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THE IMPACT OF THE DIGITAL ECONOMY ON GROSS DOMESTIC PRODUCT: EVIDENCE FROM GLOBAL ECONOMY

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Abstract:

In recent decades, there has been a swift digital transformation leading to significant, and occasionally even pivotal, developments in the global economy, business, and society. Whether estimations of Gross Domestic Product (GDP) still offer accurate indicators of development in a digitalized economy has turned into a contentious issue. The characteristics of the digital economy have significant ramifications for measuring GDP, productivity, and family well-being in the retail industry, as well as throughout the economy's service sectors. As a fresh inspiration for economic globalization, the growth of the digital economy presents both opportunities and challenges for further advancement. The productivity paradox should be acknowledged in the digital economy, recognizing that GDP numbers have limitations when it comes to tracking the sector's progress. In light of the declining productivity and the continued growth of the digital economy, this study offers fresh insights into the identification of disruptive business models driven by digital solutions. This paper's contribution is to empirically evaluate how the digital economy affects GDP using data from the global economy. Data and information from many sources were gathered for this research through a literature survey, for the gathering of GDP and digital economy statistics. The data sources included specific data from the US BEA, OECD, ADB, APEC, and IMF.

Keywords: Digital economy, ICT, Global economy, GDP, technology.

1. INTRODUCTION

The physical world is evolving into an ecosystem comprised of actual items with sensors and actuators built into them, which are linked to services and applications via a variety of networks. The Internet of Things (IoT) has the capacity to propel the subsequent stages of our economy's and society's digitization. The new techniques for creating, processing, storing, and transferring data form the foundation of the digital economy and digital computer technologies. Without a doubt, only those nations that are able to create a climate conducive to the digital economy will set the pace of the global market.

However, and this is partially the reason for criticisms that the digital transformation cannot be fully captured by current GDP estimates, the digital economy component will be mostly invisible (perhaps with the exception of output from online retailers that might be visible in extremely detailed classification systems) (Ahmad, 2018). Nonetheless, the digital activity of firms worldwide is growing daily,
having a significant impact on the economy in terms of GDP per capita, employment, labor productivity, and other areas (Mentsiev et al., 2020). The United States and China are the global leaders in terms of the percentage of digital GDP at 12% and 8.6%, respectively. France is the country with the highest percentage of its GDP in digital GDP at slightly more than 8% (Armashova-Telnik et al., 2021).

The portion of the internet economy that digital skills and digital capital comprise now makes up around 22.5% of the global economy, with significant room for growth and further integration with the traditional economy (Guo et al., 2017). By 2025, internet products could boost the world economy by almost $6 trillion, with other estimates placing that figure between $1.9 and $14.4 trillion as of 2020. The digital economy will represent 5.5% of the Gross Domestic Product in developed nations and 4.9% in developing nations (Jurayevich & Bulturbayevich, 2020). Of the $25.6 trillion in B2B online business, the US led the world in 2017 with $8.1 trillion, followed by Japan ($2.8 trillion), Germany ($1.4 trillion), the PRC ($0.9 trillion), and the Republic of Korea ($1.2 trillion) (Albert, 2020).

Regarding the labor-market effects of digitalization, digitalization will undoubtedly have a significant structural impact on the labor market (in terms of employment sectors and types) in Germany up to 2035, although it is unlikely to have a significant impact on overall employment levels (Becker, 2019).

This paper's contribution is to empirically evaluate how the digital economy affects GDP using data from the global economy. The goal of this essay is to examine how GDP is impacted by the digital economy. The remainder of

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the paper is organized as follows: Section 2 presents the theoretical background. In Section 3, the methods and data are explained. The results are shown in Section 4, and the paper is concluded in the final section.

