Exploring Developing World's Readiness to Adopt Society 5.0: Pakistan's Case in Point

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Article Info	ABSTRACT
	Society 5.0, advocates for a future in which technological advancement is guided by human-centered values. In simple terms it aims to create a *super-smart* society by integrating cyberspace and physical space with the aim of fostering a more inclusive, sustainable, and balanced society. originally envisioned in Japan, the Japanese government has been actively promoting it to address challenges like an aging population, economic stagnation and environmental concern. Some developed nations (e.g. Germany) have begun aligning their systems with similar vision. Although Pakistan, as a developing nation, remains at an early stage of digital transformation due to its unique socio-economic and infrastructural conditions, the article will explore Pakistan's potential to adopt the principles of Society 5.0 by examining key challenges and opportunities across governance and broader socio-economic systems. Despite growing global interest in Society 5.0, existing literature largely focuses on advanced economies, leaving limited understanding of how developing countries like Pakistan might engage with this paradigm shift. Thus, employing a qualitative exploratory approach, this article assesses Pakistan's readiness for Society 5.0.

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1. INTRODUCTION

The concept of Society 5.0 has been in the headlines since 2016 when Japan introduced it in the 5th Science and Technology Basic Plan, aiming to bring physical and cyber spaces into contact to produce solutions for social issues. Approved by the Cabinet Office's Council for Science, Technology and Innovation, the idea has since been floating in the debate among scholars of both STEM and Social Sciences' field (Report, 2015). The focus of the plan was to determine whether science, technology, and innovation (STI) can contribute to sustainable and inclusive development in Japan and abroad. The issues at focus before the committee were, among others, the aging population, rural depopulation,

and economic stagnation (Fukuyama, 2018). The aim was to move beyond Society 4.0, largely standing on information systems, toward a human-centered, super-smart society that integrates physical space to cyberspace through advanced technologies such as AI, IoT, and robotics.

Technological advancements have long been criticized due to their potential negative impacts on humans, but the Society 5.0's vision to bring it to their disposal to create solutions to their problems is changing this discourse and the overall perspective of looking at the technology through the lens of a solver for societal problems (Tokyo, 2020). Globalization and the rapid dispersion of scientific knowledge and information technology have played a greater role in changing this perspective. The expansion of intellectual knowledge has helped scholars and scientists share findings of their studies, which help produce further knowledge in crucial fields of Society 5.0. These fields, including the Internet of Things (IoT), robots, artificial intelligence, regenerative medicine, and neuroscience etc. are having a clear impact on the human lifestyle and human existence itself (Report, 2015).

The advancement in technology is propagating change in the social behavior of public and private institutions and even societies across the globe. The digital tools that are contributing in entrenching the foundation of Society 5.0 include AI, autonomous robots, augmented and virtual reality, cloud computing, cyber-physical systems, and similar technologies (Calp & Bütüner, 2022). These tools are not limited but are expanding with further research and development. However, the access to these digital tools is hindered in many developing countries like Pakistan due to unique socio-economic patterns, which are a major obstacle in catching up with the global pace of adopting Society 5.0.

Although the developed world is rapidly adopting the models and strategies of Society 5.0 as they are providing convenient solutions to their societal problems, the developing world however remains far behind in attaining this pace as each faces unique but somewhat similar local challenges, such as economic constraints, limited infrastructure, and governance gaps across sectors like education, healthcare, transportation, agriculture, logistics, environment, mobility, and general quality of life (S. , O. M. , O. M. , K. M. , & N. A. Arezki, 2025).

In the case of Pakistan, the efforts towards fostering digital transformation have been made extensively, where the government is committing itself to bringing education and infrastructure to give its youth the space to thrive in the changing dynamics of global technological shifts (Malik, 2024; Mian, 2024; UNDP, 2024). With 60% of its population being youth, and the global demand for tech-related careers and entrepreneurships, Pakistan holds immense potential in adopting Society 5.0 (Report, 2021). However, like other developing countries, Pakistan's local challenges are there to remain unless strategically addressed to achieve maximum potential in bringing Society 5.0 home. These challenges include but not limited to infrastructure gaps, especially in connectivity, energy, and data systems, only 37% of population has access to internet compared to 81% in the developed world, skill constraints and limited digital literacy among stakeholders, policy regulations, and governance shortcomings, the country has limited laws and regulations to protect privacy risking the chance of stakeholders in investing in tech sectors in Pakistan. The country also lacks adequate financial and infrastructure resources, which hinder the progress towards implementing scalable solutions.

