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HARNESSING AND ACCELERATING THE ACQUISITION AND IMPLEMENTATION OF DIGITAL-TECHNOLOGICAL- BASED SKILLS FOR SUSTAINABLE ECONOMIC GROWTH AND DEVELOPMENT

SÜRDÜRÜLEBİLİR EKONOMİK BÜYÜME VE KALKINMA İÇİN DİJİTAL TEKNOLOJİK TABANLI BECERİLERİN KAZANILMASI VE BU BECERİLERİN KULLANIMI

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Abstract

Because of the necessity in the revolution of economic growth and development, as well as the faster demand for them caused by COVID-19 lockdown measures, digital-technological skills are becoming more vital than ever. Efforts have been made to help harness and accelerate digital-technological talents. Despite these efforts, many people still struggle to obtain sufficient proficiency in digital-technology-based skills. Impartiality in digital-technological-based skills across the population is projected to play a particularly important role in distributing the prosperity promised by long-term economic growth and development. As noted, and held as one of the five foundational pillars of the World Bank's Digital Economy for Africa (DE4A) initiative, a concentrated effort is required to equip the young population with digital-technological-oriented skills. The development of technological skills is a critical issue for a country's educational and social policy. As a result, sustainable economic growth and development necessitate various digital-technical skills that vary by country and cohort, depending on economic and technological growth and development levels. The debate in this chapter will be focused on the concept of digital technology and digital-technologically based skills, as well as the importance of digital-technologically based skills for sustainable development and economic progress. Also, describe how digital-technological-based skills contribute to economic growth and development and the impact of digital-technological-based skills on the economy and society at large. Finally, the chapter will elaborate on the need to harness and increase digital-technological-based capabilities for long-term economic growth development. The chapter concludes with a summary and suggestions for economic growth and development.

Keywords: Digital skills, Technological Skills, Sustainable Development, Economic Growth, Sustainable Economy

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Özet

Ekonomik büyüme ve kalkınma devrimindeki gerekliliğin yanı sıra, COVID-19 karantina dönemindeki tedbirler sebebiyle ihtiyaçların karşılanması noktasında dijital teknolojik beceriler her zamankinden daha önemli bir hal almıştır. Bu süreçte dijital teknolojik yeteneklerin kullanılmasına ve hızlandırılmasına katkı sağlamak için gerek özel sector ve gerekse de kamu kesimi tarafından oldukça çaba gösterilmiştir. Bu çabalara rağmen birçok kişi hâlâ dijital teknolojiye dayalı becerilerin kullanımda yeterliliğe sahip değildir. Nüfus genelinde dijital teknolojiye dayalı becerilerdeki tarafsızlığın, uzun vadeli ekonomik büyüme ve kalkınmanın vaat ettiği refahın dağıtılmasında özellikle önemli bir rol oynayacağı öngörülmektedir. Dünya Bankası'nın öngördüğü ve Afrika için Dijital Ekonomi (DE4A) girişiminin beş temel dayanağından biri olarak kabul edilen "genç nüfusu dijital teknoloji odaklı becerilerle donatmak" hedefi için yoğun bir çaba sarfetmek gerekmektedir. Teknolojik becerilerin geliştirilmesi bir ülkenin eğitim ve sosyal politikası için kritik bir konudur. Sonuç olarak, sürdürülebilir ekonomik büyüme ve kalkınma, ekonomik ve teknolojik büyüme ve gelişmişlik düzeylerine bağlı olarak ülkeye ve kuşağa göre değişen çeşitli dijital-teknik becerileri gerektirmektedir. Bu makale, dijital teknoloji kavramı ve dijital teknolojiye dayalı becerilerin yanı sıra dijital teknolojiye dayalı becerilerin sürdürülebilir kalkınma ve ekonomik ilerleme için önemine odaklanmaktadır. Ayrıca dijital teknolojiye dayalı becerilerin ekonomik büyümeye ve kalkınmaya nasıl katkıda bulunduğunu ve dijital teknolojiye dayalı becerilerin ekonomi ve genel olarak toplum üzerindeki etkisinin de açıklanması hedeflenmektedir. Çalışmanın nihayetinde, uzun vadeli ekonomik büyüme gelişimi için dijital teknolojiye dayalı yeteneklerin kullanılması ve arttırılması ihtiyacı üzerinde durulacak ve ekonomik büyüme ve kalkınmaya ilişkin öneriler sıralanacaktır.