2.THEORETICAL BACKGROUND

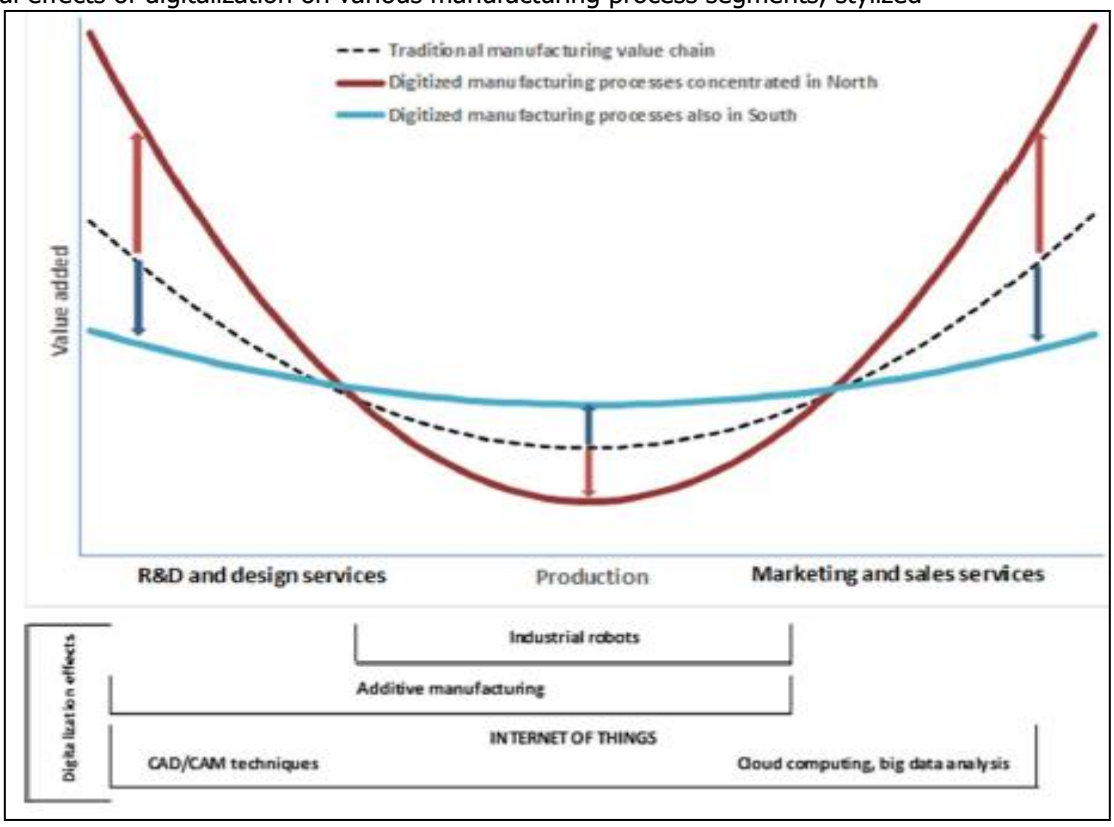
The Financial Stability Board (IMF, 2018) highlighted that the gross domestic product (GDP) is a measure of production, specifically market and near-market production valued at market prices. It is now up for debate whether GDP figures are still a reliable indicator of growth in a digital economy. Numerous economists from academia and business, such as Brynjolfsson & McAfee (2014) and Feldstein (2017), have proposed that the growth of material living standards has outpaced GDP growth. They argue that the underappreciated output produced by the digital economy, including goods viewed as welfare-enhancing, may be sufficient to explain the productivity slowdown that started in the mid-2000s (Reinsdorf& Schreyer, 2019).

Don Tapscott was the first to propose the idea of the 'Digital Economy' as developing and applying digital technologies with a financial influence (Tapscott, 1995). Another perspective is that concepts that had been evolving in international economic literature since the 1960s gave rise to the idea of the electronic or digital economy, reflecting Daniel Bell's concept of an "information economy" (Bell, 1974). The Government of Canada highlighted that the term "digital economy" refers to "the network of providers and consumers of digital content and technologies that facilitate daily life" (Tse, 2011).

Evaluating how digitalization influences the production process and how its many parts become increasingly entwined could be founded on what is referred to as the "smile curve" (Mayer, 2019). The smile curve illustrates the distribution of value generation throughout pre-production, production, and post-production sectors by viewing manufacturing as a sequence of interconnected tasks.

The smiling curve has strong empirical backing even if it lacks a strict theoretical foundation (e.g., World Bank et al., 2017). The exact shape varies between sectors and nations, but it is typically U-shaped, signifying that value addition is concentrated at the start and end of the chain, where pre-production and post-production jobs are situated (Figure 1).