These and other constraints are on the way of making the efforts towards adopting Society 5.0 in Pakistan and generally in other developing countries. Moreover, there is a staggering gap of academic literature on this topic, which could guide policy patterns, making it hard to stir a discussion over the effort to bring Society 5.0 home. This paper tries to fill this gap in making an attempt to study the current state of Society 5.0 in Pakistan, challenges, and the potential of the country in adopting Society 5.0.

Literature Review

Although the establishment of Society 5.0 has not been fully materialized and there are many hurdles on its way to achieve its full potential across regions, scholars of various fields have already been shedding light on its current integration with modern systems and its future implications for the countries around the world. This portion explores the existing literature about the subject from various points of view to gauge its development and potential challenges especially as case in point in the developing world.

There are various studies that elaborate on the concept of Society 5.0 to propagate the conceptual understanding of this new era. Mayumi Fukuyama's (2018) work is one such example of explaining Society 5.0 and how it aims for a new human-centered society, a concept taking birth in Japan. She notes that Japan's societal challenges have been worsening. From a sharp decline in the birth rate coupled with an increasing senior population, Japan is facing an acute challenge of labor shortage which puts pressure on social security costs. From the point of view of infrastructure, Japan established this large-scale development during the high growth period between 1950 to 1970. Over a 50-year long period, the infrastructure is deteriorating and it is anticipated that a total of 190 trillion yen will be necessary over the 50 years from fiscal 2011 to fiscal 2060 to replace this with modern demands.

In line with building the concept and elaborating this transformation from Society 4.0 to Society 5.0, Ferreiral and Serpa's (2018) brief explanation puts forward the future prospects of how a society will look like in the era of Industrial Revolution 5.0. They define Society 5.0 as "proposing to the future the potential of the individual-technology relationship in fostering the enhancement of the quality of life of all people through a super smart society." They note that while Society 4.0 focuses on production, Society 5.0 will seek to put human beings at the center of innovation (Serpa & Ferreira, 2018). Similarly, Keidanren (Japan Business Federation) (2016) presents one of the aims of Society 5.0 that in there every individual no matter the age or gender, can live safe and secured, comfortable and healthy life and each and every individual can realize his/her desired lifestyle. It will foster improved productivity through digitalization and reform of business models, and at the same time, the new economy and society will be materialized by promoting innovation and globalization (Keidanren, 2016).

These issues are not unique to Japan but are contingent on other countries as well. In the case of Indonesia, Rohayati and Abdillah (2024) identify the ways to implement Society 5.0 and the potential challenges it has been facing in bringing home this modern infrastructure. Nevertheless, they emphasize the urgency of digital transformation in Indonesia, citing uneven infrastructure and digital literacy as major hurdles. The global trends towards digital transformation have been rapidly moving and they put pressure on Indonesia to inline their efforts with this transformation of Society 5.0 and seek to realize a super smart society. They also note that Indonesia's efforts to attain this transformation have been materializing (Rohayati & Abdillah, 2024). However, there are still challenges related to governance, inadequate infrastructure for encouraging digital transformation, and capable human resources.

Like Indonesia, the constraints related to implementation of the Society 5.0 are varied largely in the developing world, and the literature related to these issues is still developing. A 2025 edited volume by Sara et al. is among the first works that have placed developing countries' realities at the center of discussing Society 5.0. Their book offers a comprehensive view of the challenges the developing world may encounter in the rapidly transforming technological societies and how they can tailor these changes to solve their societal problems. The content of the book provides researchers with new trends in AI, blockchain, and big data applications for several social problems and how they can contribute to making human life better. The authors have reserved special focus on solutions based on

disruptive technologies that can provide solutions in various fields such as education, health, industry, agriculture, transportation, energy, environment, and healthcare etc in developing countries.