Anahtar Kelimeler: Dijital beceriler, Teknolojik Beceriler, Sürdürülebilir Kalkınma, Ekonomik Büyüme, Sürdürülebilir Ekonomi

Introduction

Many countries have benefited greatly from the rapid advancement of science and technology, particularly in the realm of information technology (IT) (Vargo et al., 2021). As a result, digital skills are increasingly important in the digital age (Doungpitak et al., 2023). Knowledge management relies heavily on information technology. This is because it is a tool that supports and assists the knowledge management process, from knowledge development through information storage and sharing, to operate quickly and efficiently. Furthermore, IT may assist organizations in maintaining the many forms of information they have accumulated (Arias-Pérez & Cepeda-Cardona, 2022; Singh, 2022). According to Limna et al. (2023), digital literacy is the capacity to access, analyze, synthesize, manage, integrate, share, communicate, create information, and create new knowledge using digital tools while utilizing information literacy skills, learning skills, critical thinking skills, emotional intelligence, and social intelligence. Examining the variables affecting the proficiency of digital technology skills may benefit all industries by accelerating the development of digital workers with high-level skills due to the significance of digital skills for the future of business

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and the need for employees to feel confident in their ability to adapt to the new business environment (Doungpitak et al., 2023). To utilize the Internet and digital technology critically, one needs to manage and maintain a variety of digital devices and related software (Amhag et al., 2019). This is known as having digital technology skills, digital competence, or digital literacy. Individuals must be digitally adept if they intend to use them for their professional progress in a complex and integrated environment that is undergoing rapid technical, cultural, economic, informational, and demographic change (Kampylis et al., 2015).

Digital technologies affect what, why, where, how, and from whom people learn. Digital technology such as computers, laptops, tablets, smartphones, and mobile phones are widely used. The primary objective of digital technology is to link people quickly, easily, and affordably. It is more important than ever in this technological age to have digitally based skills for both economic growth and sustainable development (Kapur 2018). By 2022, the proportional adoption of skills based on digital technologies was expected, according to a World Economic Forum (2018) poll (see Fig. 1). Electronic tools, systems, equipment, and resources that produce, store, or analyze data are referred to as digital technologies. Digital literacy proposes a framework that demonstrates that there are other literacies, such as critical literacy, multiliteracies, technical and operational literacy, and social-emotional literacy, to develop to become digitally literate. Digital literacy is the underpinning influence on successful use of educational technologies in both in-school and out-of-school contexts. According to Yaşar 2020, it is "the construct that sustains the competent use of digital technology across the diverse contexts throughout an individual's life."

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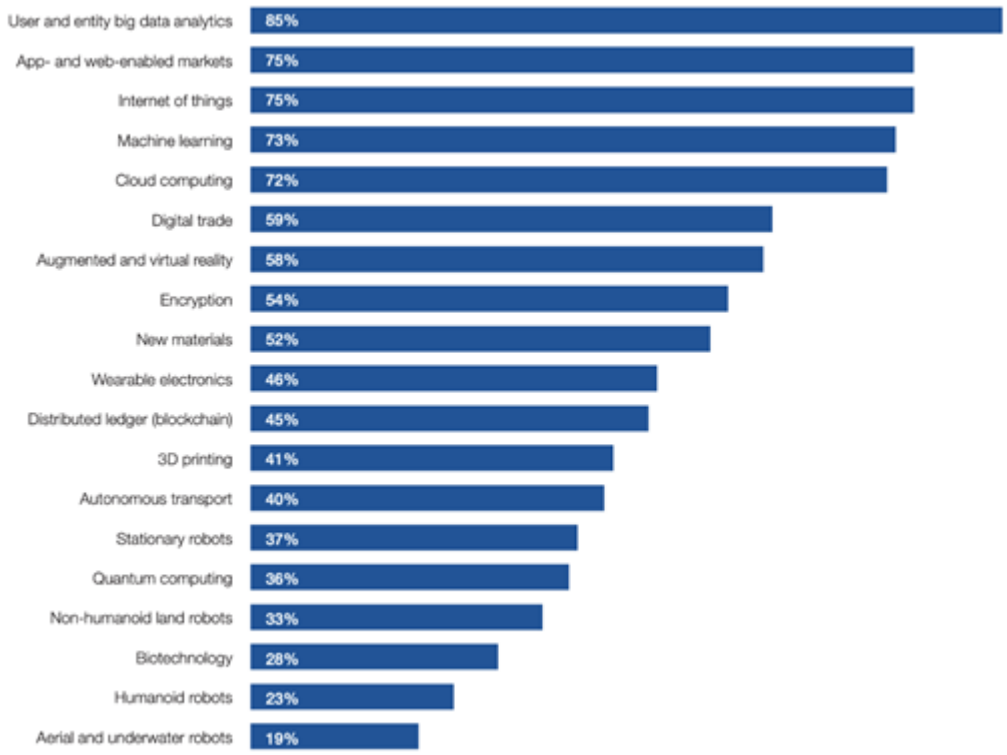