Fig1.Potential effects of digitalization on various manufacturing process segments, stylized



Source: Mayer,2019

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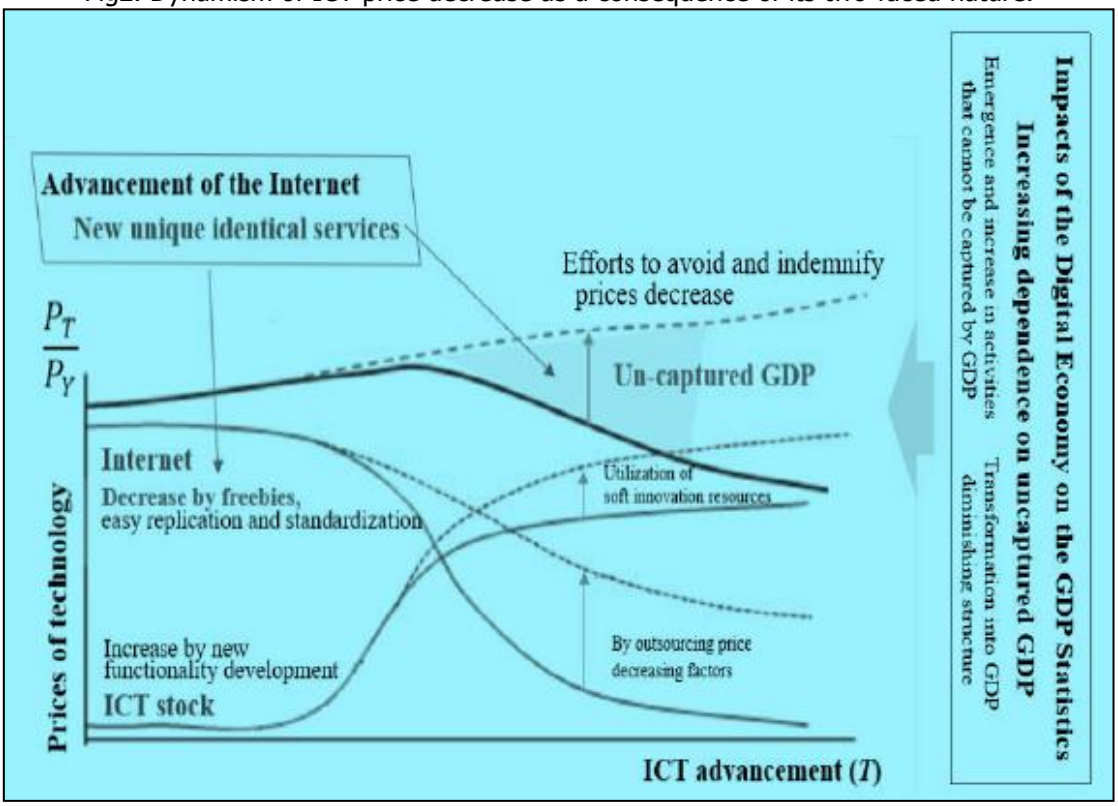
The ongoing decline in ICT prices causes the leading ICT enterprises' marginal productivity of ICT to decline. To satisfy customer preferences in the face of price reductions and fierce competition, ICT companies strive to add novel and distinctive aspects to their goods and services. However, GDP, which measures economic value, may not always account for these efforts, leading to what is known as uncaptured GDP. This situation can be linked to the mismeasurement of ICT pricing (Watanabe et al., 2018a).

ICT takes into account contrast and bipolarization, stemming from its dual character in terms of price formation (Figure 2). While ICT improvements typically drive up technology prices through the creation of new features, the Internet's rapid growth responds to falling technology costs due to its mass standardization, cheap duplication, and free nature (Tou et al., 2018). Drawing from empirical research on the bipolarization trend at the national and industrial levels, as well as previous reviews on the decline in productivity due to the Internet's rapid advancement, the emergence of online intermediaries, the decline in technology prices, and the resulting emergence of uncaptured GDP (Naveed, 2017).

Fig2. Dynamism of ICT price decrease as a consequence of its two-faced nature.



Source: Yuji Tou,2018

As a result, this kind of bipolarization emerges in the competitive game among global ICT firms. As these organizations aim to expand their profits in a cutthroat market, their marginal productivity of digital services declines when costs drop due to extreme ICT innovation.

As stated by Watanabe et al. (2018a), novel and distinctive digital services include e-commerce platforms such as Alibaba, Amazon, and Rakuten, which sell products efficiently and offer economical services. Search engines with online advertising like Google and Yahoo offer data search services at reduced costs. Free search engines like Wikipedia, Linux, and R provide free information search and dissemination. Social networks like Twitter, Facebook, LinkedIn, and YouTube offer services for efficiently finding and exchanging information. Cloud computing platforms like Amazon, Apple, Cisco, IBM, Google, and Microsoft transform fixed costs into minimal expenses.

In response to these conditions, top international ICT organizations have been attempting to transition to a new business model that generates undiscovered GDP. This change can be viewed as the spontaneous creation of uncaptured GDP, rather than merely relying on the uncaptured GDP that has emerged from the Internet. These organizations achieve this by utilizing the power of soft innovation resources, such as untapped resources whose use is not always within the purview of GDP accounting (Watanabe et al., 2018b).

