Breaking Barriers: Technological Adoption Challenges in Organizations of Developing Economies - A Case of Pakistan

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Abstract

Technology integration at the workplace is the most talked about and challenging topic in this technologically poised era. Academia and practitioners are both struggling to upgrade themselves. By not adopting technological revolutions, emerging economies face the danger of being left behind, which could lead to a significant disproportion of economic development and living canons compared to industrialized nations. Technological transformation in developing economies has both problems and possibilities.

The research analyzes the challenging factors of implementing innovative technologies to foster societal development, economic advancement, and enhanced quality of organizational practices in emerging economies, with a particular emphasis on Pakistan. The study identifies the critical obstacles to adopting technology, such as scarcity of financial resources, threats over data privacy and security, the unwillingness of management personnel to embrace change, the fast pace of technical developments, and a deficiency of awareness vis-à-vis the advantages of integrating technology. This research used a cross-sectional, quantitative approach to collect data from 287 participants representing different industries/organizations in Karachi, Pakistan. The descriptive statistical analysis was performed via SPSS, emphasizing organizations' notable obstacles during technology adoption.

The findings identify the importance of strategic resource allocation, strong cybersecurity measures, efficient change management, ongoing innovation, and thorough education and communication to address these difficulties. Working on these challenges is imperative if an organization seeks benefits from advanced technology and innovation, maximum employee efficiency, and required sustainable growth. The study findings propose valuable insights to help policymakers, organizational leaders, and practitioners pursue technological adoption and inspire economic development in Pakistan, an emerging economy.

Keywords: *Technology Adoption and its Challenges, Pakistan as a Developing Economy, Change Management, Data Security and Privacy, Lack of Awareness and Technology Integration*

Introduction

Technological change can present challenges, and the disadvantages of not embracing it are significant for developing economies. By investing in education, infrastructure, and sustainable technologies, developing economies can harness the power of technological change to achieve economic growth, social progress, and a better standard of living for their citizens. Without embracing technological advancements, developing economies risk falling behind developed nations that are constantly innovating and improving their productivity. This can lead to a widening gap in economic growth and living standards.

The economy may suffer significantly if new technologies are circumvented. Even with more resources, businesses commonly find it challenging to create and manage novel technology, which causes delays and lost opportunities. (Chantret et al., 2020) The technological divide widens, and developing economies' competitiveness declines when they cannot transfer and embrace innovative technologies. (Day & Schoemaker, 2000) Besides, there is criticism that innovative information and communication technologies (ICTs) will result in a sustainable information society. For example, telework hasn't made travel any less necessary, and the ICT industry still influences the environment even though it uses fewer resources than the whole economy. (Marton & Singh, 1992)Resistance to new technologies obstruct innovation, sustainability, and economic development. Therefore, businesses and countries must embrace and finance the development of emerging technologies.

Importance of adoption of new technologies for developing economies

Adopting new technologies is essential for developing economies. New technologies like information and communication technology (ICT) can help economic growth and development by increasing access to knowledge, education, and information. (Milner & Solstad, 2021) Adopting digital technology, like ICT, can also help with sustainable economic development. (Lechman, 2013) Employing innovative technologies can also help address the global shortage of skilled workers in all sectors and the brain drain in developing economies. They can promote the development of top-notch organizational systems, offer continuing workplace and technological integration assistance, and expand the capability to research and adopt new trends (Strielkowski et al., 2022). The latest technology diversifies economic strategies, reorganizes significant difficulties, and strengthens ties between public and private entities (Thomson et al., 2011).

Importance of adoption of new technologies in different organizations

In today's competitive world, marketers must innovate in product creation, marketing techniques, and management processes to acquire a long-term competitive edge in the context of a variety of consumer choices and brand-switching tendencies (Iqbal & Mohiuddin, 2024)Acceptance of new technology is critical in many industries. The latest information and communication technologies have been employed in various industries, such as manufacturing, construction, healthcare, and education, to improve customer satisfaction and increase production. (Šušić, 2018).

The biopharmaceutical industry's long-term competitiveness and the supply of patient medicines depend on adopting innovative technology. (Schaefer et al., 2023)Emerging technologies like blockchain, virtual reality, and artificial intelligence have also significantly impacted the service industry, which includes banking, insurance, and agriculture. These technologies can enhance consumer satisfaction, reduce expenses, and promote business growth. (Schaefer et al., 2023) Marketers also increasingly employ various innovative techniques using the internet and social media. (Mohiuddin et al., 2018) Depending on the technology employed, applying Industry 4.0 technologies to corporate entrepreneurship and firm growth in the manufacturing industry has different effects. Different technologies have different implications for expanding both new and existing businesses. (Kim & Oh, 2022) In general, industries that want to stay competitive, boost efficiency, and meet evolving customer needs to adopt new technologies.

Importance of adoption of new technologies for the economic development of Pakistan

Pakistan's economic progress dramatically depends on the acceptance of new technology. Research has shown that innovation is critical in promoting economic growth and elevating economic status. (Awan et al., 2022) Information and communication technologies (ICTs) have the power to increase small and medium-sized enterprises (SMEs') productivity and promote their expansion (Mohiuddin & Iqbal, 2020; Nazir & Khan, 2022). Furthermore, the significant gains in productivity and sustainability that ICTs have brought about have helped organizations. (Latif, 2023) Therefore, accepting new technology, particularly ICTs, can promote economic growth, raise productivity, and address various financial problems in Pakistan.

The potential of digital transformation and sustainable economic development to revolutionize educational systems worldwide is a compelling narrative that has unfolded in

recent years. (ElMassah & Mohieldin, 2020) Unfortunately, certain nations have not fully embraced technological progress in today's rapidly evolving digital world. The absence of digital resources, skills, and awareness is one of the primary causes of the gap in technological innovation and adoption. (Nordhaus, 2019) In comparison to other Southeast Asian nations like Malaysia (26), India (61), Singapore (1), and Sri Lanka (68), Pakistan's Digital Evolution Index (DEI) is low at rank 80. Although some researchers have concluded that the digitalization of institutions is a complex process, DEI insights can help us realize the need to support digital change in Pakistan's organizations (Knoema, 2021).

Significance of the study

Despite its benefits, this research approach has limitations. Descriptive statistics can provide a broad picture of data, but they may lack the depth and precision that other analytical approaches do. Furthermore, the study's cross-sectional approach limits its ability to detect long-term trends and changes in innovation problems. Overall, the chosen study technique lays a good foundation for exploring the issues that occur on the path to innovation, providing helpful insights for policymakers, organizational leaders, and practitioners seeking to foster an innovative and creative culture.

Objectives of the study

The research is aimed to identify:

1. The extent to which data security and privacy are concerned hinders the adoption of new technologies in management.
2. The degree to which limited financial resources hinder the effective integration of technology in management.
3. The resistance to change among management staff is challenging in adopting new technologies.
4. The extent to which the rapid pace of technological advancements makes it challenging to keep up with management.
5. The degree to which there is a lack of awareness about the benefits of technology integration among employees.

Literature Review

Technological progressions are transforming this globalized economy, fostering efficiency and driving innovation. Still, developing economies face exceptional challenges in adopting frequently upgraded technologies. This literature review explores the barriers to technological implementation organizations encounter, specifically focusing on Pakistan's developing economy.

Theoretical Framework

Several theoretical frameworks can be used to analyze technological adoption in organizations. Here are two prominent ones:

- **Diffusion of Innovation Theory:** Developed by Everett Rogers, this theory explores how, why, and at what rate new ideas and technologies spread within a social system. