

THE DYNAMICS AND IMPACT OF GLOBALIZATION IN THE FIELD OF SCIENCE AND TECHNOLOGY

Anissa¹, Muthia Ayu Saleha², Najwa Khansa Salsabilla³, Neyla Azaria⁴, Rita Agustina⁵

^{1,2,3,4,5} Primary School Teacher Education, University Lampung, Indonesia

*anissa170206@gmail.com*¹, *muthiaayus27@gmail.com*², *najwakhansa53@gmail.com*³,
*neylaazariaa@gmail.com*⁴, *ritaagustinq6@gmail.com*⁵.

ABSTRACT

Globalization has become a major force shaping various aspects of human life, including in the fields of science and technology. Globalization makes technology easier to access and exchange between countries and accelerates the development of innovation. But not everyone benefits equally from globalization, and some countries or regions lag behind in adopting new technologies. In Indonesia, we can see the physical impact of globalization through the development of cities that are part of the urban network. This can be seen in the telecommunications infrastructure, transportation, and the presence of international companies and their branches. Globalization has brought negative and positive impacts to Indonesian society. The positive impact is that we can see changes in values and attitudes, advances in science and technology, and an increase in the level of life. But there are also negative impacts such as consumptive lifestyles, increased individualism, and the influence of western lifestyles that are getting stronger, as well as increasing social inequality. By understanding how the dynamics and impacts of globalization affect science and technology, we can work together to create a more just and inclusive country where knowledge and technology can be used for the common good.

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A. Introduction

Globalization can be meticulously characterized as a complex and highly nuanced phenomenon that facilitates the intricate web of connections and interactions among nations worldwide, encompassing a diverse array of sectors including but not limited to the political, social, cultural, technological, and economic dimensions, and is collectively identified as globalization. In the profound examination put forth by the esteemed scholar Anthony Giddens, it is asserted that the nature of social relationships among individuals intensifies and intertwines more deeply within this expansive global framework, thus establishing links between disparate events in a manner that engenders mutual repercussions across various geographical territories, ultimately culminating in a holistic evolution of numerous aspects of life between these distinct geographical entities. Moreover, Srijanti elucidates in the scholarly work of Sajidiman (2014:278) that "globalization symbolizes the introduction or spread of influences from one specific region or country to another distinct region or country, as well as the overarching process through which a nation engages in relations on a global scale." From this analytical perspective, one can deduce that globalization fosters a world that is not only increasingly interconnected but also significantly interdependent, thereby enabling rapid changes in one specific locality to resonate with extensive implications across the globe, occurring more swiftly than at any previous juncture in historical context.

Every pivotal dimension of human existence is deeply and profoundly shaped by the overpowering forces of globalization. This extensive phenomenon invariably gives rise to a plethora of new challenges that demand careful scrutiny and resolution, in order to effectively harness the immense potential of globalization for the overall betterment and progressive advancement of humanity as a collective entity. The concept of "globalization" itself began to emerge approximately two decades in the past, and it is only within the recent decade that it has matured into a contemporary ideology that is extensively acknowledged and deliberated upon among various societies. In other words, the notion of globalization has deeply infiltrated societal consciousness to a remarkable degree. When partaking in dialogues concerning globalization, we are invariably addressing a sophisticated process characterized by rapid innovations in the fields of science and technology, which possess the extraordinary potential to fundamentally reshape the course of historical narratives.

In this contemporary epoch characterized by globalization, the swift advancement of scientific and technological fields is unfolding at an unprecedented velocity, which will indubitably influence every imaginable facet of human life. The ramifications of this advancement harbor the potential to manifest as both beneficial and detrimental, and the eventual outcome is predominantly contingent upon the willingness and preparedness of the pertinent stakeholders to enact dynamic reforms, particularly concerning developments within the scientific and technological arenas. Moreover, we find ourselves deeply entrenched in an age of globalization that has drastically altered the manner in which individuals navigate their lives and has, in numerous circumstances, augmented their mobility across international borders. Naturally, this evolving reality can also catalyze transformations in individual lifestyles, which may adversely impact the developmental trajectories of our youth and may even pose significant challenges to traditional social norms.

B. METODE PENELITIAN

Qualitative descriptive research represents a vital methodological approach within the broader realm of qualitative inquiry. In the context of this particular study, the author has deliberately chosen to employ a qualitative descriptive methodology, which allows for a nuanced exploration of the subject matter at hand. As articulated by Sugiyono (2016:9), the role of researchers is fundamentally significant when they embark on investigations that focus on natural phenomena, rather than experimental frameworks, and this is achieved through the application of a qualitative descriptive approach that is firmly rooted in the philosophy of postpositivism. The findings derived from this investigation indicate that qualitative research is primarily concerned with prioritizing the understanding of meaning rather than merely seeking to generalize findings across various contexts. To gather comprehensive data, a triangulation or mixed-method approach was implemented, while the analysis of the collected data was conducted through the lens of inductive reasoning or qualitative methodologies. The overarching objective of qualitative descriptive research is to meticulously describe, illustrate,

elucidate, and provide detailed answers to the research questions by engaging in a thorough examination of an individual, a group, or a specific event. Within the framework of qualitative research, human beings serve as the central subjects of inquiry, and the written outcomes are articulated in the form of statements or narratives that accurately reflect the events and phenomena being investigated.

