecurity and digital marketing, among other fields.

Economic consequences of information technology on earnings differences are regarded as a complex and multifaceted issue driven by different factors, including technology accessibility, digital literacy, skill levels, and labor market conditions. The essence of IT is to increase output, create new jobs, and a conducive economy. However, this differs across various social strata, creating income and wealth distribution inequities. A significant factor behind the income misbalance of the digital era is the uneven distribution of digital facilities and technologies. Social-economic determinants like income, education, and geographic location can form barriers that impede and limit people's capacity to fully optimize digital tools. The SLR conducted in this research reveals that, among all the other obstacles, the cybersecurity threats are deemed the most significant. The issue of data privacy and data security is a significant challenge for the widespread adoption of IT in the future. Fig. 4 below depicts the primary and most significant apprehension over the implementation of information technology in the future evolved civilization.
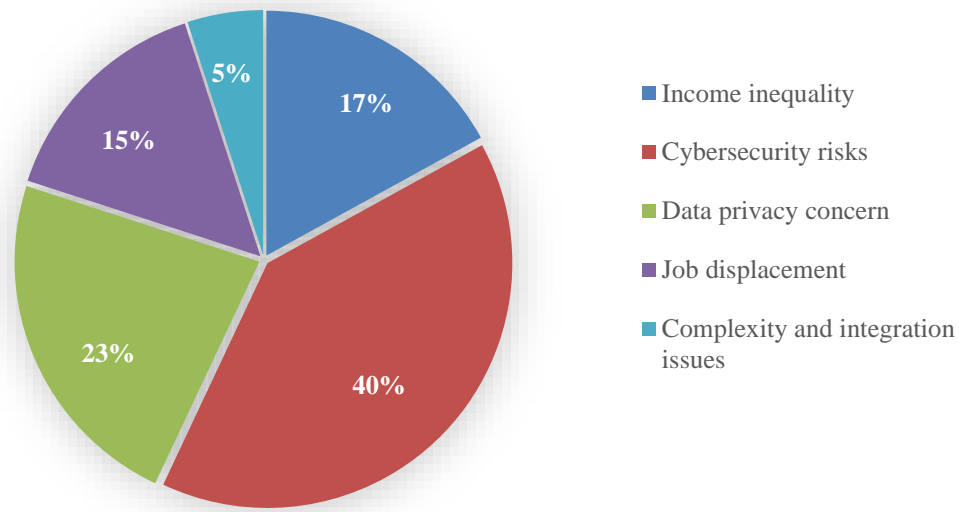
Fig. 4. Barriers to adopting IT in the future world from SLR.

VII. CONCLUSIONS AND FUTURE RECOMMENDATIONS

This study has explored more profoundly the transformational aspects of IT for the future world; it looks at how it affects different areas of human activity and improves the workforce in particular by conducting a systematic literature review. The advanced learning period will only determine the world's future, specifically information technology. Technologies of the Latest Age, including Generative AI and low and no-code programming, may solve life improvements in each aspect. Through information based on the job market, technology has generated and transformed new jobs for AI specialists, cybersecurity experts, and digital innovators with their emergence.

Furthermore, in the workplace, information technology knows no hand and enhances productivity, communication, and efficiency, helping organizations to be dynamic in light of the constantly declining market conditions and innovation. Consequently, the use of technology in our lives in the future remains indefinite and even limitless. As technology evolves, it will no longer be only intelligent cities and driverless cars, but virtual reality mixed with personalized medicine; life, work, and interaction with the outside world will look radically different in the technological future. However, the underlying point is that its influence is double-edged no matter how far technology grows and develops. Overlooking some barriers identified in this study by bibliometric analysis, information technology can improve our lives, but it also brings up privacy, security, and equal opportunities to get the benefits.

Future studies recommend conducting a real-time survey and analysis-based study to truly understand the adoption of IT in individuals' lives. However, a survey and analysis will be conducted in the following study of this paper.

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