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FUTURE COMMUNICATION TECHNOLOGIES: INNOVATION AND IMPACT ON GLOBAL SOCIETY

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Abstract. Development technology communication Keep going experience significant acceleration, changing method man interact , work , and live life everyday. This article discuss various technology future communication is in progress developed, including 6G network, communication quantum, internet visible eyes, reality mixed reality and holograms. With integrate analysis technology, impact social, economic, and ethical, articles This give outlook about How innovation This can change global society, as well as possible challenges and opportunities appear. Development technology communication Keep going experience significant acceleration , changing method man interact, work, and live life everyday. This article discuss various technology future communication is in progress developed, including 6G network, communication quantum, internet visible eyes, reality mixed reality and holograms. With integrate analysis technology, impact social, economic, and ethical, articles This give information about How innovation This can change global society , as well as possible challenges and opportunities appear.

Keywords: technology; communication; innovation

I. INTRODUCTION

Technology communication Keep going develop with rapid, pushing limitation ability man For interact, work, and access information. From analog phones to 5G network now this, every innovation technology communication has bring change fundamental to life humans . Now, the world is preparing entering a new era with technology more communication sophisticated, such as 6G network, communication quantum, internet visible eyes, and reality mixed. Technologies This expected No only increase efficiency communication but also change dynamics social, economic, and global politics.

Technology communication has experience revolution outside normal since beginning 20th century, changing method man communicate, work, and interact. Start with invention telephone by Alexander Graham Bell in 1876, communication man experience change significant, shorten distance between people all over the world. Then, development radio and television technology in the early the 20th century gave method new for man For access information in a way mass. The entry of the internet at the end of The 20th century began the era of digital communications, where information can delivered in count second to all over the world. Nowadays, communication wireless like technology cellular and Wi-Fi have become standard in life everyday, allowing internet access and communication When anywhere and anytime .

Development technology digital communication begins with the emergence of the internet in the 1960s, which was the beginning developed For needs military and academic. However, in the 1990s, the Internet became more wide used by the public with the emergence of the World Wide Web, which allows people to access information and communication in a way more easy and fast. According to data from Internet World Stats, by 2023, more of 5.5 billion people, or about 69% of world population, has connected to the internet, signifying improvement big from only 413 million internet users in 2000.

Wireless communication has become foundation from the digital era when This . Technology This started with telephone mobile generation first (1G) in the 1980s , which only allow calling analog sound. Progress going to 2G technology in the 1990s introduced service message text (SMS) and calls digital voice. In the early 2000s, 3G technology expanded ability network mobile For access the internet with more speed high, followed by 4G support data-intensive applications such as HD video streaming. Currently, 5G networks are already launched in several countries, offering far data speed more high and higher latency low compared to technology previously.

5G network is not only just improvement from 4G; technology This offer speed up to 10 gigabits per second , which means a thousand times more fast from 4G network . This allows applications new like virtual reality (VR) and augmented reality (AR), vehicles autonomous, and the Internet of Things (IoT). According to report from Ericsson Mobility Report 2023, more from 1.5 billion 5G subscriptions are estimated will there at the end 2024 , shows rapid adoption from technology this is worldwide. Although 5G is still in stage beginning implementation, needs will more communication

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fast and safe Keep going developing. This is partly big driven by the increasing volume of data transmitted every day, which is estimated will reaching 463 exabytes per day globally by 2025, according to International Data Corporation (IDC). Growth exponential This highlight need will technology more network sophisticated and safe For handle increasing data transfers big.

Technology future communication like 6G is in progress in stage development and expected become successor to 5G. 6G is expected will offer data speeds up to 100 times faster fast than 5G and allows data transfer with almost latency No there is. It will open door for applications new like network nerve very sophisticated manufacturing, transmission holographic, and computing at the edge with ultra- low latency. Research by Samsung Research show that 6G technology can available in 2030, with various trials that have been started in several developed countries .