As noted by Nana Syaodih Sukmadinata (2011:73), the primary aim of qualitative descriptive research is to effectively characterize and provide a comprehensive description of actual occurrences, whether they are naturally occurring or the result of human intervention. This methodological approach is characterized by an emphasis on examining the quality, inherent nature, and interrelationships among various activities, thereby shedding light on the complexities of the subject matter. Furthermore, it is essential to understand that descriptive research does not seek to alter or manipulate the phenomena being studied, nor does it offer therapeutic interventions; instead, it serves to depict a condition in its authentic state. The only form of 'therapy' provided through this research endeavor is the research process itself, which is meticulously conducted through a combination of systematic recording, in-depth interviews, and careful observation. By employing these methods, researchers are able to gather rich, descriptive data that enhances our understanding of the intricate dynamics at play within the studied context.

C. RESULTS AND DISCUSSION

The Relationship Between Science and Technology

Definition of Science

Science represents a sophisticated and multifaceted form of knowledge that transcends the mere accumulation of information by humans; instead, it encapsulates a profound comprehension of various phenomena and encompasses a systematic process of organization and classification. As defined in the esteemed Big Indonesian Dictionary, science refers to a body of knowledge within a specific domain that has been meticulously structured using distinct methodologies designed to elucidate particular occurrences and phenomena pertinent to that field of study. This notion is further corroborated by the insights of Mulyadhi Kartanegara, who asserts that while science and knowledge share foundational similarities, they diverge significantly in terms of their respective scopes and areas of focus. Prior to the dawn of the 19th century, the two domains were often perceived as overlapping entities; however, following that period, science began to be more narrowly defined, predominantly associated with physical or empirically measurable inquiries, whereas knowledge was recognized for encompassing a broader spectrum, which includes metaphysical dimensions that elude conventional material understanding. Thus, science serves not only to enhance human understanding and knowledge but also to compel us to engage with the intricate realities of existence, including those aspects that lie beyond the reach of traditional scientific inquiry.

According to the perspectives articulated by Jacob, science can be understood as a meticulously crafted system developed by humans, intended to facilitate the comprehension of both themselves and their surrounding environment, as well as to enable adaptation to that environment or to effect alterations within it to suit their diverse

needs and aspirations. Baiquni (1994) elaborates on this concept by stating that science emerges as a product of consensus among experts, forged through rational reasoning and critical analysis of empirical data derived from careful observations of the natural world. The advancement of science occurs through a rigorous process of drawing well-reasoned conclusions based on the logical analysis of observational data, which is coherently organized into a comprehensive framework. The veracity of scientific claims can be subjected to repeated testing and validation by the scientific community, reinforcing the reliability of scientific knowledge. Consequently, one can conclude that science embodies a sophisticated form of knowledge characterized by deep understanding and systematic organization, while simultaneously representing the outcome of a meticulous process of critical and rational analysis conducted by knowledgeable experts. Ultimately, science plays a pivotal role in assisting humanity in comprehending both their intrinsic nature and the external environment, as well as in adapting to or modifying that environment for the fulfillment of their essential needs and objectives.

Definition of Technology

The term "technology" finds its etymological roots in the Latin word "texere," which directly translates to the act of weaving or constructing. While in contemporary conversation the term is frequently linked to the advancements in machinery and electronic gadgets, the essence and scope of technology are, in fact, considerably more expansive. As articulated by Roger in 1983, technology encompasses the intricate design and crafting of tools aimed at mitigating uncertainties that arise in the relationships between causes and effects, all with the ultimate objective of achieving specific, predetermined goals. In simpler terms, technology serves as a vital facilitator for humans, enabling them to strategize and execute actions with heightened efficiency and precision. On another front, Jacques, in 1967, conceptualizes technology as an array of methodologies that strive to furnish rational and efficient guidance across all facets of human endeavors. This perspective underscores the notion that technology transcends mere tools and machinery; it fundamentally includes organized strategies and systematic approaches that are instrumental in realizing desired outcomes. Iskandar Alisyahbana, in 1980, posits that although the terminology of "technology" may not have been prevalent in earlier times, the underlying concept has been a part of human existence for millions of years. It is an inherent trait of humanity to be compelled to devise tools and systems that enhance their comfort, welfare, and overall prosperity. Within this framework, technology can be understood as the manner in which individuals employ their cognitive faculties and instruments to fulfill their various needs, effectively acting as an extension or amplification of their physical, sensory, and intellectual capabilities. Therefore, in a comprehensive sense, technology encompasses not merely tangible hardware or software, but also intricate concepts, innovative designs, and strategic methodologies that collectively assist humans in achieving their goals with greater effectiveness and efficiency. This broad definition of technology encapsulates diverse dimensions of human existence, ranging from the rudimentary tool-making practices of

ancient civilizations to the sophisticated technological innovations that characterize our contemporary society.