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3. METHODOLOGY

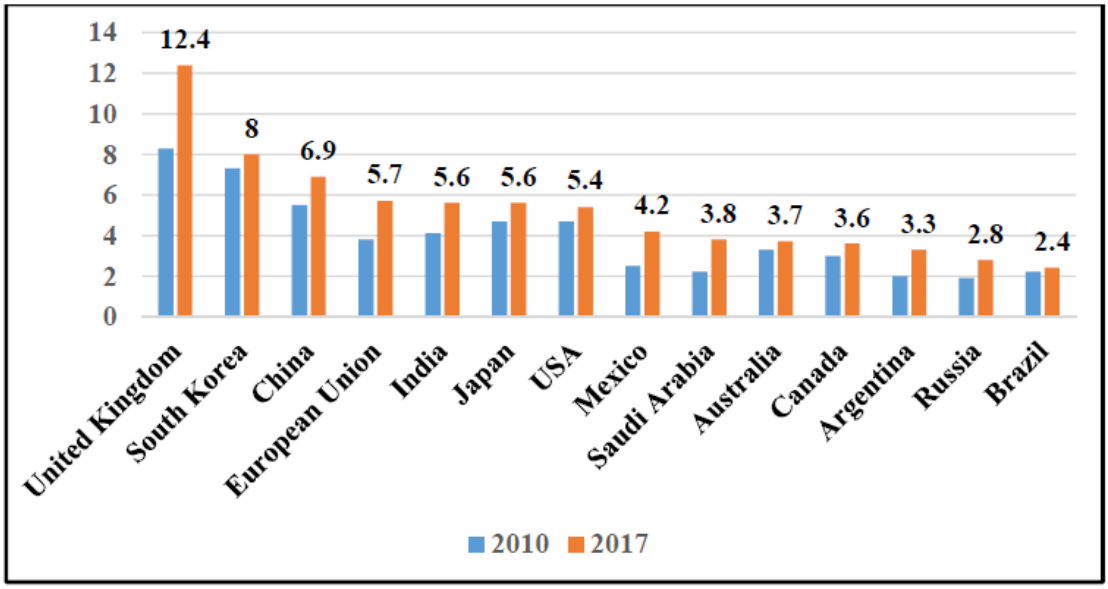
In research, two primary methodologies are employed: the deductive method and the inductive approach. Conversely, a deductive method to study is incompatible with an inductive approach. The inductive approach, which is frequently employed in interpretivism, focuses on moving from the particular to the general. It presents inductive logic as a logic that draws new conclusions by applying established theories.

To gather data and information from various sources, this study used a literary survey, taking into consideration government statistics, published resources, and the impact factors of the examined publications. Specific to the gathering of GDP and digital economy statistics, this work utilized data sources from the US BEA, OECD, ADB, APEC, and IMF. The data gathered assisted in formulating the conclusions and provided answers to the study questions.

4. RESULT AND DISCUSSION

The advantages of the digital economy are apparent in daily life, but there are serious concerns that official statistics might not fairly represent these benefits. According to Ruzimamatovich (2020), when it comes to the GDP percentage of the digital economy, the UK leads the world. The industry, which is larger than manufacturing and commerce and includes ICT and telecommunications, online shopping, and government funds linked to the Internet, ranks second behind real estate. China and South Korea follow in the rankings. If you examine the markers of the advancement of electronic commerce, the UK leads from a national perspective, followed by Germany, according to The Boston Consulting Group (BCG) (Figure 3).

Fig3. The percentage increase in the digital economy's portion of each nation's GDP



Source: Ruzimamatovich,2020

Figure 4 shows how the European countries are divided into six groups (clusters) based on the observation of two parameters: GDP per capita and IT spending per capita. The most developed countries in Western and Northern Europe are in the first and second groups, distinguished by a high level of investment in the ICT sector. The south Mediterranean nations—Portugal, Spain, Italy, and Greece—have a much lower GDP per capita compared to other nations and also exhibit lower ICT spending. All of the so-called "new members," with the possible exception of Slovenia, are in the third group, where the difference in ICT investment is quite significant (Micic, 2017).

The fourth category of countries consists of Mediterranean nations, which are characterized by high GDP per capita and low levels of ICT sector investment. The fifth group includes ten recently admitted European Union countries, marked by low GDP per capita and minimal ICT sector investment. Finally, the sixth group consists of the Baltic nations and those with a small ICT market (Domazet & Lazic, 2017).

