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TRANSVERSAL TECHNOLOGY AS A KEY IDEA FOR FUTURE GLOBAL ECONOMIC GROWTH

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Abstract

Transversal technologies play a vital role as a key driver in future global economic growth. In this context, technology not only functions as a tool, but also as a driving force that significantly changes the economic and business paradigm. Innovation in this sector, driven by technology, can improve people's welfare and strengthen the cultural identity of the nation. Transversal technologies are important forces behind innovation and development, and in the years to come, their significance is only predicted to increase. These technologies will probably have a significant impact on how many industries and society as a whole develop in the future as they continue to progress. Transversal technologies have the ability to address some of the major issues facing humanity in addition to spurring innovation and economic progress. Transversal technologies not only serve to improve efficiency and productivity, but also act as key drivers in creating new opportunities and driving inclusive and sustainable economic growth. Collaboration between stakeholders, including governments and the private sector, is essential to harness this potential and address future challenges.

Keywords: Transversal technologies, growth, global economy

INTRODUCTION

Technological innovation plays a vital role in global economic growth. One of them is transversal technology (Whittemore, 2018). Advances in other fields, such as the digital revolution and information and communication technology, have changed the global economic landscape and provided new

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opportunities for countries and businesses to become more competitive. Technologies such as robotics, automation, and artificial intelligence have increased industrial productivity and efficiency, resulting in better output, lower production costs, and greater competitiveness worldwide. In addition, technological advances have transformed existing business models, such as digital platforms that connect producers, service providers, and consumers.

The use of big data technology and artificial intelligence in the health sector, for example, has brought new breakthroughs in medicine and medical care, are some examples of innovation opportunities in other sectors. In addition, technology has enabled businesses to communicate with customers around the world through electronic commerce and e-commerce platforms. In the rapidly evolving digital era, the global economy is facing increasingly complex dynamics. The development of technology and global connectivity provide new opportunities for economic growth and progress worldwide (Moskowitz, 2014). However, there are also challenges that need to be overcome in facing these changes.

The digital era has opened up new opportunities in the context of the global economy. Advances in information and communication technology make collaboration between businesses in different countries easier and more efficient. Globalization is becoming a growing trend, where companies can access global markets while meeting local needs. In addition, e-commerce and digital platforms provide opportunities for small business actors to participate in the global economy (Klofsten et al., 2019). All of this creates healthier competition and enables more inclusive economic growth. However, the dynamics of the global economy in the digital era also pose challenges. One of the main challenges is the digital inequality between developed and developing countries. Access to technology and the internet is still uneven throughout the world, causing a digital divide that can hinder economic growth. In addition, the emergence of dominant digital platforms also raises concerns about monopoly and unfair competition. Effective regulation is needed to maintain a balance between innovation and protecting the public interest. In facing this global economic dynamic, international cooperation and smart regulation are needed. By facing challenges wisely, we can take advantage of opportunities in the digital era to drive growth and prosperity worldwide (Shinn, 2005). According to Cooke, P. (2018) technologies with the potential to affect several industries and sectors are referred to as transversal or cross-sector technologies. These technologies are frequently distinguished by their wide range of applications and capacity to stimulate advancement

and invention in a variety of disciplines. Biotechnology, robotics, renewable energy, and artificial intelligence are a few typical instances of transversal technologies. The ability of transversal technologies to upend established markets and open up fresh avenues for development and innovation is one of its primary characteristics. The advancement of artificial intelligence, for instance, has the power to fundamentally alter how we work, communicate, and engage with the world. Artificial intelligence (AI) is being utilized in healthcare to provide novel diagnostic tools and treatments, and in finance and retail to enhance customer service and automate repetitive jobs (Fernandes et al., 2021).

According to Sabadie, J. A. (2014) transversal technology will be the main driver of global growth in the future. Transversal technology is believed to have the potential to change or improve various aspects of human life without being limited to one specific field. Transversal technologies such as artificial intelligence (AI), Internet of Things (IoT), blockchain, and cloud computing have proven to have a broad impact and can be used in various sectors, especially economics and business.

Cooke, P. (2021) stated that transversal technology also has the potential to promote competitiveness and economic growth. Transversal technology can assist boost productivity and boost the competitiveness of businesses and industries by enabling organizations to function more effectively and efficiently. Adoption of robots and automation technology, for instance, has been demonstrated to boost output and lower production costs, while the use of renewable energy technology can lessen reliance on fossil fuels and enhance environmental sustainability.

The capacity of transversal technology to facilitate the creation of new goods and services is another important characteristic. Transversal technology assists in fostering the establishment of new markets and sectors as well as economic expansion by giving firms the means to innovate and generate fresh solutions. For instance, the application of biotechnology facilitates the creation of novel medications and medical procedures, and advancements in renewable energy technologies foster the expansion of the clean energy sector (Calero et al., 2020).