The Relationship Between Science and Technology

The realms of science and technology, which have been synthesized into the overarching concept of science and technology, represent two fundamentally interdependent and inseparable components that are crucial to the advancement of modern society. Science, serving as the cornerstone and essential foundation for the progression of technological development, opens up avenues for groundbreaking technological innovations that possess the potential to significantly transform and enhance various aspects of human life and existence. In a reciprocal manner, technology, which embodies the practical application of scientific knowledge, generates an extensive array of increasingly sophisticated apparatuses and systems, thereby accelerating advancements in diverse scientific fields and disciplines. The dynamic interplay between science and technology fosters and fortifies the growth of both domains, ensuring that they evolve in tandem with one another. Scientific inquiry uncovers the fundamental principles and laws governing the natural world, which are subsequently harnessed and utilized in technological advancements, while technological innovations, in turn, inject fresh ideas and revitalization into the scientific arena by developing advanced tools and systems that facilitate more intricate experiments and comprehensive research endeavors. The intricate relationship between science and technology is underscored by the fact that science serves as the primary wellspring of technological advancement, whereas technology embodies the practical execution of the scientific knowledge that has been meticulously discovered and thoroughly examined. In the absence of a robust scientific underpinning, it is highly unlikely that technology would have been able to evolve at the unprecedented pace that we witness in contemporary times. Therefore, the symbiotic relationship between these two fields is not only essential but also pivotal in driving forward the boundaries of human achievement and understanding. Ultimately, it is through this continuous interaction and mutual reinforcement that we can anticipate further revolutionary developments in both science and technology, shaping the future of humanity in profound ways.

Definition of Globalization

Numerous scholars and professionals in the field provide a variety of interpretations and definitions regarding the multifaceted concept of globalization. For instance, Tomlinson articulates that the term "globalization" encapsulates the swift and considerable expansion of interdependent networks that fundamentally shape and characterize modern social existence. This phenomenon leads to a plethora of intricate and highly nuanced relationships that are often difficult to categorize. Tomlinson (1999:1–12) contends that globalization fundamentally alters human perceptions and the various frameworks through which individuals interpret their surroundings, a process that can yield either beneficial or detrimental outcomes depending on the context. This concept underscores a profound and ongoing intensification across numerous domains, encompassing society, consumer products, fashion trends, technological

advancements, the dissemination of knowledge, and innovations in medicine. In his analysis, Tomlinson posits that globalization represents a critical component of global modernity, acting as a catalyst for worldwide advancement and development. This assertion is grounded in empirical evidence and is resistant to alteration, reflecting the inherent nature of globalization. Furthermore, Robertson characterizes globalization as a conceptual framework that highlights the significance of global conditions while simultaneously enhancing a collective global consciousness (Robertson, 1992: 8). He suggests that the term "globalization" denotes a swift and extensive progression that influences the beliefs, aspirations, and lifestyles of a society that is constantly evolving and adapting to new realities. As a more advanced phase of modernization, globalization comprises interrelated elements that contribute to the formation of a novel configuration of the global order, which fundamentally transforms numerous facets of daily life. Meanwhile, Anthony Giddens presents globalization as the ongoing process of expanding social connections from a localized setting to both proximate and distant locations on a broader, global scale.

This phenomenon represents a dialectical process wherein events occurring in one geographical area catalyze developments in another, thereby creating a complex web of interrelations. The impetus for globalization arises from the establishment of social ties that transcend both spatial and temporal boundaries, incorporating local transformations into the larger narrative. Giddens posits that modernity has both generated and is a product of globalization (Giddens, 1990). In this context, he articulates his conception of globalization in relation to his overarching social theory. He asserts that globalization constitutes a process through which global social ties are deepened continuously, thereby connecting disparate locations into a singular, shared experience that exerts a uniform influence. As a significant social phenomenon, globalization has engendered a more interconnected global society and a cohesive global culture characterized by shared preferences, understandings, and worldviews that transcend national borders. Consequently, the locus of power has transitioned from a centralized framework to a more decentralized one, shifting from individuals to collective entities, and evolving from direct forms of influence to more indirect mechanisms. In this new paradigm, cultural control has supplanted coercive forms of control, representing a significant shift in how societies function. In summary, globalization has culminated in the integration of the world's social systems, which now exhibit more distinct characteristics than those of prior societies. Both traditional and modern communities have undergone transformative changes, and these developments have reinforced the global social network that interlinks various locations around the world. This dynamic implies that any occurrence in one area will resonate and be experienced simultaneously in other regions, thereby highlighting the interconnectedness of contemporary life (Giddens, 1990: 63–64).