Fig4. Europe's technological landscape, GDP per capita comparison, and expenditure on ICT

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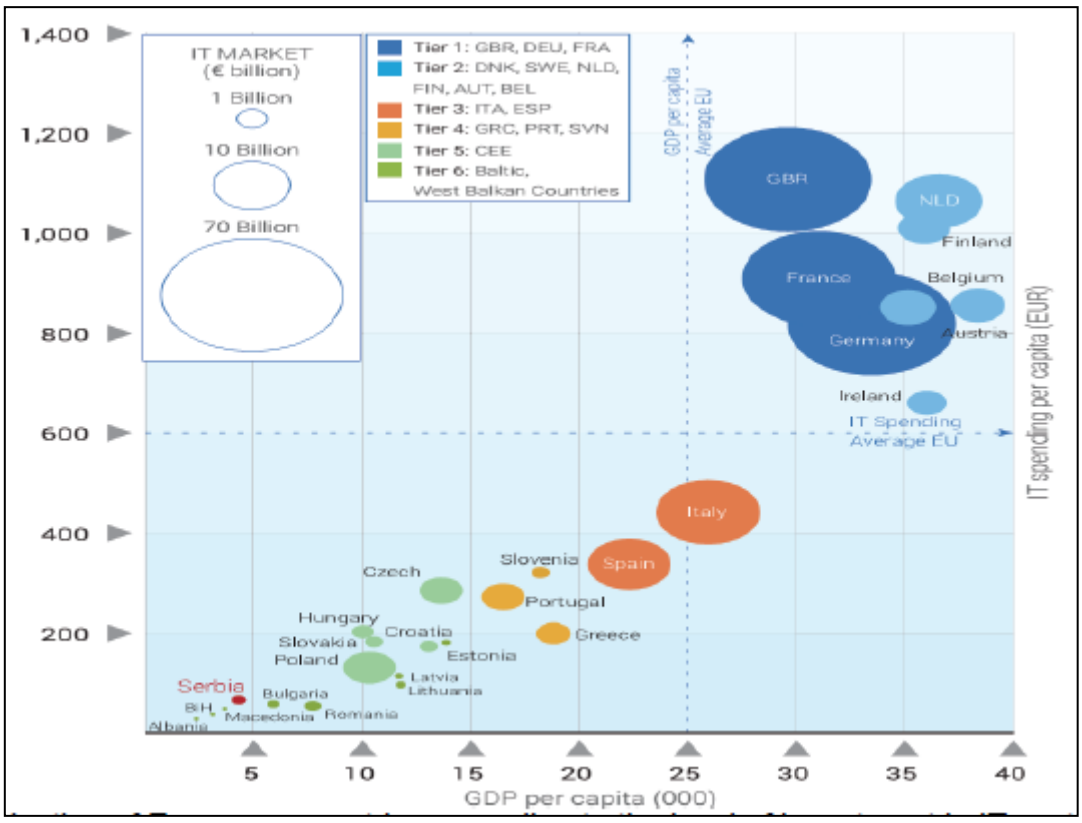

Source: Domazet & Lazic 2017

It is simple to see that nations with higher GDP per capita tend to have much higher ICT spending, based on the technology map previously indicated. Two inferences might be drawn from this: Firstly, these nations require higher ICT investment due to increased ICT penetration in both business and daily life. Secondly, they may aim to enhance their ICT sector and make it a more driving force in their economies, based on public policies and strategic orientation (Micic, 2017).

However, achieving consensus among disparate parties is a difficult task. The survey on economies' practices and ideas about the definition and classification of digital economic activity, as well as the statistical difficulties of developing a new satellite record, was completed by the OECD Informal Group on Measuring GDP in a Digitalized Economy to illustrate the varying perspectives (Asia-Pacific Economic Cooperation, APEC, 2019). Nineteen task force members responded to the poll. When asked what constitutes a part of the digital economy, different respondents had different replies. As part of the "digital economy," twelve respondents said they would not report the full value of items ordered digitally (Figure 5).