Fig.1: Proportion adoption of Digital Technological skills. *Source*: Future of Job Survey 2018, World Economic Forum

The proliferation of digitization and the rise of electronic technologies have caused significant development in and changes to skills based on digital technology. These modifications made it more important to comprehend how academics will perceive and use these technologies professionally in the future. The study by Jwaifell et al. (2019) revealed the average level of academics' competencies, attitudes, and use of digital technology tools; in addition, the study revealed that the level of using digital technology tools could be predicted by the levels of academics' competencies and attitudes.

Concept of digital technology and digital-technological-based skills

Organizations must recombine and adapt digital technologies; they need new skills to create, learn, and adapt to changing digital technologies. This is necessary to better comprehend the complex and dialectical linkages between digital technologies and skills. Reorganizing creative and innovative processes both within and across businesses is necessary due to the coevolution of digital technology and abilities.

All elements of economic and social activities have been affected by and restructured by digital technologies. They can be applied in some ways that interrupt current activities, while in other ways they have a more incremental influence and add to current activities. They can sometimes replace current technologies and tasks, but they can also be used in addition to

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them. They occasionally lead to the development of new ventures, services, innovations, and business prospects. Digitalization is effective because it not only enables automation but also records and maintains information about tasks and activities. This creates a record that can be examined and offers chances to enhance workflows, job organization, and future event forecasts (Agrawal, Gans, and Goldfarb 2018).

Digital technologies have a wide range of application domains, from the sciences and engineering to professional services, health care, and other industries. The transformative or disruptive effects of digitally based skills on business, industry, education, and society in general have received a lot of popular and scholarly attention. To compete in the rapidly changing digital environment, businesses and employees may need to change drastically (Nambisan et al., 2019). Even changes that initially appear incremental and slow and adhere to the standard learning procedures for new technologies may ultimately undergo profound transformations in ways that are unforeseen up front. For instance, the types of talents and professions that are available are significantly impacted by the capacity to codify human tasks in software (Helper et al., 2021). Organizational, industry and national skill requirements are evolving, rendering many current ones unnecessary or obsolete (Cedefop, 2018).

The quantitative research on the adoption of information and communication technology (ICT), automation, and the degree to which they replace humans in performing tasks (Acemoglu & Restrepo, 2018) is a major source of the researchers' understanding of the relationship between digital technologies and skills (Bessen, 2019). The relative decline in low-skill workers compared to both high-skill and medium-skill workers at the beginning of the 1980s and the more recent hollowing out of the middle class and middle-skilled routine tasks, which are susceptible to being performed by machines, have all been attributed to skill-biased technological change, followed by routine-biased technological change. Estimates of the effect of digital technology on employment are based on this and vary greatly. In some more pessimistic viewpoints, the use of digital technologies will primarily result in the loss of some jobs (Acemoglu and Restrepo, 2019); in more upbeat viewpoints, the use of these technologies will primarily improve current jobs or lead to the creation of new ones (Autor & Salomons, 2018; Felten, Raj, & Seamans, 2019); and in still other viewpoints, the effects will be mixed (Das et al., 2020). The secret to enabling these sophisticated digital technologies to complete tasks that were previously regarded as nonroutine is not to mimic human thought and behaviour but rather to standardize specific components of the entire work to make them amenable to computerized processing. Nonroutine complicated (i.e., integrated) processes can more easily be automated after being divided into modular parts. Machines can replace or augment and complement human capabilities by reducing complexity and modularizing complex operations.