The Development of Globalization In the Field of Education

The evolution of science and technology within the educational landscape has ushered in a significant wave of modernization and advancement in the processes associated with education, fundamentally altering how knowledge is imparted and

absorbed. Over the course of time, the influence of technology has catalyzed a multitude of changes that have reshaped the educational experience. Some of the most notable examples of this transformation include the shifts in how students engage with learning material, the pedagogical approaches adopted by instructors, and the unprecedented access to an ever-expanding array of learning resources that are continuously updated to reflect the latest information and methodologies. Traditionally, education was predominantly conducted in a face-to-face format, where students and educators would interact in a physical classroom setting; however, the advent of digital tools such as Google Classroom, Zoom, and various other innovative platforms has enabled learning to occur remotely from the comfort of one's home, thereby expanding accessibility and flexibility for learners everywhere. As articulated by Abdulhak (2005: 4130),

"The use of ICT can be classified into three types, namely: first, as a medium or educational tool, which is only a supplement to clarify the explanation being delivered," indicating that these technologies serve as enhancements rather than replacements for traditional teaching methods. The benefits associated with this integration of information and communication technology are manifold and cannot be overstated. Secondly, technology serves as a source, functioning as an entity that actively seeks out and provides essential information to learners and educators alike. Thirdly, it plays a pivotal role as a comprehensive learning system that facilitates a more holistic approach to education. Over the years, humanity has experienced a remarkable evolution, transitioning from the rudimentary use of paper and pen as tools for remote communication between professors and students to the adoption of telephones, which allowed for instantaneous communication that transcended geographical boundaries. This evolution has only accelerated with the onset of the fourth industrial revolution, where rapid technological advancements have come to dominate virtually every aspect of modern life, including the realm of education. In this new era, the integration of advanced technologies is not merely an enhancement but a fundamental component of educational practice, influencing everything from curriculum development to student engagement strategies. The ongoing transformation signifies a paradigm shift in the educational landscape, compelling institutions and educators to adapt continually to the dynamic interplay between technology and teaching. Thus, it is imperative that all stakeholders in education remain vigilant and responsive to these changes to optimize the learning experience for all involved. The future of education will undoubtedly be shaped by these technological innovations, ensuring that learning remains relevant and accessible in an ever-evolving global landscape.

According to the insights provided by Rosemberg in the year 2001, it has become increasingly evident that the learning process has undergone a multitude of significant transformations, which can be directly attributed to the rapid proliferation and integration of Information and Communication Technology (ICT) within educational environments, including:

1. The phrase "From the classroom to anywhere and anytime" encapsulates the revolutionary shift in educational paradigms, emphasizing that the act of learning, which was traditionally confined to the physical boundaries of a school or

educational institution, has now transcended those limitations, allowing for the acquisition of knowledge to occur in virtually any location and at any moment, facilitated by the expansive reach of the internet. This remarkable transformation is predominantly made possible through the utilization of advanced digital platforms such as Google Classroom, Zoom, and a myriad of other innovative resources that enhance accessibility and flexibility in learning.

2. The expression "From paper to online or channels" delineates a significant evolution in the mediums through which instruction and learning take place, highlighting that educators and learners who previously relied on conventional textbooks and printed materials for their educational pursuits can now seamlessly engage in the learning process through a diverse array of digital tools and online platforms, which include but are not limited to Google Docs and Microsoft Word, thereby fostering a more interactive and dynamic educational experience.
3. Furthermore, the phrase "from physical facilities to network facilities" aptly describes the transition from traditional learning environments that employed blackboards or whiteboards as primary teaching aids to contemporary approaches where instruction can be delivered through sophisticated virtual whiteboards equipped with LCD screens or television-like displays, thus enabling a more engaging and visually stimulating learning atmosphere that promotes collaboration and participation among students.

In the Field of Technology

The concept of "technology" is traced back to the ancient Greek term "tecnologia," which, when interpreted in Indonesian, signifies "systematic examination and discourse concerning the entirety of the world and its regulatory frameworks." This idea is fundamentally linked to the word "techne," which denotes art or craftsmanship in the context of ancient Greek society. Thus, within this conceptual paradigm, technology can be understood as the advanced art of both devising and efficiently employing various instruments that are crucial in the production process. As we witness the ongoing progression of technology, its definition has broadened to include the application of advanced scientific principles designed to meet a wide spectrum of human needs and demands. Moreover, technology can be envisioned as a systematic approach that improves both the use and production of diverse products, thereby enhancing their efficiency and efficacy. Throughout this transformative journey, existing products are carefully restructured and repurposed into vital elements that contribute to a specific system or framework, as articulated by Miarso in 2007. Initially, technological advancement occurred at a relatively slow rate; however, as human culture and civilizations developed, the velocity of technological innovation began to increase markedly.