As an example, Gunawan et al (2025) present a solution using Society 5.0 strategies for formulating the Forest Development Model in developing countries, as most of the countries' economy is dependent on the agriculture sector. Their work proposes sustainable forest management solutions within the framework of Society 5.0 that nations and global communities can adopt to align forest management with societal welfare while ensuring environmental sustainability. There are many traditional ways which have been integrated within these societies for ages, and their work has unearthed those methods and propose that these can be brought into practice for more sustainable forest management. Some of these methods include leveraging forests for carbon reduction and achieving net-zero carbon emissions, utilizing forest resources for health purposes, either directly or through herbal medicine, and promoting forest-based ecotourism (Gunawan et al., 2025). Moreover, forest management can be aligned with environmental service-based approaches, which ensure clean air, water, food, and recreational activities coupled with ecological preservation. Models like these integrate both nature-based solutions with technological advancements, and together, they maximize the likelihood of ensuring a better life for humans.

Although the literature on the development of Society 5.0, its future prospects, and potential challenges in Pakistan is scarce, there are some voices that shed light on how Pakistan has been adopting Society 5.0 and what stops it from achieving its greater potential. Khalique and Hina's (2023) work on the role of universities in the era of Industrial Revolution 5.0 aka Society 5.0 in Pakistan asks a very pertinent question that what the universities are doing in facilitating the adoption of Society 5.0 and how much is our education model relevant to the global demands for the skills and capabilities in terms of human resource. Their analysis reveals that Pakistan's education system, generally and the higher education system, particularly is not compatible with the global demands. It is far behind in terms of producing quality-oriented and innovative human capital that could be part of the high-tech industry and leading technological advancement in society. The industrial practices in the major sectors are still practicing Society 3.0 strategies, and some sectors lag far behind in reaching Society 5.0. In the era of this changing technological advancement, Pakistani universities have a great responsibility to prepare a workforce that is capable of skills such as problem solving, critical thinking, adaptability, information management, and creativity (Khalique & Hina, 2023).

Amjad et al. (2025) raise similar concerns in their work on Society 5.0's impact on STEM help-seeking: unpacking teacher-student interactions. They explain the relationship of teacher- student interaction and help-seeking behaviors in STEM education in the context of Society 5.0. They argue that TSIs foster a supportive learning environment, while STEM education equips them for the necessary skills for the rapidly increasing technological advancements. Their findings through interviewing teachers and students reinforce their argument. Therefore, for a society like Pakistan where the advancement of Society 5.0 is facing enormous challenges, the teacher-student interactions should be prioritized under safe environments where students get prepared for learning better and be capable of modern technologies. This interaction can further be enhanced by providing technology-based infrastructure in STEM classes, as students show concern regarding the lack of these facilities (Amjad et al., 2025).

Furthermore, on the 4th Industrial Revolution and Society 5.0. Kazi Mahir Tajwar (2025) puts into perspective the struggles and hurdles of South Asian countries in adopting Society 5.0. In terms of Pakistan, he notes that Pakistan is moving forward in adopting innovation pertinent to modern technology and has been yielding productivity improvements but they are often hampered by energy shortages and pollution control deficiencies. He further states that it has gradually been adopting smart farming and digital payment systems, implementing programs focusing on reforestation and pollution

control, and attaining limited but growing emphasis on renewable energy integration (Tajwar, 2025). However, there are still challenges ahead related to governance, environment, and cultural barriers that it needs to address in order to smooth the journey towards adopting Society 5.0

2. METHOD

Research Design

This research has employed a qualitative, exploratory methodology based on secondary data analysis to assess the level of development of Society 5.0 in the context of developing countries, focusing particularly on the case of Pakistan. With the help of secondary resources, including policy documents, reports from organizations, academic articles, international development reports, and news reports, and official websites from government agencies, this paper studied the current state of Society 5.0, challenges, and the potential of adopting Society 5.0. Data was analyzed through thematic content analysis, focusing on the strengths and limitations across different sectors, including governance, digital literacy, infrastructure, and policy coherence. All resources under study are publicly available.

Research Qustion

What is the level of readiness of Pakistan in adopting Society 5.0?