Besides the network communication traditional, communication quantum currently develop rapid as future technology For data security. Technology This use principles mechanics quantum For transmit information with almost the same way impossible For hacked . Countries like China and the United States Already start study intensive and development network communication quantum. According to report from Nature, China succeeds do a trial communication quantum distance Far between satellite and earth as far as 1,200 km, proving potential big from technology This in create more communication safe.

Reality mixture (Mixed Reality) combines element from the real world and the virtual world, allowing user interact with digital objects in the real world. Technology This Already start used in the field education , training and industry entertainment. According to Global Market Insights , the reality market mixture estimated will reach worth $25 billion by 2025, driven by increasing request For solution more training and education immersive.

Technology future communication expected can give impact significant economy . According to McKinsey Global Institute, adoption digital technology can add up to $15 trillion in global GDP by 2030. Technology This will allow innovation in various sectors, including health, manufacturing, and services finance, with introduce more efficiency height and business model new. However, there is also a risk that adoption technology This can widen digital divide between developed and developing countries If No There is effort For ensure more access fair .

With progress technology communication, appears challenge new related ethics and impact social . Use technology like the internet visible eyes and communication quantum cause concern about privacy and potential data misuse. According to study from Journal of Information, Communication and Ethics in Society, strict regulations and clear policies required For protect privacy individual and prevent abuse technology. In addition, the increase dependence on digital technology can cause problem social like digital isolation and inequality access .

Technology future communication, starting from 6G network up to communication quantum reality mix and hologram, has potential big For change method We live and work. However, to maximize benefit from technology this is important For face challenge social, economic, and ethical issues that emerge along with development technology This. Collaboration between government, industry and society civil required For ensure that technology This developed and used in a way responsible answer, and For maximize the benefits for all over people man.

II. RESEARCH METHODS

The methods used in this study are critical analysis methods and library methods. The critical analysis method that the author means here is an effort to select by summarizing and considering problems so that they can be reduced, repositioned, and presented regularly. Meanwhile, the library method is a research method carried out by collecting, reading, recording library data and processing research materials (Mustika, 2008).

III. RESULTS AND DISCUSSION

6G Network: Ultra High Speed and Connectivity

Technology 6G network is estimated will become breakthrough big in the world of communication, with its planned launch in 2030. The network This expected offer very high data rates, reaching terabytes per second, which is far beyond ability 5G network now this. With speed this , 6G will allow very large data transmission in short time, support various application advanced like ultra- realistic virtual reality and augmented reality (VR/AR). In addition, the 6G network is also expected can support city highly connected smart, where every device, from light Then cross until car autonomous, can communicate in real-time for increase efficiency and safety. In the sector industry, 6G will push more automation sophisticated, enabling factory clever For optimize production process in a way automatic with help intelligence artificial intelligence (AI).

There are six direction technology that has role big in realizing 6G, the network mobile generation Next, are : IBN, THz, AI, DLT/BC communications, devices smart and communication free gadgets, and communication quantum. (De Alwis, C., Kumar, P., Pham, Q.-V., Dev, K., Kalla, A., Liyanage, M., & Hwang, W.-J. 2023).

1) Intent-Based Networking (IBN): IBN will automate implementation intention business to in network with utilise defined policy with Good For support adaptation the new 6G service. With use AI/ML technology, IBN enables network For translate intention user to in network configuration and strategy, improving flexibility, efficiency, and security .
2) Terahertz (THz) Communication: THz communication offers very large bandwidth, which exceeds ability frequency used in 5G network. With ability For provide data rates up to terabits per second (Tbps), THz expected can used in various 6G applications, including transmission wireless speed high and wireless backhaul in the network very dense heterogeneous.
3) Intelligence (AI): AI will become key in optimize management 6G network , helps in taking complex decisions, and allows network become more cognitive. AI

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will also used For various application industry, such as vehicle autonomous, analytical diagnostics, and optimization network.