Given that technology is essentially a consequence of rapid cultural development, it is logical that the speed of technological advancement is considerably faster in more advanced cultures, as observed by Adib in 2011 on page 245. In this modern age characterized by globalization, technology has become a fundamental cornerstone that is significantly reshaping the fabric of human existence and interaction. The rapid

progress witnessed in the realms of communication and information technology has had profound effects across a vast array of life aspects and societal frameworks. In earlier times, primitive humans may have depended on natural forces, such as the wind, as basic methods of communication; however, with the ongoing advancements in science and technology, humanity has successfully developed far more intricate and effective communication channels.

The increasingly significant and essential function of communication technology in this age of globalization is a phenomenon that merits attention and cannot be disregarded. The swift exchange of information and the urgent necessity for real-time communication have driven the advancement of progressively sophisticated communication technologies. Consequently, individuals now benefit from unprecedented access to a vast array of information from all parts of the world, along with the ability to participate in direct and effective communications that are unencumbered by time or geographical limitations. Research by Ameliola and Nugraha, published in the *Keperawatan ejournal (e-Kep)* in 2015, highlights notable progress in the fields of information and technology, collectively indicating the rapid evolution of technological development. Indonesia, as a vital member of the global community, has not remained unaffected by the significant ramifications of this technological transformation. In light of these advancements, the Indonesian government has adopted a proactive approach to leverage and optimize various information and communication technology resources, including but not limited to the internet, smartphones, and an array of other digital devices.

Technological advancements exert a complex influence on various dimensions of human life, shaping interactions with both our environment and one another. On one side, the innovative tools and systems arising from technological progress simplify numerous tasks, making them considerably more convenient and efficient, while concurrently expediting processes and improving overall effectiveness across diverse sectors. However, akin to a double-edged sword that presents both merits and drawbacks, technology is not without its negative repercussions, which require careful contemplation. The careless or improper utilization of technological innovations can result in a spectrum of detrimental effects that may jeopardize both individual and societal welfare. As articulated by Munir (2008), while technology undeniably enhances human life through its ongoing advancements, it simultaneously introduces challenges by transforming established norms, legal structures, values, and ethical principles that underpin society. Therefore, it is crucial for individuals and communities to exercise considerable responsibility in the employment of technology to mitigate its potential downsides. Neglecting this responsibility could lead to technology undermining our material existence as well as our spiritual and ethical dimensions of life. This highlights the importance of a thoughtful and prudent approach to harnessing the advantages of technology, ensuring that we do not compromise our ethical standards or overall quality of life in the process. It is vital for society to conduct a critical assessment of the implications of technological advancements, as this will help us navigate the complexities they present. By establishing appropriate regulations and frameworks, we can aim to

enhance the positive effects of technology while protecting our fundamental moral values and communal welfare. Ultimately, the challenge lies in striking a balance that enables us to embrace technological progress without jeopardizing the integrity of our social fabric.

Positive and Negative Impacts

The prevailing attitude of the general populace towards technology has become a ubiquitous phenomenon, which can be directly attributed to the significant and pervasive influence that technology exerts on various aspects of social life. In the contemporary era, it is almost impossible to escape the omnipresence of technology, which envelops our daily experiences, whether we are referring to rudimentary tools or sophisticated devices. For instance, one can easily discern that telecommunication services not only streamline the process of communication but also enable the swift transmission of vital messages over extensive distances, thus bridging geographical divides. In reality, the advent of mobile phones has revolutionized the way we interact, allowing us to connect with individuals across the globe with unprecedented ease and efficiency. Furthermore, it is imperative to acknowledge the substantial impact that information technology has had within the educational sector, as this innovation has significantly simplified the process of verifying student data through the utilization of computers, particularly when compared to the more cumbersome methods of relying solely on handwritten records in physical books from previous years. Nevertheless, thanks to the advancements brought forth by technology, the arduous tasks of the past have been transformed into streamlined processes that can now be accomplished with remarkable efficiency. Consequently, it is no surprise that computers have become an integral part of the educational landscape in contemporary society, being employed extensively for a myriad of academic purposes. The reliance on digital tools not only enhances the learning experience but also prepares students for a future that is increasingly intertwined with technological advancements. As we continue to navigate this digital age, the role of technology in education and communication will undoubtedly evolve, further shaping our social interactions and informational practices.

The Influence of Science and Technology in Education

A. Positive Impact

1. The emergence and subsequent proliferation of mass media, with a particular emphasis on electronic platforms, have increasingly established themselves as pivotal elements in the realm of education, effectively positioning themselves as primary sources of information and knowledge dissemination, which in turn has resulted in a significant displacement of traditional educators from their historical role as the foremost providers of information to students.
2. In response to this evolving educational landscape, a plethora of innovative pedagogical strategies have been developed and implemented, all designed with the express purpose of streamlining and enhancing the educational journey for both instructors and learners alike; consequently, the integration of technology into the educational process is poised to furnish novel methodologies that empower students

to grasp and comprehend even the most abstract and complex subjects with greater ease and clarity.