3. RESULTS AND DISCUSSION

Discussion

State of development of Society 5.0

Countries around the world have been facing many challenges, such as an aging population, declining birth rates, aging and outdated technical or technological infrastructure, and so on. With the help of integrated technologies, several initiatives have been helping countries to eliminate or at least minimize these issues. For instance, Japan's increasing aging population is posing a greater risk to the economic growth of the country. The estimates show that by 2050, Japan's 40% of population will be over the age of 65 (Zeisl, 2019). To fill the workforce gap, Japan may be able to transform this demographic change into an advantage by relying on robotics and AI. For taking care of a large portion of aged people, smart robots and AI are being taken as assistants with mobility, daily tasks, and companionship for elderly citizens (Zeisl, 2019). IoT devices and AI diagnostics are helping seniors receive medical attention from home, hence reducing their strain over hospital visits and improving access (Allen, 2024). Smart infrastructure is being installed inside homes and public spaces with sensors and automation that support adults living independently. In terms of declining population, Society 5.0 is pairing with government reforms, which are bringing child-support policies such as expanded leave, childcare subsidies, and flexible work arrangements. Urban planning is taking care of incorporating digital services, which make parenting easier by installing AI-assisted education to real-time health tracking for children in homes. With technological advancements, remote work and flexible schedules have been made easier, which encourages women to balance careers with family life and taking care of their children (Nakatani, 2023).

These and many other solutions to societal problems are placed at the center of technological advancement under the Society 5.0 framework (Tavares et al., 2022). Many developed countries have been rapidly adopting the changes and bringing technologies home that are easing the lives of their citizens. The contextual scenario of the developing world, however, presents quite a different picture. The developing world is going through issues such as poor governance, outdated infrastructure, and economic constraints across sectors like education, healthcare, agriculture, environment, transport, mobility, logistics, and general quality of life (S. , O. M. , O. M. , K. M. , & N. A. Arezki, 2025). The

pace of digital transformation, therefore, lags behind the developed world and hence provides a contextually different scenario.

Pakistan's readiness in adopting Society 5.0

The case of Pakistan is one such example among the developing countries. The country's industrial models are still operating on Society 3.0 or in a few areas on Society 4.0 frameworks, and there are both structural and non-structural constraints that are becoming hurdles in the development of Society 5.0 in its full capacity. Scholars such as (Sarfraz et al., 2021), (Razzaq & Mahmood Malik, 2025),, (Khalique & Hina, 2023), and others have been talking about how it can thrive in sectors like IT, healthcare, and industry.

Zouina et al. (2021) write in the context of COVID-19 that how Pakistan can adopt Society 5.0's tools to better its healthcare systems. The tools already in place under Society 4.0, such as mobile technology and AI, are being used for contact tracing and data collection technologies. Current digital tools are very effective in detecting infectious outbreaks, but with improved human application via Society 5.0 can improve coping with the impact, speed, and scope of the spread of infectious disease outbreaks. Chinese AI-based thermal imaging cameras (Naudé, 2020) and the Canadian AI model BlueDOT present solutions to detect the infected person. A proposal to curb the impact of the virus includes data collection tools to aid in predicting outbreaks, promoting contact tracing, symptom checking, and establishing vulnerabilities. With Society 5.0's onset, however, these services can be enhanced to improve human health (Hanif & Linta Iftikhar, 2024). Drones and robots can be used to deliver medical supplies to health facilities, meals, and medicine to infected patients at their homes.

Industry 4.0 and certain technological innovations address certain problems in Pakistan's healthcare system and other sectors, such as dwindling levels of patient care or lack of resources. Domestically, Industry 4.0 technology is capable of ensuring vital steps to curb health-related issues. However, the emerging technologies on an international level, which can address myriad societal problems in different sectors, should be seen as plausible. International application of cryptocurrencies such as Bitcoins are a successful alternative for financial sectors in emerging economies such as Pakistan that can ease the issue of online payments. Similarly, mobile money can help vendors and customers to go cashless and facilitate remote payments. The use of AI and blockchain has been seen as useful in various areas, including health data analytics, remote patient monitoring, biomedical research, education, management of electronic medical records, drugs, and pharmaceutical supply chain management (Mashamba-Thompson & Crayton, 2020).