4) Distributed Ledger Technology/Blockchain (DLT/BC): DLT, especially blockchain, will play a role in increase flexibility, security, and privacy in 6G network. Technology This allow storage distributed and secure, and management source more power efficient through contract smart, which will be very important For management spectrum and transactions in 6G ecosystem.
5) Devices and Communications Gadget Free: Devices smart on 6G network will covers various technology sophisticated, including screen holographic and communication based on haptic . Gadget -free communication will allow environment all- round user Can without need device physical, with utilise interface sensor and AI based for interaction user.
6) Quantum Communication : Quantum communication offer potential For increase speed and security communication with utilise principles physics quantum. Technology This estimated will be one of mover main in realize secure and fast communication on 6G networks, with utilise distribution key quantum and computing quantum For data processing .

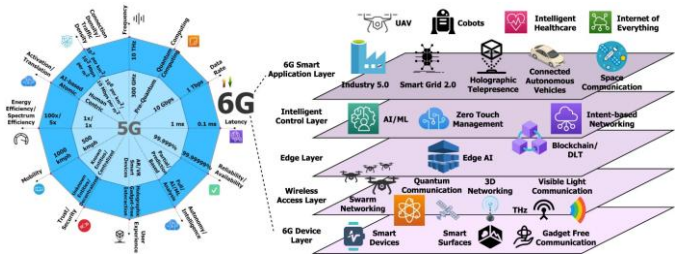

Figure 1: 6G upgrade , layers 6G architecture level height , 6G technology , and applications. Source : De Alwis, C., Kumar, P., Pham, Q.-V., Dev, K., Kalla, A., Liyanage, M., & Hwang, W.-J. (2023).

Based on Figure 1, 6G network highlights the ultra high speed and connectivity expected from technology This is :

a) Data Rate: 6G networks are expected to can reach data rates up to 1 terabit per second (Tbps), much faster more tall compared to 5G network. This is allow very fast data transmission, supports application like more virtual reality advanced and communication holographic.
b) Connectivity and Density Network (Connection Density & Traffic Density): 6G is expected support density distant connection more high , with potential For connect more from 10 million devices per square kilometer. This is important For supporting the growing IoT developing and applications that require connectivity massive, such as smart cities and vehicles autonomous.
c) Latency: One of the improvement The main thing in 6G is subtraction latency up to 0.1 milliseconds, allowing response time real For highly sensitive applications, such as telemedicine, industrial automation , and vehicles autonomous.
d) Reliability and Availability: 6G networks will offer very high reliability with level availability reaching 99.99999%, which is very important For application critical like operation distance distance and communication military.
e) Efficiency & Spectrum Efficiency: 6G is designed For become Far more efficient in use energy and spectrum, reducing consumption energy per bit and maximize use available spectrum . It supports development technology friendly more environmental and operational economical .
f) Experience User (User Experience): With technology like communication hologram based and interaction without devices , 6G will offer experience remote user more immersive and natural. Technology such as AI/ML, Edge AI, and Communications Quantum will also enrich experience user through more network smart and personal.

This 6G technology expected capable present change big in method We communicate, work, and access information, with unmatched speed and reliability unmatched by generations previously.Six technology This expected No only will allow 6G network for fulfil demands future communication, but also introduce services and applications new that has not been Once There is previously.

However, the implementation 6G networks also bring significant challenges. One of the challenge main is need will infrastructure newer one sophisticated and more expensive than network previously. Tower construction mobile new, installation device harder the more strong , and development device more software advanced need investment large . In addition, because 6G operates at higher frequencies, tall than 5G, the signal more prone to to disturbance , which requires solution technical new For ensure stable connectivity . Challenges other related with data security and privacy, considering improvement amount connected devices and the volume of data generated, the risks to attack cyber and data breaches are also on the rise. Therefore that, development 6G network must accompanied with strengthening protocol security and framework Work strict regulation For protect user data .

Quantum Communication : Ensuring Data Security in the Digital Age

Quantum communication is innovation revolutionary in technology communication that utilizes principles mechanics quantum For transmit information with level very high security. Basically, the technology This use phenomenon physics quantum, such as superposition and entanglement quantu), for ensure that information sent No can tapped or hacked without detected. This is make communication quantum is very interesting For applications that require level extraordinary security normal high, as in the field military, diplomacy international, as well as sector business and finance that requires Very secure data exchange.