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The need for digital-technological-based-skills for sustainable development and economic growth

The world is currently experiencing a period of digitization, with the majority of daily activities relying on digital technologies. This has led to significant changes in industrial production, with the fourth industrial revolution focusing on digitalization. The term "Industry 4.0" was created to address these issues, requiring system standardization, rapid development, individualization, flexibility, resource efficiency, and decentralized decision-making. The economy has shifted from raw materials to information and skilled human capital, necessitating workers with a wide range of technologically based abilities. According to studies, basic internet capabilities, as well as abilities to understand and apply online content, should both be taken into consideration.

Technical skills: Employees must be proficient in the languages and skills of the constantly evolving technology to preserve a competitive advantage. The workforce must be able to adapt consistently to changing employment needs connected to new skill-intensive jobs. There is more employment that requires technical abilities as workplaces have grown more complicated and backed by ICT.

Information skills: Due to the amount of data and information, employees in almost every industry must be able to find, assess, and organize information that frequently comes from various sources. Due to the ease of access to a variety of information sources, people must be able to detect when information is needed and assess the validity and importance of that information.

Communication skills: The ability to transfer information and ensure that meanings are effectively expressed by taking into account the audience and medium are crucial communication skills in the expanding service sector. To successfully navigate the modern social world, one must be able to harmonize their wants and aspirations with those of the greater society. Employers need candidates with communication skills due to the interdependence of our global economy.

Collaboration skills: Work is evolving to become increasingly specialized, interdisciplinary, and knowledge-based. Employee collaboration is required because of the complexity of the duties because no single person can be an expert in every field. As a result, teams of individuals performing complementary responsibilities and tasks are increasingly used to complete work. Workers frequently rely on others to do their responsibilities. They require a clear awareness of their respective tasks as well as those of their cooperating partners to perform interdependently.

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Critical thinking skills: Making decisions based on knowledge and communication that has been gathered while employing adequate thought and reasoning is referred to as critical thinking. It relates to the capacity for introspective thought and deft judgment in selecting the information or communication that is pertinent in a particular situation. A crucial 21st-century skill is the capacity to sort through the volume of incoming material to develop your point of view. Employees need to be able to think critically to establish an independent perspective or opinion that is well-founded in the specific domain.

Creativity skills: It is essential to be able to change information into new knowledge in addition to being able to process and transfer information. Previous studies have frequently argued that complicated issues demand original solutions. The generation of original and possibly beneficial ideas for goods, services, or processes is a key component of creativity. Employee creativity is emphasized as a requirement for long-term organizational performance, making it an essential competency for firms to lead or evolve with the times.

Problem-solving skills: Employees require the ability to resolve challenges that are unique to their area because the workforce is being presented with more difficult and uncommon problems. Problem-solving abilities are needed in complex, ambiguous, and novel situations. The knowledge and abilities needed to deal effectively with complicated non-routine circumstances are sometimes regarded as problem-solving abilities. Despite its importance, domain-specific knowledge is more than just prior knowledge. An employee must determine the processes required to collect this information, potential gaps, and necessary actions.

Digital literacy refers to the ability to adapt to new settings in the digital economy, requiring critical thinking and problem-solving skills. It is similar to media literacy, which focuses on citizens' right to knowledge and freedom of speech. Media education is crucial for democracy, active citizenship, and a country's development.

The impact of digital-technological-based-skills on the economy and society

The digital economy, fueled by the internet and digital devices, aims to improve social production efficiency and economic growth. It values innovation, creativity, and market information, generating "Big Data" that can be used for internal risk management and external oversight of financial services and institutions. Four factors are used to examine the digital economy: value factor, employment sector, penetration rate, and technology. The growth of the economic value of data generation, transit, processing, and storage is related to the value factor (Afonasova et al., 2019). Since the emergence of interactive and mobile communication technologies in the first decade of the twenty-first century, digital-technological-based abilities have permeated all aspects of business and society. Digital-technological-based skills are high-level enterprise capabilities that enable the use of intelligent, connected devices and

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data analytics to develop and deliver services and products that provide differentiated value. Skills digitization enables enterprises to combine to achieve corporate goals and consumer value, using digital assets and business resources, and digital networks. Information literacy has become increasingly important for employees across all economic sectors. Digital technology serves as a medium for communication, a wealth of data for strategic business decisions, and a platform for sharing and self-promotion of creative and artistic expression. Skill ownership aims to make it easier for individuals to accomplish tasks successfully and achieve the best possible work outcomes.