Transversal technologies have the ability to address some of the major issues facing humanity in addition to spurring innovation and economic progress. For instance, developments in biotechnology are being utilized to provide novel medicines for a range of ailments, while breakthroughs in AI

and robots are being used to address issues like climate change and an aging population (Rinkkala et al., 2019).

All things considered, transversal technologies are major forces behind innovation and advancement, and in the years to come, their significance is only predicted to increase. These technologies will probably have a significant impact on how many industries and society as a whole develop in the future as they continue to progress.

RESEARCH METHOD

This study uses a descriptive method by collecting data from various reliable sources, including literature studies and recent publications. The descriptive approach is used to describe transversal technology as a major driving idea for global economic growth comprehensively. The first stage in this research method is collecting literature relevant to the research topic. A literature search is conducted through academic databases, scientific journals, and related publications that discuss transversal technology as a major driving idea for global economic growth. The selected literature must be of good quality and relevant to the research objectives. After collecting the literature, an analysis and synthesis of the information found is carried out. Relevant data with details regarding the meaning of transversal technology, projected growth in the world economy, the role of transversal technology in future global economic growth related to the research topic.

RESULT AND DISCUSSION

Definition of Transversal Technology

According to Escuder-Mollon et al., (2016) transversal technology refers to technology that can be applied across multiple fields and disciplines, enabling integration and collaboration between different sectors. This technology often includes innovations that support efficiency and effectiveness in processes, products, and services. Transversal technology is technology that is not limited to one particular application or sector, but can be applied broadly across industries and fields. This technology is often a key driver in digital transformation and innovation, due to its ability to improve productivity, efficiency, and quality in a variety of contexts.

Jiménez-Crespo, M. A. (2020) states that there are several types of transversal technologies that are commonly known, including:

1. Information and Communication Technology: This includes hardware and software used to manage and disseminate information. Information and

Communication Technology is very important in almost all sectors, including education, health, and business.

2. Renewable Energy Technology: This technology includes renewable energy sources, including biomass, solar, and wind. The use of this technology supports sustainability and reducing environmental impacts.
3. Biotechnology: This entails using biological systems or living things to create new goods and procedures. Biotechnology is widely used in the medical field agriculture, and industry.
4. Automation and Robotics: This technology is used to improve efficiency and productivity in various industries through process automation and the use of robots.
5. Artificial Intelligence (AI): AI is used to analyze data and make automated decisions, which can be applied in areas such as healthcare, finance, and transportation.

Transversal technologies enable faster innovation and better collaboration between different disciplines, driving progress across many sectors. Technologies with the potential to affect numerous industries and sectors are referred to as transversal or cross-cutting technologies. These technologies are frequently distinguished by their broad variety of applications and capacity to stimulate innovation and advancement in numerous disciplines (Abuže, 2020). Biotechnology, robotics, renewable energy, and artificial intelligence are a few typical instances of transversal technologies.

The ability of transversal technologies to upend established markets and open up fresh avenues for development and innovation is one of its primary characteristics. The advancement of artificial intelligence, for instance, has the power to fundamentally alter how we work, communicate, and engage with the world. Artificial intelligence (AI) is being utilized in healthcare to create new diagnostic tools and treatment plans, and in finance and retail to enhance customer service and automate repetitive jobs.

According to Torres et al., (2018) Additionally capable of boosting competitiveness and economic growth are transversal technology. Transversal technologies have the potential to boost productivity and enhance the competitiveness of enterprises and industries by facilitating more efficient and effective operations within organizations. While the adoption of renewable energy technology can assist lessen dependency on fossil fuels and promote environmental sustainability, the application of robotics and automation technologies has been demonstrated to increase productivity and

lower industrial costs. The capacity of transversal technologies to facilitate the creation of new goods and services is another important characteristic. Transversal technologies can promote the establishment of new markets and sectors and assist drive economic growth by giving businesses the resources and tools they need to innovate and find new solutions. For instance, the application of biotechnology facilitates the creation of novel medications and medical procedures, and advancements in renewable energy technologies foster the expansion of the clean energy sector (Goggin et al., 2019).

Transversal technologies have the ability to address some of the major issues facing humanity in addition to spurring innovation and economic progress. For instance, developments in biotechnology are being leveraged to create novel illness therapies, while improvements in AI and robots are being used to address issues like population aging and climate change. All things considered, transversal technologies are major forces behind innovation and advancement, and in the years to come, their significance is only predicted to increase. These technologies will probably be crucial in determining how business and society as a whole are shaped in the future as they continue to grow and evolve.