Superiority main from communication quantum is his ability For detect existence effort tapping. When the particle quantum (such as photon) is used For send information, every effort For intercept or observe particle the will cause change in circumstances quantum. Changes This can detected by the party sender and recipient, so that they can know whether channel communication they currently under surveillance or

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tapped. Because of its almost perfect security. not unmatched, technology This considered as ideal solution for protect information sensitive and critical data from threat cyber in the future.

Quantum computing predicted capable finish problems very complex computation, which at the moment This No Possible completed by computer classic, including supercomputer. This is will bring change big in field future technologies, including in further AI development advanced, simulation more scientific accurate, and much faster big data processing more fast Yalcin, et al. (2024) .

Although the potential is very large, communication quantum Still face a number of challenge significant technical. One of the obstacle main is stability and efficiency transmission distance far . Currently, communication quantum effective only in relative distance short Because particle quantum tend lost its coherence (stability) quantum) when pass more distance Far or through less than ideal media. However, various research and development currently done For overcome obstacle this, including development satellite quantum and quantum repeaters that can extend distance communication. With effort ongoing research it is hoped in a number of year to front, communication quantum will the more stable and efficient , open road For more implementation wide in various field .

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Invisible Internet : Integrated Technology in Life Daily

The concept of the internet is not visible eyes, or invisible internet, refers to the internet integration that is so massive in life daily so that his presence almost No visible . Technology This allow device For always connected, start from embedded sensors in clothes until equipment House ladder smart and technologically capable worn (wearable technology), such as watches clever or AR glasses. Devices This continously collect and share data, create a fully digital ecosystem each other connected and responsive to need user. Imagine smart refrigerator that can order material food in a way automatic when stock thinning, or clothes that can monitor health its users and send data directly to provider service health.

Figure 2. about The concept of the internet is not visible eyes , showing How technology has integrated with strong in life everyday, creating a fully digital ecosystem connected and responsive to need users. Another thing , Figure 3, about Technology Future Communication with draft Internet of Intelligent Things (IoIT) shows its influence on various sectors , including city smart, care health, and industry.

Figure 2: The concept of the internet visible eye. Source : Illustration use DALL E application , Author , 2024.

Figure 3: Internet of Intelligent Things (IoIT) and its impact on various sector. Source : Illustration use DALL E application , Author , 2024.

"The Internet of Intelligent Things (IoIT) represents a transformative convergence of embedded systems, edge computing, and machine learning, setting the foundations for a series of disruptive applications that will significantly impact various sectors globally, including smart cities, Industry 4.0, and healthcare" (Oliveira et al., 2024).

Meaning: “The Internet of Intelligent Things (IoIT) represents convergence transformative from system embedded, edge computing, and learning machine, which sets foundation for a series application disruptive that will impact significant in various sector globally, including city smart, Industry 4.0, and services health.

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However, with progress This also brings challenges significant related privacy and data security. Because the device in internet ecosystem visible eye This continously collect and share information, risk to data breaches and abuse information personal become more high. According to report Gartner, by 2025, more from 75 billion device will connected to the internet, and many from device This will collect sensitive data about activity daily users, preferences, and even health them. Therefore that 's important For ensure that the data collected safe from access No legal and violation.

Apart from the problem privacy, internet visible eyes also cause question significant ethics related with supervision and control. In a world where every aspect life We can monitored and analyzed by connected devices, there are potential big for entity government or corporation For abuse technology this. Control excessive or continuous monitoring can threaten freedom individual and worsen problem privacy. Therefore that 's important for society and makers policy For consider implications ethics from technology this and develop framework Work proper regulation For protect rights individual. This includes set clear boundaries about types of data that can be collected, how the data is collected used , and who owns it access to the data.

Mixed Reality and Communication Immersive : Changing the Way We Interact

Reality Mixed Reality (MR) is technology that combines element from the real and virtual world to create more experience immersive and interactive. With integrate virtual elements to in environment real, MR allows user interact with digital objects in room physique they. In the context of communication, reality mixture offer potential big For create shared virtual space where individuals can interact as if they are in the same location, even though separated in a way physical. For example, in A meeting business, participants are in various parts of the world can sit around same virtual table, see One each other, and interact with presentation or digital documents as if they present in the same room.