Fig5. An overview of some of the OECD's survey replies about GDP measurement in a digital economy

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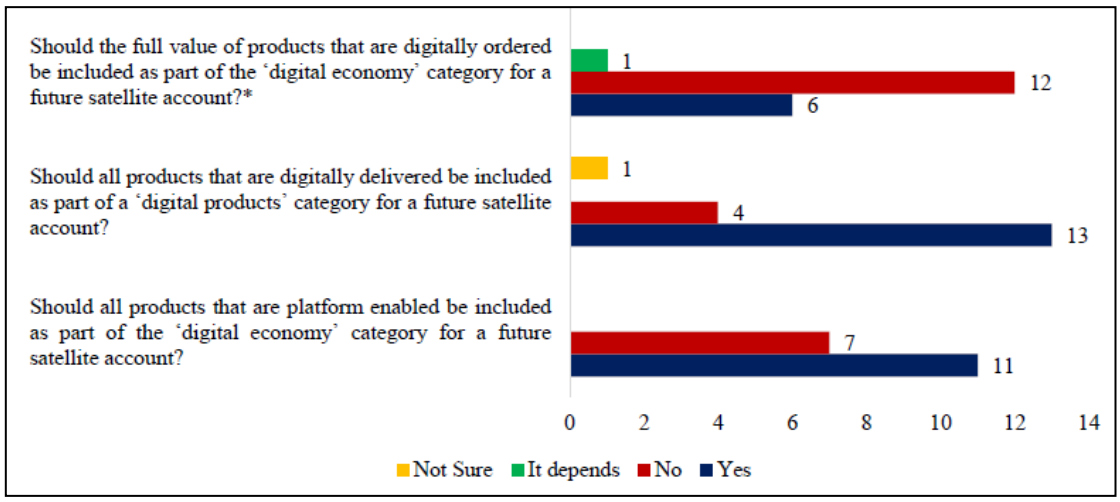
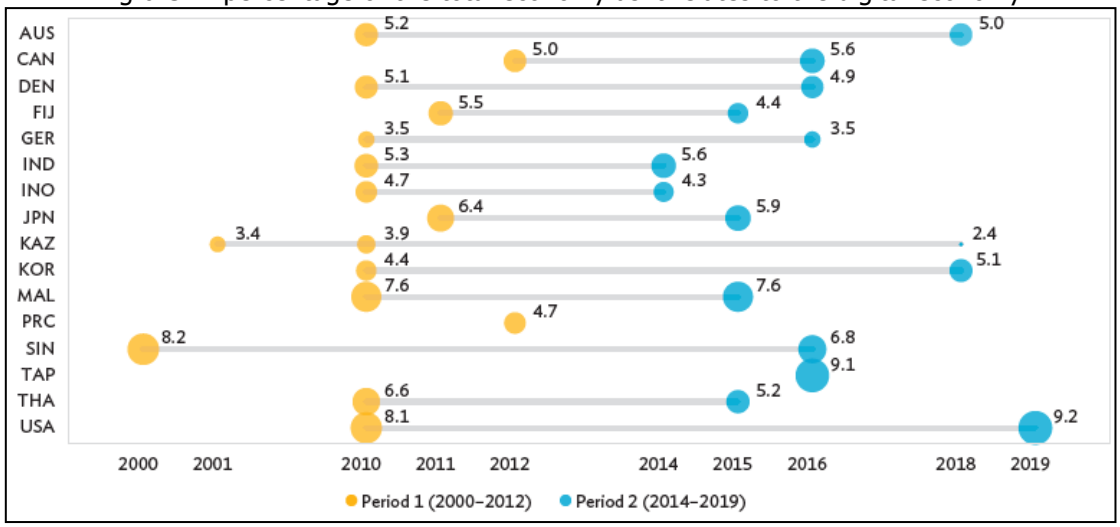


Source: APEC,2019

Four member economies would not include all products in the digital product category, whereas 14 member economies agreed that all digitally delivered products should be included. Regarding the question of whether platform-enabled goods should be included in the "digital economy," 11 respondents said they would, while 7 said they wouldn't. There are differing opinions on whether or not digital economy products should include enablers like computers and smartphones. As stated by the Asian Development Bank (ADB, 2021), the initial projections of digital GDP as a proportion of total GDP, broken down by economy, are compiled in Figure 6. For every economy that was examined, the size of the digital economy as a proportion of GDP ranged from 2% to 9%.

Fig 6.GDP percentage of the total economy as it relates to the digital economy



Source: ADB,2021

A deteriorating digital economy as a proportion of GDP is seen in all economies, with the exception of Malaysia, which stayed constant, and Canada, India, the US, and the Republic of Korea, all of which saw increases. Even though the digital economy's share of GDP has historically decreased or increased only slightly over time, this does not imply that it is becoming less relevant or having less impact on the world economy.