Future Global Economic Growth

Nordhaus, W. D. (2021) stated that future global economic growth is expected to face various challenges and significant changes. Several factors that will affect this growth include:

1. Geopolitical Fragmentation: The global economy is predicted to experience fragmentation due to geopolitical changes, which can increase economic barriers between countries. This has the potential to disrupt international trade and investment flows
2. Economic Volatility: There is increasing volatility in important economic indicators such as output, interest rates, and prices. This uncertainty can affect investment and consumption decisions in various countries.
3. State Intervention: Increasing government intervention in the economy is also a trend that is likely to continue. This could include more aggressive fiscal policies to support economic growth amidst global challenges
4. Dependence on Domestic Demand: Countries, including Indonesia, are expected to increasingly rely on domestic factors for economic growth, especially with the anticipated decline in global demand
5. Transformation of the Service Sector: The service sector is expected to dominate global economic growth. With reduced dependence on the

manufacturing sector, many countries will shift to a more sustainable service-based economy.

6. Innovation and Creative Economy: Amidst challenges, there are opportunities for innovation and creative economy development. Countries that are able to harness this potential can create new growth engines that contribute to the welfare of society.
7. Global Recession: Some analysts predict the possibility of a global recession that could affect economic growth in various countries. This recession could be caused by various factors, including market instability and the impact of tight monetary policy.

Overall, despite significant challenges, there are also opportunities for sustainable growth through innovation, service sector development, and policies that support domestic economies. Countries that can adapt quickly to these changes will be better able to face future uncertainties (Valin et al., 2014).

At the beginning of 2024, the global economy faces increasingly complex challenges. The global economy refers to an economic system that involves interdependence and interaction between various countries around the world. Economic activities such as international trade, cross-border investment, and capital movements between countries are the main elements that shape the dynamics of the global economy. The scope includes the exchange of goods, services, and resources between countries, taking into account factors such as currency fluctuations, international trade policies, and financial market dynamics that impact global economic well-being. In the report "Indonesia Economic Prospects" published by the World Bank in December 2023, it stated that, "The risk of economic slowdown in Indonesia will increase in the next few years, although overall, the domestic economic condition is still considered solid." Therefore, it can be questioned why the global economic projection in 2024 shows a downward trend (Christensen et al., 2018).

Factors Affecting the Global Economic Downturn (Diffenbaugh, N. S., & Burke, 2019):

1. Geopolitical Uncertainty. Uncertainty in geopolitical relations between major countries, which can trigger a global economic downturn through conflict, trade disputes, or changes in international political dynamics, impacts market player confidence and investment. Quoted in TimesIndonesia, Jakarta, said, 2024 is expected to see the Indonesian economy increasingly dependent on domestic GDP factors along with the

anticipated decline in global demand. On the other hand, a significant increase in fiscal spending, especially during the general election period, is expected to spur GDP growth of 5% year-on-year (YoY).

2. Changes in Currency Values. Fluctuations in currency exchange rates have a major impact on the competitiveness of a country's exports and imports. Sudden and significant changes in exchange rates can cause instability in international trade relations. According to Bisnis.Com, In 2024, Indonesia's export and import growth projections are only around 9% and 9.4%, respectively, indicating a decline compared to 2023 and 2022. The decline in export and import growth is due to the weakening of the global economy which is expected to occur in the coming year. 3. Commodity Price Fluctuations. Changes in global commodity prices, such as oil, metals, and agriculture, have a significant impact on the global economy, especially harming countries that are highly dependent on exports of certain commodities. "Meanwhile, with the weakening economy of Indonesia's main partner countries, positive growth in other countries, especially in North America (2.2%), South America (3.3%), and Asia (5.8%), is considered an opportunity that needs to be optimized by Indonesia to expand its export market. Although the prices of several commodities, including coal, are expected to stagnate next year, except for crude oil which is projected to increase, providing an additional dimension to Indonesia's export strategy," Bisnis.Com with the title Economists Warn RI's Trade to Weaken in 2024.

Ultimately, 2024 marks a challenging early period in the global economy. The World Bank has warned of the risk of an economic slowdown in Indonesia, although overall domestic economic conditions are considered solid. Factors such as geopolitical uncertainty, currency fluctuations, and changes in global commodity prices are the main causes of the global economic downturn. In the face of projected declines in global demand, Indonesia is expected to increasingly rely on domestic GDP factors. Although export and import growth estimates show a decline, a careful strategy with increased fiscal spending and exploitation of growth opportunities in various countries, including North America, South America, and Asia, is an important step to respond to the negative impact of the global economic downturn in 2024.