Nanotechnology, the backbone of the Society 5.0 and the future of the next generation, and advanced materials play a crucial role in therapeutics, surveillance and monitoring, rapid diagnostics, developing novel forms of PPE, and vaccines. Large companies are coming to the surface with new technologies that help improve healthcare systems and others, too. Recently, an Italian company, Nanotech Surface, produced a nanomaterial-based sanitizer that keeps killing bacteria after months of its application. Similarly, the Czech Respilon Group designed respiratory masks that kill viruses rather than just trapping or blocking them. Such advancements suggest that Society 4.0 already possesses the tools to push for fulfilling the vision of Society 5.0. However, access to these innovations is limited to the developed world and a large part of the world, including developing countries such as Pakistan.

Although the road towards achieving maximum potential in adopting Society 5.0 seems far, Pakistan's tech ecosystem has key programs at its disposal which align to the principles of Society 5.0. Presidential Initiative for Artificial Intelligence & Computing (PIAIC) is one such program launched in 2018. It focuses on promoting education, research, and business opportunities in AI, IoT, Blockchain, and Cloud Native Computing (Shabbir, 2020). The initiative was envisioned for the young generation to make an imprint on the world's path towards the Fourth Industrial Revolution. The

Government of Pakistan also provides financial support to young people for startups and innovative projects, operates incubators, and provides digital skills training. These grants are provided with the help of private sector partners, commissioning studies which inform public sector policy and undertake outreach to propagate innovation and to spread awareness about its programs amongst industry, academia, media, and policy makers.

In terms of integrating the agriculture sector with technological modernization, initiatives like Digital Dera are being put into practice to provide free community Wi-Fi and digital hubs for farmers, moving towards smart village models, which serve as an effort to integrate IoT for agriculture. As of February 2025, Pakistan has set out to embrace 5G to underpin digital transformation in the country's socio-economic landscape. With this, the government aims at improving the national digital strategy, working to digitize governance, expand e-services, and create a smart Pakistan where technology plays a foundational role for public service delivery and economic growth (huaxia, 2025). In line to take robust and sustainable actions for digital transformation, URAAN Pakistan (2024-2029), a five-year economic strategy launched by Prime Minister Shehbaz Sharif, is another such step in this direction. It commits to the digital transformation of the country by boosting ICT exports, expanding freelancing, establishing tech hubs, and infrastructure modernization (Correspondent, 2025).

Challenges ahead

These initiatives, vision, and commitment of Pakistan for digital transformation are there as foundational steps towards clearing their path towards adopting Society 5.0. However, there are still many limitations which hinder this path and should be considered crucial in addressing in order to take decisive steps towards Society attaining 5.0.

First, Pakistan has no centralized policy for Society 5.0, which suggests that the country is not yet realizing this global shift towards this technological transformation. Unlike countries like Japan, Pakistan does not have a national-level strategy or roadmap. Most of the existing programs operate in silos (PIAIC, NICs, e-governance) without having an interlinked coordination. This weakens an accelerated effort towards finding innovative ways that smooth the path towards Society 5.0. Second, Pakistan's literacy and digital literacy rates are very low. The national literacy rate is 63%, very low from the technologically advanced countries, even among some developing countries. Digital literacy, on the other hand, is insufficient for the large-scale adoption of advanced technologies like AI or IoT. Although the government is taking initiatives to provide digital skills to youth, that is far from the national or global demand needed to bring digital transition. Also, access to digital infrastructure is also scarce. Developed countries have penetrated the internet to 81% of the population, whereas the developing world stands at only 17.5%. In Pakistan, only 37% of the population has access to the internet. This poses a staggering hurdle in the path towards adopting Society 5.0. Digital tools require user awareness and education, which remains very limited in underserved areas, making the road towards Society 5.0 bumpy.

Third, the governance mechanism to protect data and privacy is not adequate. There is an absence of updated data privacy laws, AI governance standards, and digital rights protections, which makes tech deployment from national or international stakeholders risky. The Personal Data Protection Bill is still under review and has not been fully implemented yet, losing the confidence of tech personnel to make Pakistan their next tech development target. Fourth, Pakistan's governance model is fragmented based on federal and provincial units, which render slow Bureaucratic processes. This institutional fragmentation is another reason that slows down the coordination of different governing units on technology-based reforms. Most of the initiatives related to fostering digital transformation have been taken by the federal government, whereas provincial governments either lack of resources or lack of willingness to implement these reforms, hence making the progress uneven throughout

different provincial units. National R&D expenditure is also minimal, only 0.16% of the GDP (Report, 2025) is reserved for tech-related expenses. This is far less than the level required to support the innovation ecosystem that underpins Society 5.0 models.