Application technology reality the mix is very broad and diverse. In the field of education, MR can used For create environment learn more interactive and immersive, allowing student learn concepts complex with a more visual and practical way. For example, students medical can using MR for learn anatomy body man through interactive 3D models, while student history can " visit " archaeological sites from the whole world without leave room class. In the sector training and collaboration distance far away, MR can used For training more simulation realistic, like in pilot training or operation medical, as well as For collaboration between teams spread across various location.

Figure 4, about Mixed Reality (MR) and Immersive Communication, featuring how the digital and physical worlds integrated in a way smooth, creating experience in -depth and interactive communication.

Figure 5, shows How technology reality Mixed Reality and communication immersive can change method We interact, especially in context medical. With HoloLens 2 assistance, a user can do ultrasound scan local while accept integrated visual instructions with environment physique they. This data Then sent in real-time via 5G network to a experts located in different locations, allowing they For give guide and even control device medical from distance far. Technology This No only increase accuracy and efficiency procedure medical but also possible collaboration cross location, making maintenance health more responsive and able accessed in various situation. System This nature flexible Because can used with various ultrasound device, expanding applications and their effectiveness in the medical world that continues developing (Parmar, D., Gupta, S., Vats, A., & Singh, G, 2024) .

Figure 4: Mixed Reality (MR) and Immersive Communication Source : Illustration use DALL E application , Author , 2024.

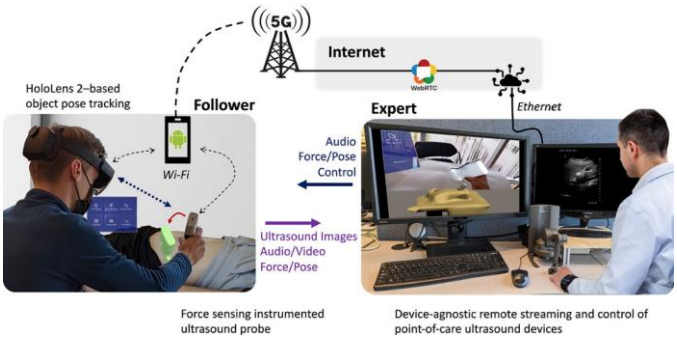

Figure 5: Mixed Reality (MR) and Immersive Communication. Source : Parmar, D., Gupta, S., Vats, A., & Singh, G. (2024)

However, even though own great potential, technology reality mix also faces a number of challenge. One of the challenge main is adaptation user. Many people probably feel clumsy or difficult For adapt self with more virtual interactions intensive and requires skills new. In addition, the cost device hard still relatively high, such as advanced MR headsets, become barrier for more adoption broadly, especially in emerging markets.

In addition, there are also concerns about problem health related use term long MR technology . Some user report symptom like nausea, dizziness, and tension eye after using MR headset for long period, which can become obstacle For

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adoption technology This in a way more wide. Therefore that 's important for developers and manufacturers MR device for Keep going repair design and functionality device they For reduce potential effect side This .

Although There is challenges, potential reality mixture in change method We communicate and interact with information is very large. With Keep going development technology this and the decline cost device hard, possibility We will see more adoption wider and more Lots application innovative from MR in various sector in a number of year upcoming.

Hologram Technology : The Future of Visual Communication

Realistic hologram technology own potential big For revolutionize method We communicate and interact visually in the future. Technology This allow creation picture three dimensions that can be seen from various angle, giving illusion that object or the person present in the same room with we. In the context communication , holograms allow virtual meeting that feels more real and personal compared with video conference traditional . With ability For display picture three dimensions in real-time, holograms can create experience very similar communication with interaction look at face, which is very valuable in various situations, such as meeting business international, consulting medical distance away, or educational events.