According to the US Bureau of Economic Analysis (BEA, 2021), recent estimates showed that in 2019, the digital economy accounted for 9.6% ($2,051.6 billion) of the current-dollar gross domestic product (GDP) of $21,433.2 billion. The manufacturing sector accounted for 10.9% ($2,345.8 billion) of the current-dollar GDP, while the finance and insurance sectors represented 7.8% ($1,665.8 billion) of the current-dollar GDP. In comparison to traditional U.S. industries or sectors, the digital economy slightly trailed these sectors (Figure 7).

Fig7. Digital economy and industry's percentage of GDP

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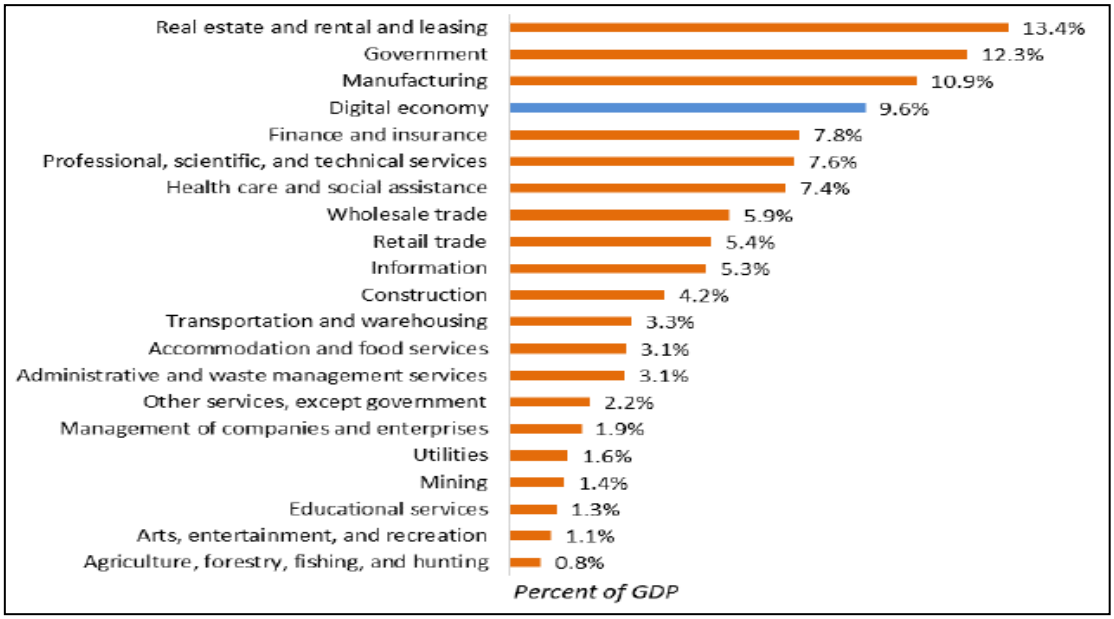

Source: US BEA,2021

To gain insight into their economic scale, it could be helpful to contrast the value of business e-commerce sales with GDP (UNCTAD, 2024). It is imperative that this distinction is not mistakenly seen as an increase in GDP. The latter serves as a gauge of value added and is thus incompatible with data that include all business e-commerce sales, including those made to other firms for input purposes.

Business e-commerce sales can account for as little as 1% of GDP in some economies or as much as 70%–80% of GDP (Figure 8). Despite the fact that the average ratio for developing economies is only slightly lower than that of developed economies (0.31), both groups showcase a significant range from the highest to the lowest ratio.