The Role of Transversal Technologies in Future Global Economic Growth

Transversal technologies play a very important role in the future growth of the global economy. Here are some key aspects of this role (Liubarets et al., 2022):

1. Accelerating Digital Transformation
   Transversal technologies, such as digitalization, are key drivers in economic and business transformation. By leveraging digital technologies, companies can improve operational efficiency and create new, more innovative business models. This is especially important in the context of post-pandemic economic recovery, where many businesses must adapt to new ways of operating
2. Empowering Micro, Small, and Medium Enterprises
   In many countries, including Indonesia, transversal technologies help empower Micro, Small, and Medium Enterprises. With access to digital technologies, MSMEs can expand their markets, increase productivity, and innovate in the products and services they offer. This contributes to inclusive and sustainable economic growth
3. Developing a Digital-Based Economy
   Transversal technologies also drive the development of a digital-based economy, which creates new opportunities in various sectors. For example, the use of artificial intelligence (AI), big data, and the Internet of Things (IoT) allows companies to automate processes and increase productivity, which in turn can accelerate economic growth.
4. Economic Inclusion and Social Justice
   By ensuring wider access to technology, countries can improve digital literacy among their citizens. This is essential for creating equality in economic opportunities and reducing social disparities. Governments need to collaborate with various stakeholders to develop regulations that support sustainable growth and protect the interests of society.
5. Innovation and Creativity
   Transversal technologies also encourage innovation and creativity across sectors. By leveraging technology, individuals and companies can create new solutions to existing challenges, which can contribute to more dynamic and responsive economic growth.

Overall, transversal technologies serve not only as a tool to increase efficiency, but also as a key driver in creating new opportunities and supporting inclusive and sustainable economic growth in the future.

Transversal technologies refer to technologies that have cross-sector impacts and can be applied across industries. These technologies include domains like quantum computing, blockchain, Internet of Things, and artificial intelligence (AI). Here are some ways that transversal technologies can drive global economic growth in the future (Whittemore, 2018):

1. Increased Productivity
   Transversal technologies enable the automation of business and production processes, thereby reducing operational costs and increasing efficiency. AI, for example, can optimize supply chains and predict market demand, while IoT enables real-time monitoring and management of assets.
2. Product and Service Innovation
   Transversal technologies drive innovation by enabling the development of new products and services that were previously impossible. For example, blockchain technology can be used to create more secure and efficient payment systems, while AI can be used to develop more personalized health applications.
3. Increased Connectivity
   IoT and 5G networks enable better connectivity between devices and systems, which in turn accelerates the exchange of data and information. This allows for better coordination across economic sectors and increases operational efficiency.
4. Improved Data Quality and Reliability
   With technologies like big data and AI, data analysis has become more sophisticated and accurate. This enables better, data-driven decision-making, which can improve business performance and the economy as a whole.
5. Improved Security and Transparency
   Blockchain offers solutions to improve security and transparency in various business transactions and operations. This technology can reduce the risk of fraud and increase trust in the global economic system.
6. Opening New Markets
   Transversal technologies can open new markets and create economic opportunities across sectors. For example, advances in renewable energy technologies can open new markets in the energy sector, while AI and robotics can create new opportunities in the manufacturing and services sectors.

7. Improved Education and Skills

   Technologies like e-learning and AI-based education platforms can improve access to and quality of education. This is important to ensure that the global workforce has the skills needed to adapt to changing technologies and market needs.

While transversal technologies offer many opportunities, there are also challenges to be addressed, such as (GOCHHAIT, S., & DE ALMEIDA, F. M.):

Inequality of Access to Technology: Not all countries or individuals have equal access to advanced technologies.

Security and Privacy: Increased connectivity and use of data raise concerns about security and privacy.

Technological Unemployment: Automation and AI can replace certain jobs, so efforts are needed to address technology-induced unemployment.

By addressing these challenges and maximizing the potential of transversal technologies, sustainable and inclusive global economic growth can be achieved.

CONCLUSION

Transversal technology plays an important role as a major driver of future global economic growth. In this context, technology not only functions as a tool, but also as a driving force that significantly changes the economic and business paradigm. Innovation in this sector, driven by technology, can improve people's welfare and strengthen the nation's cultural identity.

Digitalization is also an integral part of economic transformation. Technological innovation in various fields, including marketing and e-commerce, has altered how companies run and communicate with customers. For instance, the expansion of online shopping in Indonesia has far exceeded the average global growth. This shows that the digital economy has very promising prospects if managed properly.

Thus, transversal technology not only functions to improve efficiency and productivity, but also as a major driver in creating new opportunities and encouraging inclusive and sustainable economic growth. Collaboration between stakeholders, including the government and the private sector, is essential to harness this potential and face future challenges.

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