Progress in technology network, such as development 6G network, very important For enables high definition 3D holograms tall For transmitted in real-time. The speed and bandwidth capacity provided by 6G will enables holographic data in amount big sent with very low latency, creating experience smooth and seamless communication disturbance. For example, in the future, someone Possible can attend conference international as a complete hologram interactive, speaking with colleague work and interact with material presentation as if they be in place the in a way physical. This will bring benefit big in matter efficiency time and cost, as well as reduce need will journey distance far away which is expensive and time consuming time .

According to Mavrikios , D., Alexopoulos, K., Georgoulias , K., Makris, S., Michalos, G., & Chryssolouris , G. (2019) hologram can used as technology key in convey content education in the environment industry and academia . Holograms enable complex 3D model visualization in size actually, that can viewed and interacted in a way together by the team students and engineers separated location. Technology This offer method new For merge method teaching traditional with Industry 4.0 technology, bridging gap between practice industry and education through interaction collaborative based on holography .

Hologram, as part from technology future visual communication, enabling visualization and interaction with data in more deep and immersive. In the context of this, hologram no only revolutionize method We communicate but also the way We study and work, make information more easy accessed and understood by various party in various discipline science . Holograms make it possible more communication effective and collaborative, where users can interact with same visual content in real-time, regardless from location physique they. This is make hologram technology as element key in evolution visual communication that will support various sectors, including education and industry, in the future .

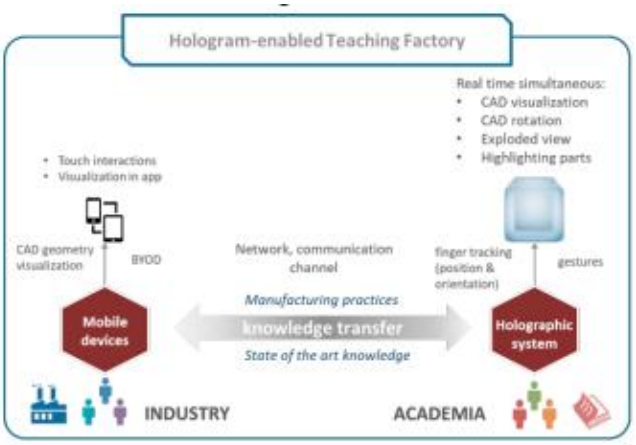

Figure 6: Hologram-enabled Teaching Factory. Source : Mavrikios , D., Alexopoulos, K., Georgoulias , K., Makris, S., Michalos, G., & Chryssolouris , G. (2019)

Figure 6, illustrates How technology holography can integrated in the concept of a "Hologram-enabled Teaching Factory" for strengthen collaboration between industry and academia . In this model, knowledge and practice manufacturing latest transferred in a way effective through use mobile devices and systems holography. Mobile devices allow users in the industry For visualize and interact with CAD models through touch, while system holography in academia allow tracking movement finger For manipulate object in hologram form in real-time. With channel integrated communication, both split party can collaborate and exchange knowledge in a way direct, create environment interactive and in - depth learning . Technology This No only enrich experience education , but also bridging gap between theory academic and practical industry, making the learning process more relevant and applicable in the real world.

However, the challenge main in implement this hologram technology is need will device Sophisticated hardware and very high bandwidth. Technology This need camera and projector special capable capture and project picture three dimensions in a way accurate. In addition, to reach quality realistic images, huge holographic data must compressed and transmitted with fast through network. This is need infrastructure very strong and reliable network, as well as significant investment in technology compression and data processing. In addition, other constraints include cost device high hardness and potential problem technical, such as delay or latency that can influence quality and effectiveness communication holographic.

With existence challenges said, the developers technology and companies telecommunication must Work The same For overcome obstacle technical and speed up adoption technology This. Innovation in algorithm data compression, development device harder the more affordable, and improvement infrastructure network everything will play role

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important in realize potential full from hologram technology in communication in the future. If the challenge This can overcome, the hologram has potential For become tool very powerful and transformational communication, opening up ways new For interact, collaborate, and learn in an increasingly digital world. connected digitally.