3. Moreover, the necessity for direct, face-to-face interaction in the learning process has become increasingly redundant as a result of remarkable advancements in technology; indeed, contemporary teaching methodologies have evolved to the point where it is no longer a prerequisite for students and educators to convene in a physical location to facilitate learning; rather, they can efficiently engage through various online postal services and platforms. This transformation is inherently connected to the optimization of learning time and the overall efficiency of educational practices, as it allows for a more flexible and accessible approach to education that can be tailored to the individual needs and circumstances of each student.

B. Negative Impacts

The issue surrounding the confidentiality of various testing tools has become increasingly susceptible to breaches and vulnerabilities in recent times. In this particular context, intelligence testing programs, such as the renowned Raven's Progressive Matrices Test, are designed to measure different cognitive abilities and talents across a diverse population. The pressing question arises: where exactly can one find access to compact disc tests that are utilized in the administration of these assessments? This alarming problem indicates that the psychological tests that are currently employed in various settings may be at significant risk of being easily compromised or leaked, which ultimately calls for a rigorous reassessment and enhancement in the development of new psychological tests to effectively address and mitigate the level of information leakage that is occurring in online environments.

Furthermore, the misuse of sensitive information has the potential to enable certain individuals to engage in illegal activities, thereby posing a substantial threat to societal norms and legal frameworks. This situation is particularly concerning given that education is widely recognized as a powerful tool for producing a generation of individuals who are not only highly educated but also possess strong moral values and ethical principles. For instance, consider the scenario where an individual with advanced computer skills might attempt to circumvent the security measures of the banking system, thereby exploiting vulnerabilities for personal gain. The profound influence of science and technology within the realm of information and communication is undeniable, as it shapes and transforms the way we interact with data and each other.

Globalization also has a significant impact on the development of knowledge and technology. This impact can be seen in two ways, positive and negative, depending on how humans face and respond to the rapid dynamics of scientific and technological developments. One example of a negative impact is increased community mobility, which can have a negative effect on the lifestyle and development of the younger generation. The development of science and technology not only brings convenience and comfort to everyday life, but also brings unwanted or negative impacts. For example, although technology has brought positive changes in various aspects of life, such as communication, transportation, and health, it has also caused new problems, such as

gadget addiction or harmful environmental impacts. Therefore, the development of science and technology cannot be separated from the social, economic, and environmental contexts. Science and technology are not only related to economic and industrial systems, but also play a role in shaping the way we interact with the natural and social environment. Thus, a better understanding of the relationship between science, technology, and society is very important in planning and managing the sustainable development of science and technology that has a positive impact on humans and the environment.

The Impact of Globalization on Human Resource Management

With the advent of innovative developments and advancements in various sectors, the role and responsibilities of Human Resource Management (HRM) have undergone significant transformations. The swift progress in scientific research and technological innovations, particularly in the realms of communication technologies and transportation systems, has effectively diminished the geographical barriers that once separated nations. Consequently, the business environment has evolved into an increasingly intricate landscape, characterized by heightened complexity and a more liberated competitive atmosphere. Organizations that are striving to thrive within the contemporary and fiercely competitive market must confront a multitude of dynamic, competitive, and often unpredictable scenarios. It has become imperative for businesses to develop the capacity to adapt swiftly and efficiently to the myriad of changes and advancements that corporate management practices introduce, in order to maintain their competitive edge. This necessity is especially pertinent when considering the challenges posed by the phenomenon of global competition that businesses face today. The current landscape of global business competitiveness not only presents a unique set of challenges but also unlocks new avenues for organizations to comprehend and cultivate effective management strategies tailored for multinational enterprises through the lens of human resource management (HRM). It is widely acknowledged within the business community that HRM transcends national borders and is crucial for achieving competitiveness in the increasingly interconnected world of multinational corporations. Furthermore, it is an incontrovertible truth that human capital serves as the foundational element of economic competition, as only individuals possess the capability to effectively manage and resolve the complexities of such competition. Therefore, the alignment of the right talent in the appropriate roles at the optimal times gives rise to a robust international framework, which is essential for success in today's global marketplace (Greenberg and Baron, 2003).