The essence of harnessing and accelerating digital-technological-based skills towards sustainable development of economic growth

In the digital age, highly developed technologically based abilities are necessary to promote economic progress. Through knowledge sharing and staff competency, digitally technologically based skills have the potential to hasten sustainability (Hellemans et al., 2021). The use of talents based on digital technologies is now crucial for business growth and sustainability. Electronic tools, systems, equipment, and resources that produce, store, or analyze data are referred to as digital technologies. The environmental, administrative, economic, and social sustainability of organizations can benefit greatly from digitalization, digital transformation, and digital technology, which can be used in a range of industries. Technology is all about innovation, and in business, innovation is all about doing things in novel ways to provide customers with better goods, solutions, and services. Technology is helpful for daily operations, but it can also help businesses grow and prosper when used wisely. Successful companies employ technology to create new business opportunities rather than just automating existing ones (Oduntan 2022).

The advantages felt by companies and employees were presented in Figure 2 to establish the importance of harnessing and advancing digitally technologically based skills for sustainable development of economic growth. This suggests that organizations will experience more employee happiness, boosted productivity, cost-savings, quicker goal-achievement, enhanced customer experience, stronger staff retention, and quicker innovation cycles. Similar to this, employees with the right digital-technological abilities gain productivity, increased personal fulfilment, greater employability, more job happiness, better career switch opportunities, promotion opportunities, and wage increases.

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Fig. 2: Necessity of Digital-technological-based skills Training for Employers and Employees
Source: AlphaBeta Survey of 7,193 workers and 2,166 employers in 7 countries (Australia, India, Indonesia, Japan, New Zealand, Singapore, South Korea) in August 2021.

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	Digital inclusion - individuals					
Country	2016	2017	2018	2019	2020	2021
Belgium	84	86	87	89	90	91
Bulgaria	58	62	64	67	69	74
Czechia	79	81	84	85	86	87
Denmark	94	95	95	95	97	97
Germany	87	87	90	91	93	89
Estonia	85	86	87	88	88	90
Ireland	79	79	80	88	89	98
Greece	66	67	70	74	77	77
Spain	76	80	83	88	91	92
France	82	83	85	87	n/a	89
Croatia	71	65	73	77	78	80
Italy	67	69	72	74	76	n/a
Cyprus	74	79	84	85	91	91
Latvia	77	78	81	84	87	90
Lithuania	72	75	78	81	82	86
Luxembourg	97	96	92	93	96	97
Hungary	78	76	75	80	84	87
Malta	77	80	80	85	86	87
Netherlands	92	94	94	95	93	94
Austria	82	85	85	86	86	89
Poland	70	73	75	78	81	84
Portugal	68	71	71	73	76	80
Romania	56	61	68	72	76	82
Slovenia	73	77	79	81	85	88
Slovakia	78	79	78	82	88	87
Finland	91	92	93	93	95	95
Sweden	91	95	91	95	95	95
Iceland	n/a	98	99	98	99	99
Norway	96	96	97	98	96	98
Switzerland	n/a	91	n/a	95	n/a	96
United Kingdom	93	93	94	95	96	n/a
Montenegro	n/a	69	70	72	77	81
North Macedonia	70	73	78	80	80	n/a
Albania	n/a	n/a	62	68	n/a	n/a
Serbia	n/a	68	72	76	78	80
Turkey	55	61	69	73	76	81

Fig. 3: The inclusion of Digital-technological-based skills across countries
Source: Digital Inclusion – Individuals (Eurostat, 2021)

According to the numbers in Figure 3, the growth from 2016 to 2021 was consistent from year to year. According to the statistics, it is critical to accelerate the development of digitally based talents for both development and economic growth. Therefore, technology is not only necessary for daily company operations, but it can also aid in the growth, survival, and success of enterprises when used effectively.