Social Impact of Technology Future Communication

Technology future communication, such as 6G network, communication quantum, internet visible eyes, reality mixture, and hologram, potentially change method man interact and collaborate globally. With ability For connecting people from various parts of the world instant and efficient, technology This can speed up interaction social and expanding access information to more many people. This is allow collaboration more cross- border effective, good in context business, education, and research. For example, scientists and researchers can collaborate in projects big without must gather in a way physical, while community in the area remote can access service education and health through a sophisticated digital platform.

However, behind benefit big this , there is risk significant social needs that need to be addressed be noticed. One of the risk main is potential isolation social and over - dependence on digital technology. The increase use digital devices for communication can reduce interaction look at face, the important thing For build connection strong and deep social isolation. social This can result in feeling loneliness and isolation, especially among individuals who tend to use up time more more in cyberspace than in the real world. According to published research in Journal of Communication, excessive dependence on digital technology can also cause various impact psychological negative, such as digital stress, anxiety, and depression, especially among generation young growing up big with technology This.

In addition, there is also a risk abuse information in technology future communication . With the more the amount of data generated and shared through digital platforms, the risk violation privacy and abuse information personal increased . Information that is not managed with Good can used For detrimental purposes, such as manipulation psychological, distribution disinformation, or even attack cyber that can threaten security individuals and countries. Therefore that 's important For develop appropriate policies and regulations For protect privacy and data security, as well as ensure that technology This used in a way ethical and responsible answer. According to Yalcin, et al (2024) There is risk in revolution technology This related data security :

"Quantum computing, while having the potential to revolutionize industry, poses significant cybersecurity risks. Quantum cybersecurity threats include data breaches of sensitive personal and financial data as well as challenges to the integrity of digital assets and their underlying cryptography (Yalcin, et al, 2024)

Meaning: Computation quantum, although own potential For revolutionize industry, but cause risk security significant cyber threats. security cyber quantum covers data breaches of sensitive personal and financial data as well as challenge to integrity digital assets and the underlying cryptography ”

On the other hand, technology future communication can also deepen digital divide between group that has access to technology sophisticated and those who are not. In many developing countries, access to adequate digital infrastructure Still become challenge big, which can limit ability individuals and communities For utilise benefit full from technology new this. If not managed with well, gap This can to worsen inequality social and economic, creating a world where only a handful of people who have access to opportunities and resources growing digital power rapidly.

Therefore that, for maximize benefit social from technology future communication and minimizing associated risks, important for government, sector private sector and community civil For Work The same in develop inclusive and sustainable solutions. This includes investment in equitable digital infrastructure, education extensive digital literacy, and development framework Work regulations that protect rights individual. With holistic and sustainable approach, technology future communication can become powerful tool For strengthen cohesion social and encouraging digital inclusion worldwide.

Impact and Industrial Transformation

Innovation in technology future communication, such as 6G network, communication quantum, internet visible eyes, and reality mixed, predicted will own impact significant on the global economy with create opportunity new in various sector. In the sector manufacturing, for example, technology This allow automation and optimization of production processes sophisticated. With ability distant connectivity more faster and more reliable, factory smart factories can integrate technology Internet of Things (IoT) and intelligence artificial intelligence (AI) for increase efficiency, reduce downtime, and minimize cost operational. Technology communication quantum, with its high security, also can change industry banking and finance, providing a better way safe For do transactions and manage sensitive data.

Figure 7: Economic Impact and Industrial Transformation. Source:Illustration use DALL E application , Author , 2024

In the sector health, technology future communication can improve diagnosis and treatment patient through more telemedicine sophisticated and use of big data for analysis predictive. 6G networks, for example, can support operation

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distance Far with high definition video transmission real-time height, allowing doctor in one location For do operations on patients in other locations with precision high. Technology this can also used For collect patient data in a way real time through devices that can worn (wearable devices), which is then can analyzed For give more personal and precise care time. In the sector education, technology like reality mixture can create environment learn more interactive and immersive, reducing gap education with give more access wide to students in the area isolated.