Lastly, there is a staggering lack of awareness around the concept of Society 5.0, particularly the global importance of digital transformation to the general masses. Even in academia and policy circles, the concept of Society 5.0 is rarely discussed and is poorly understood, often confused with Society 4.0 and its strategies. The discussion on the potential prospects of Society 5.0 and how to attain it in Pakistan is scarce. There are only a few papers that bring about this topic in a comprehensive discussion, but they too lack the standards of being a hallmark for policy reference. A serious effort towards educating the masses about Society 5.0's concept, its importance for the betterment of society, and its global relevance in the changing scenarios around digital civilization is crucial for integrating Society 5.0 in developing countries like Pakistan.

Result

The paper has studied the current state of Pakistan's readiness in adopting Society 5.0, what are the challenges that are hindering progress, and what are the potential points that could be addressed as a priority in order to accelerate the progress towards adopting Society 5.0.

The literature studied and analyzed through thematic content analysis provided evidence that Pakistan currently has no formal national policy for Society 5.0, which is a huge setback in formalizing the process and making strategies on the national level. However, federal and provincial governments have taken initiatives like the Presidential Initiative for AI and Computing (PIAIC), Digital Pakistan Vision, and URAAN Pakistan, which provide foundational elements of Society 5.0 and show the commitment of the government to being ready to adopt Society 5.0.

With growing global relevance of the digital transformation, and the country's commitment to bringing technological advancement, it has immense leverage in its youth population, accounting for 60% of the total population. To train this lot, government initiatives like DigiSkills program is providing free training in freelancing and digital skills. It has trained over 4 million individuals from across Pakistan since its launch in 2018 and has been aimed to train another three million individuals in its new wave on DigiSkills 3.0 (Digital Pakistan, 2025). Programs like Digital Dera in Punjab show early examples of transforming villages and integrating rural areas with tech using IoT in agriculture.

Even though the government is committed to fostering digital transformation, there are still formidable limitations, both structural and non-structural, that are hindering the path towards adopting Society 5.0. These should be considered by policymakers in order to address through updated reforms and future strategies. Structural limitations such as inadequate digital infrastructure, low R&D investment, weak Data Protection and Cybersecurity laws, fragmented governance, and poor inter-agency coordination need a national policy level of effort to bring incremental improvements that make the system robust and facilitate the adoption of Society 5.0 in a cohesive manner. Non-structural limitations such as low digital literacy, lack of public awareness about Society 5.0, resistance to change, and brain drain are also there to slow the process of Society 5.0 adoption.

Although a few present literatures talk about the integration of Society 5.0 in education and healthcare sectors, there is a dire need for more research and academic discussion that stirs conversation about the subject and proposes practical solutions towards pacing up the efforts for adopting Society 5.0. The integration of Society 5.0 in other sectors also needs the academic guidelines and roadmap which could be translated in policy frameworks.

4. CONCLUSION

The era of Industrial Revolution 5.0 is here, and the world is pacing up its efforts to maximize its integration in society. The developed world is bringing innovative solutions for societal problems to create a super smart society where technology facilitates a comfortable life for people coming from all walks of life. With digital tools such as AI, big data, Internet of Things, Cloud Computing, and autonomous robots, big countries and companies are producing goods and services to facilitate the formation of super smart cities, envisioned by the pioneers of Society 5.0 in Japan. The access to these tools, however, is not equally available to all countries, and developing countries lag far behind in adopting these technologies due to their unique local socio-economic challenges.

This paper highlighted these challenges which are hindering the pace of attaining these technologies by the developing countries, keeping its focus mainly on the case of Pakistan. The country's 60% of population is youth, and is committed to bringing technological advancements. Some of its initiatives, such as PIAIC, URAAN Pakistan, and others in line with digital transformation, provide a breeding ground for the transition towards Society 5.0. However, the challenges on its way towards realizing its maximum potential require serious commitment and resources. It is not only a recommendation for Pakistan but largely for the developing countries, which are committed to translating their digital transformation efforts in realizing Society 5.0 that they need to prioritize tech-related reforms and have to adopt a vision for the future for bringing Society 5.0 home.

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