Fig 8. Business e-commerce sales as a percentage of GDP, 2022 or later

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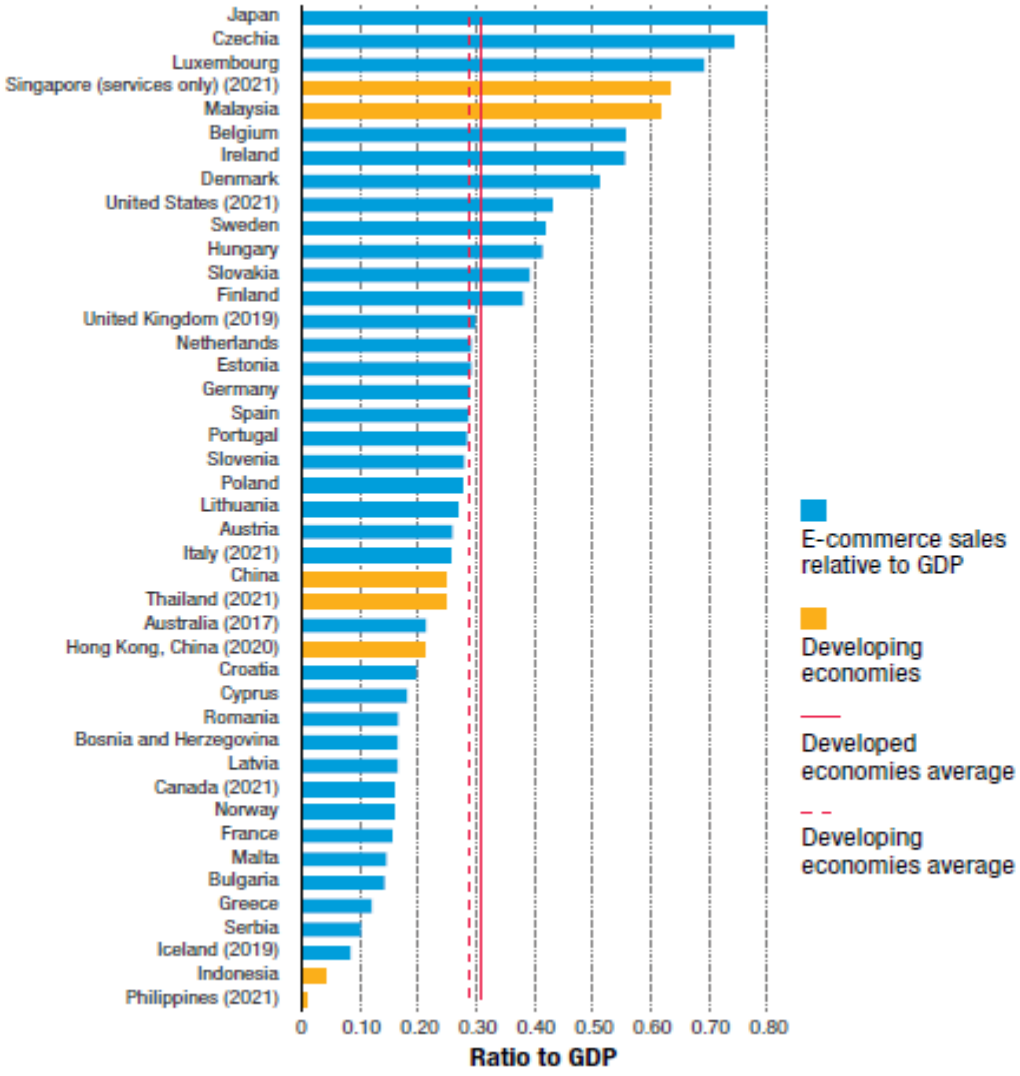

Source: UNCTAD,2024

5. CONCLUDING REMARKS

The definition and calculation of GDP have changed over the past few decades in response to perceived issues and shifting conditions. However, the emergence of the digital economy has raised serious new skepticism about the accuracy of GDP statistics and has accelerated the need for improved measurement. The national income and product accounts face several difficult challenges in light of the productivity measurement associated with the digital economy.

While the Internet has led to remarkable advancements in digital innovation, providing us with exceptional services and welfare, industrialized countries' productivity appears to be declining, raising concerns about a potential productivity paradox. It is becoming increasingly crucial to discuss how GDP numbers measure the digital economy. Enterprises around the world are becoming more digitally active every day, significantly impacting the economy, along with GDP per capita, employment, and labor productivity.

It is evident that nations with considerably larger ICT expenditures tend to have higher GDP per capita. This could lead to one of two conclusions: either they have a greater need for ICT investment due to increased usage of ICT in both business and daily life, or they wish to grow their ICT sector and make it more prominent than it currently is, depending on state policies and strategic orientation.

Macroeconomic statistics now face new measurement challenges stemming from the digital economy, which might be even more complex than those from the past. There are also potential adverse consequences of the digital economy, particularly in emerging countries. For instance, there is increased susceptibility to digital security and privacy issues, as well as disparities between the global North and South, such as the risk that digital technology may exacerbate "premature deindustrialization" in developing nations by facilitating "re-shoring of production."

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Considering that leading global ICT firms have been working to develop fresh survival tactics in light of growing reliance on uncaptured GDP, the forefront of their endeavors should be investigated. In modern economies marked by rapid expansion of digital products and services, as well as product turnover and quality changes, it is essential to understand the biases inherent in standard approaches. Concurrently, the benefits of global collaboration in the digital domain and the imperative to establish a comprehensive global digital economy are becoming increasingly apparent.

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