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How acquisition and implementation of digital-technological-based skills will transform economic growth and development

Digital transformation is a crucial technological transition process that affects every economy and society, driving economic growth through the use of technologies such as the web, internet, detectors, data analytics, machine literacy, blockchain technology, and IoT. This modernization has enhanced supply chain management, created new manufacturing methods, and altered business operations while raising people's standards of living. Digitalization is felt differently globally, reflecting the variety of options it offers (Singhdong et al., 2021; Raja & Venkatachalam, 2022; Olczyk & Kuc-Czarnecka 2022). Recent research has focused on the variables affecting how people use digital technologies, such as customer expectations and organizational structure. Organizations must pay attention to digital transformation to adopt digital technology, with strategic imperatives including digital resources, adaptability, and a digital growth strategy (Nasiri et al., 2020; Andreoni et al., 2021; Li et al. 2021; Omrani et al. 2022; Gholami, 2023; Vrontis et al., 2022).

The digitalization of the economy has its own traits, patterns, and trends, and is used by many nations to boost competitiveness and economic development efficiency. It establishes links between government, business, and society using cutting-edge information technology and covers socioeconomic events on the Internet platform, mobile devices, and sensor networks. Access to the Internet is essential for participating in the digital economy, improving citizen well-being, corporate competitiveness, and worker productivity (Vrontis et al., 2022; Inna et al., 2021).

It has been noticed that talents based on digital technology can alter economic development and growth. Comparing industry and society, it can be seen that digital transformation has the potential to benefit society more than it does industry (see Fig. 4). In comparison to industry, digital transformation has the potential to generate more value in the automotive, electrical, and logistics sectors.

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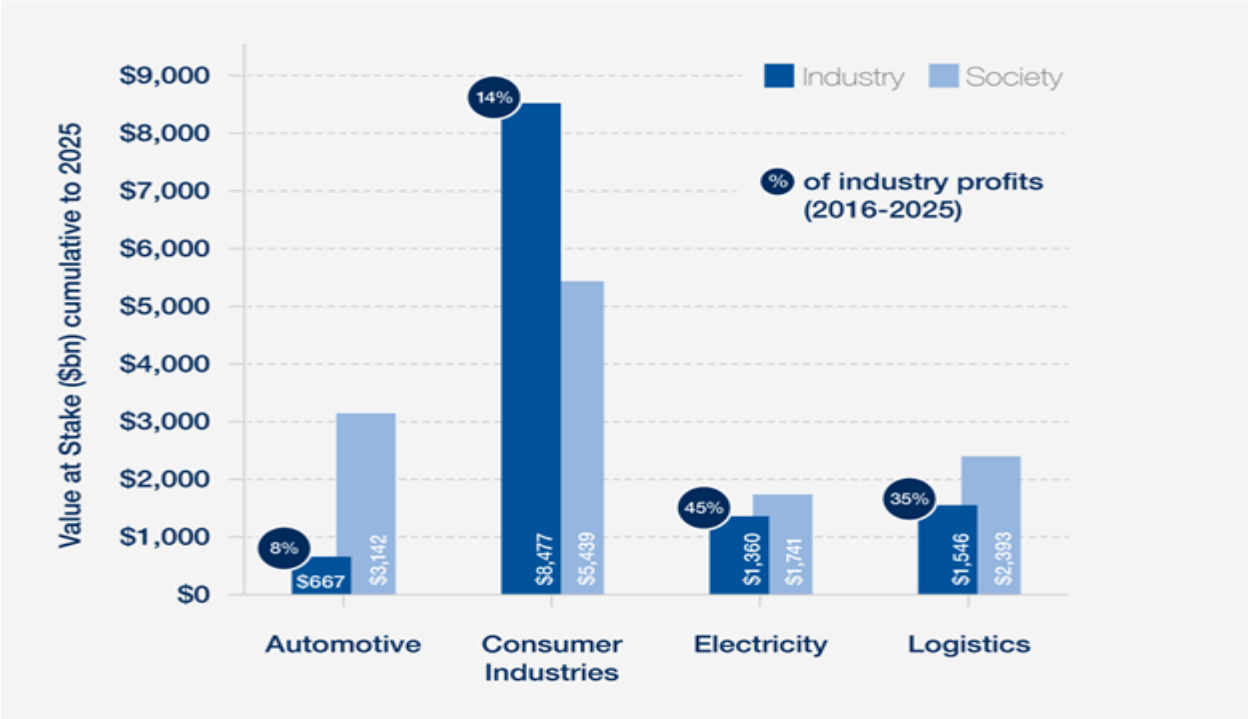