Repositioning and Changing the Role of Human Resources

The predominant challenge currently encountered by the field of human resources is the dynamic nature of the business landscape, which is particularly highlighted by the rapid advancements in information and communication technologies that are transforming the way organizations operate. The rise of an increasingly competitive market environment is invariably accompanied by a plethora of intricate business challenges that ultimately manifest as various HR-related issues that organizations must

address strategically. As articulated by Schuller in 1990, the three principal business obstacles that are intricately tied to human resources involve effectively managing workforce diversity in order to secure a competitive edge, adeptly managing human resources to navigate the complexities of globalization, and strategically managing human resources to enhance competitive advantage within the marketplace. To address these challenges, development activities are meticulously implemented concerning the core responsibilities attributed to contemporary HR managers, which encompass the management of talent, interests, and passions, the formulation and execution of strategic initiatives, the facilitation of organizational change, and the provision of expert consultation to various stakeholders, all aimed at bolstering HR competencies in leadership transformation processes alongside effective cost control and asset management practices, as noted by Schuler in 1990. In light of these circumstances, it becomes imperative for HR managers to take on the critical responsibility of meticulously planning and supervising the execution of HR development, educational, and training programs that are essential for the business to implement in order to elevate the capabilities of the existing human resources within the organization. This strategic approach not only ensures the development of a highly skilled workforce but also aligns the human resources function with the overarching goals and objectives of the organization, thereby enhancing overall performance and competitiveness in the marketplace. Ultimately, the effective management of these HR development initiatives is crucial for fostering an adaptable and proficient workforce that can thrive amidst the ever-evolving challenges of the business environment.

Human Resource System in International Alliances

In light of the heightened level of competitiveness that has emerged as a direct consequence of the pervasive nature of economic globalization, it has become increasingly essential for businesses to cultivate distinctive and competitive advantages that will enable them to not only survive but also flourish in what is often a volatile and unpredictable market environment. The formation of global alliances, which refers to the strategic cooperation between international businesses, plays a crucial role in facilitating the achievement of corporate objectives and targets in an interconnected world. Moreover, the significance of collaboration cannot be understated, as it encompasses partnerships formed between two or more multinational corporations operating within the confines of a single nation or even alliances forged among different entities within a singular country, both of which are vital for fostering innovation and driving economic success. Thus, in today's dynamic marketplace, the ability to effectively collaborate and establish strategic alliances is paramount for organizations aiming to secure their position and enhance their competitive edge on a global scale.

The intricacies associated with human resource challenges tend to escalate proportionately with the intensification of competition prevalent within the marketplace, thereby giving rise to a myriad of interconnected business dilemmas that organizations must navigate. Among the myriad human resource challenges that arise in the context of multinational coalitions, there are several critical factors to consider:

1. The integration of management practices and cultural considerations; this process is essential for nurturing effective workgroups, fostering a culture of continuous improvement in bidirectional communication, and allowing employees ample opportunity to familiarize themselves with one another's diverse backgrounds and differences. This necessity arises from the profound influence that differing cultural perspectives and management styles exert on the successful integration and collaboration of human resources sourced from a variety of national and cultural environments. A failure to effectively unite these varied elements can significantly impede the potential for success in collaborative efforts undertaken within international alliances.
2. The strategic approach to job design represents a pivotal tactic aimed at enhancing overall productivity and ensuring high-quality outcomes. However, tensions may arise during the job design and redesign phases because each participating entity often holds the belief that their proficiency in utilizing technology and their manufacturing techniques surpass that of their counterparts, leading to conflicts that must be carefully managed.
3. Recruitment and staffing strategies are specifically tailored to attract and secure the most competent human resources, individuals with the requisite expertise in technology, specialized knowledge, and other essential competencies necessary for the efficient operation of a contemporary organization. In essence, the contemporary business landscape places an increasing emphasis on the knowledge and skill sets possessed by the workforce, particularly those that are intrinsically linked to problem-solving abilities and effective decision-making processes. These competencies encompass traits such as extroversion, emotional stability, agreeableness, conscientiousness, and openness to experience, all of which are encapsulated within the framework known as The Big Five Personality Dimensions; these dimensions play a crucial role in shaping employee attitudes and behaviors. Ultimately, the degree to which these various performance factors are harmonized and balanced will have a direct and substantial impact on the overall performance of the company as a whole.
4. Orientation and training programs are critical for familiarizing both new and existing employees with the organizational culture and operational framework, encompassing a broad range of topics such as the management model implemented, the core values upheld by the company, its traditions, and its historical context. The workforce's capacity to effectively navigate social challenges and to surmount feelings of anxiety and dissatisfaction that may arise when acclimating to a new cultural setting will prove to be a significant determinant of the success and efficacy of this international alliance.