However, regardless from potential benefit big economy, innovation in technology communication can also bring challenge seriously, especially related with disruption power work . Improvement automation and adoption technology advanced can replace work man in various industry. For example, repetitive and manual tasks in manufacturing or service customer can with easy automated, reduce need will power Work human beings. According to report from World Economic Forum, more from 85 million jobs all over the world potential replaced by technology automation by 2025. This can create challenge big for workers whose positions threatened and in need improvement skills or training repeat For still relevant in the labor market Work .

In addition, rapid digital transformation this can also deepen gap economy between developed and developing countries. Countries with more digital infrastructure good and more access big to technology new will more Ready For utilise opportunities offered by technology future communication. On the other hand, countries that are left behind in matter digital infrastructure and skills technical Possible face challenge in compete globally. This is can to worsen inequality economy and slow down growth in less developed countries develop.

For face challenge this is important for government, industry and society For collaborate in develop supportive policies inclusive and sustainable digital transformation. Investment in education and training repeat power work, development equitable digital infrastructure, and the creation of framework supporting regulations innovation while protect rights worker is steps key For ensure that benefit economy from technology future communication can enjoyed by all layer society. With Thus, technology This can truly functioning as mover growth an inclusive and sustainable economy.

Ethical and Regulatory Challenges

With progress technology rapid communication, emerged challenge new related with ethics and regulation . Protection privacy and data security becomes attention main, especially with increasing the amount of personal data collected and stored by the device smart and network sophisticated. In addition, there are also concerns about use technology For objective supervision and control social. Proper arrangement and regulation international required For ensure that technology This used with ethical and responsible manner answer, and For protect rights individual.

There is challenge significant that needs to be overcome. First, the problem privacy and data security becomes the more urgent, remembering amount connected devices and the volume of data generated will Keep going increased. Risk data breaches and attacks cyber also increases along with adoption technology new This. Second, there is question serious ethics about supervision and control, especially in matter how data is collected, stored, and used by governments and corporations. Other issues include adaptation user to technology new and associated costs with development and implementation infrastructure new.

For maximize benefit technology future communication, important for researchers, makers policies, and society general For Work The same in create proper policies and regulations. Clear and strict regulations must applied For protect privacy individual and ensure that the data is used in a way ethical and safe. In addition, it is important For promote digital literacy among public general so that they can understand and manage associated risks with technology new This. Collaborative effort This must focused on the development and implementation responsible technology answer, which is not only maximize benefit for global society but also minimize potential risks and losses.

With wise and collaborative approach, technology future communication can give impact significant positive to efficiency, security, and global accessibility, helping shape a better future connected, safe and fair for all. The global community must Ready face change big This with openness to innovation, while still alert to possible challenges and risks emerge. In facing an increasingly digital and connected future, we must ensure that progress technology walk along with progress social and ethical, for the sake of togetherness and global prosperity.

Opportunity for Global Innovation and Collaboration

Technology future communication offer opportunity big for global innovation and collaboration. Countries can Work The same in research and development For create more solutions effective and sustainable. In addition, with more connectivity well, the people in the area remote can to obtain access to education, services health, and opportunities more economy good . According to International Telecommunication Union (ITU), improvement connectivity can increase growth economy in developing countries up to 2% per year.

Technology future communication, such as 6G network, communication quantum, internet visible eyes, and reality mixed, have potential big For revolutionize method We communicate and interact. This innovation No only offer much greater speed and efficiency more high, but also open opportunity new For more interaction immersive and secure. For example, 6G networks will allow almost connectivity instant and use applications that require large bandwidth such as VR and AR, while communication quantum promising level security that has not been Once There is previously in data exchange. Internet is not visible eye will integrate technology to in life daily with a smooth and efficient way, while reality mixture will open ways new For learn, work, and play, blurring the boundaries between the physical and digital worlds.

IV. CONCLUSIONS

Technology future communication own potential For change method We live, work, and interact. With utilise

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opportunities offered by 6G networks, communications quantum, internet visible eyes, reality mix and hologram, we can create a better world connected and inclusive . However, to reach this, it is necessary There is a balanced approach that takes into account benefits and risks, as well as consider implications more social, economic and ethical broad. Global collaboration, proper regulation, and awareness will not quite enough answer social will become key in create a better future Good for all over people man.

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