Fig. 4: Digital transformation between industry and society
Source: World Economic Forum (Accenture Analysis)

A crucial strategic imperative continues to be the development of 21st-century skills and capabilities in business, engineering, and education. Adoption of innovative strategies is necessary for the coherent development of skills and abilities. Economic development and successful education can both benefit from technology integration (Ramaila & Molwele 2022). Utilizing abilities based on digital technology promotes creativity and drives innovation. Digital technologies are clever because they enable personal growth. For instance, artificial intelligence, picture recognition, and the internet offer insight into a person's performance, learning, and behaviour, which improves comprehension and reflection of a person's business development and progress.

The growing trend of digital-technological-based skills for both vertical and horizontal economic growth

The development of technological skills is a key concern for a nation's social and educational policies (Rodrigues 2021). Digital technology-based skills are becoming increasingly important for economic progress in all its manifestations. Skills related to digital technology are in great demand and are expanding in a variety of fields, including artificial intelligence engineering, cloud and edge computing, analytics, social media, mobile advertising, website

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building, and others. The development of technological skills is crucial for a nation's social and educational policies. Digital technology-based skills are increasingly important for economic progress, with increasing demand in fields such as artificial intelligence engineering, cloud computing, analytics, social media, mobile advertising, and website building. Key digital-technological-based skills include digital content marketing, search engine marketing, data analytics, blockchain, cybersecurity, UI/UX design, programming, automation and IoT, and digital business and sales skills.

Digital content marketing involves a complex universe of upskilling, including marketing analytics, social media marketing, SEO authoring, and online blogging. Search engine marketing involves website optimization skills, which drive organic search and high conversion rates. Data analytics encompasses various subfields, and blockchain is a disruptive technology that could change major sectors of the economy. Cybersecurity professionals are needed to protect cutting-edge firms and key infrastructure. UI/UX design is essential for creating user-centred products**.**

Factors influencing the acquisition and implementation of digital-technological-based skills for economic growth and development

The shift from traditional to digital workplaces is causing a skills gap, with 53% of CEOs unable to find suitable candidates. Digital skills drive business productivity, with technologies like paperless accounting, automated bookkeeping, and blockchain enabling higher-value jobs. However, true productivity improvements require employees to understand how to use them effectively. Organizations that use data analytics and artificial intelligence gain a competitive advantage and efficiency. A digital skills shortage could harm a company's bottom line, but focusing on helping staff understand the value of digital processes and providing adequate training can boost productivity and stay ahead of competition.

Definition of terms

Digital literacy: The method and results of learning certain skills, as determined by the use of information and communication technology.
Media literacy: This is the capacity to comprehend and assess various media types and their messages.
Digital media: Any communication medium that works with different encoded machine-readable data formats is referred to as this.
Digital economy: It refers to a set of institutional categories (concepts) that incorporates outstanding accomplishments and cutting-edge technology, particularly digital, and boosts the efficacy of social production.

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Skills Digitization: To meet organizational objectives and maximize customer value, it is defined as the competence that enables companies to broadly combine digital assets and business resources and to use digital networks to innovate products, services, and processes.
Information literacy: This is a skill that has become increasingly important for employees across all economic sectors in recent decades.
Skills: Skills are the ability to apply reason, thoughts, and ideas, as well as creativity, to do, change, or make anything more meaningful to produce value from the task.
Technology: It is all about innovation, and in business, innovation is all about doing things differently to give better products, solutions, and services to clients.

Summary

The chapter examines how to harness and accelerate the acquisition and application of digital-technological skills for long-term economic growth and development. Today, technology plays a vital role in many facets of daily life. Digital technology abilities are essential in this day and age. Technological skill development is a key issue for a country's educational and social policies. As a result, sustainable economic growth and development demand a variety of digital-technical skills that differ by country and cohort, depending on levels of economic and technological growth and development. The discussion in this chapter centred on the concept of digital technology and digitally-based skills, as well as the necessity of digitally-based skills for sustainable development and economic advancement. Also described are the contributions of digital-technological-based talents to economic growth and development, as well as the impact of digital-technological-based skills on the economy and society at large. Finally, the chapter discussed the importance of harnessing and expanding digital-technology-based capabilities for long-term economic growth development.

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