Cultural Context in Human Resource Management Issues

Every organization that is actively engaged in a competitive market environment is fundamentally motivated by a singular, overarching goal: to strategically harness its unique competitive advantages in a manner that allows it to surpass its rivals in the

intricate and dynamic realm of commerce. Although it is evident that the path to corporate transformation can be navigated through a multitude of diverse strategies and methodologies, it is imperative to recognize that the intrinsic adaptability of the organization itself, combined with the invaluable contributions of the human resources that are pivotal to this transformation process, remain essential components that greatly impact the overall efficacy and success of such transformational endeavors. In the context of a multifaceted and perpetually changing business landscape, the execution of transformation initiatives within organizations, along with the associated functions of human resources, presents formidable challenges that can only be effectively addressed through the establishment of vital collaboration and synergy between these two crucial components. Human resources, which should be equipped with the requisite knowledge, skills, and abilities necessary to adeptly respond to the relentless waves of innovation that characterize an increasingly accelerated pace of development, must comprise individuals who are not constrained by conventional limitations; rather, they should embody a borderless organizational structure wherein they possess the essential KSA—knowledge, skills, and abilities—that are critical to propelling the transformation process forward while simultaneously offering the requisite flexibility to adapt through the proficient utilization of rapidly advancing information and communication technologies, which have now become an indispensable aspect of contemporary business practices.

Cultural Context in Human Resource Management: A Study of East Asian Countries

The nations situated within the East Asian geographical region, which offer a plethora of unique and remarkable opportunities for the exploration and study of cultural dynamics, encompass a varied and eclectic mix of countries, including but not limited to Brunei, Cambodia, China—particularly highlighting the unique case of Hong Kong—Japan, Laos, Malaysia, Myanmar, the Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. These countries are distinguished not only by their individual cultural characteristics that set them apart in a global context but also by certain commonalities that may serve to create bonds among them in various dimensions of societal engagement, interactions, and cultural heritage. Upon undertaking a meticulous and detailed analysis of the various branches of International Business Management (IBM), Hofstede (1980; 1991) identified four primary dimensions that encapsulate the fundamental essence of cultural identity and expression. In accordance with the comprehensive research conducted by Black et al. (1992), it has been suggested that there are three distinct approaches to evaluating the intricacies of host cultures: (1) Cultural toughness, which assesses the degree of difficulty faced by expatriates as they endeavor to adapt to an unfamiliar and novel country in stark contrast to the cultural environment they are accustomed to in their home country; (2) Communication toughness, which evaluates the similarities and differences in language, as well as the nature and extent of interpersonal relationships that are necessary for successful job performance; and (3) Job toughness, which gauges the extent to which the responsibilities and tasks encountered by the expatriate diverge from their prior

professional experiences and considers whether these roles offer greater autonomy or impose additional constraints.

In view of the multitude of internal and external factors that significantly influence organizational dynamics—particularly the complexities inherent in job toughness—it becomes increasingly arduous to establish generalized statements regarding the nature of communication toughness. As a result, the greater the divergence between the cultural frameworks of the expatriate's home nation and that of the host country, the more formidable the challenges expatriates are likely to face during their process of cultural and professional adjustment. Extensive scholarly investigations concentrated on the adaptability of expatriates have concluded that even when expatriates are situated within the same geographic region, they may still encounter a wide variety of challenges that can differ considerably from one individual to another. Given the plethora of cultural distinctions and diversities that expatriates must traverse while functioning within the East Asian milieu, it is of paramount importance for organizations to implement thorough and comprehensive cross-cultural training programs. Such initiatives are not merely beneficial but are essential in fostering a heightened level of cultural sensitivity among managers, thereby ensuring that management philosophies and practices are not only appropriately contextualized but also effectively adapted to suit cross-cultural environments, avoiding the pitfalls of inappropriate transposition or misapplication.

D. CONCLUSION

The influence of globalization on the realms of science and technology is intricate and multifaceted, encompassing a wide range of effects that can be observed across various domains. In numerous facets of modern social existence, the phenomenon of globalization has engendered considerable reliance and prompted significant transformations in both mental frameworks and overall worldviews. The repercussions of this global integration can manifest in ways that are either advantageous or harmful, contingent upon the manner in which society elects to engage with and respond to these changes. The observable expansion of urban centers that are integral components of the global city network within Indonesia serves as a tangible testament to the far-reaching effects of globalization. As a direct consequence of this phenomenon, living standards have seen notable enhancements, advancements in scientific fields and technological innovations have surged, and there has been a marked evolution in values and attitudes prevalent within society. Nonetheless, it is imperative to acknowledge that the adverse ramifications also warrant attention; these include a heightened sense of individualism, the prevalence of a consumer-driven lifestyle, the pervasive influence of Western cultural norms, and a troubling rise in socioeconomic disparities. Furthermore, globalization acts as a catalyst, propelling the rapid progression of both scientific inquiry and technological development. Consequently, this dynamic transformation has a profound and lasting impact on our daily existence and societal structures. This underscores the critical necessity for communities and individuals to be adequately equipped and willing to adapt to the ever-evolving landscape of globalization, so as to effectively harness its beneficial aspects while simultaneously mitigating any detrimental consequences that may arise. In doing so, society can strive to strike a balance that

fosters growth and inclusivity, ensuring that the benefits of globalization are widely shared among all members of the community.

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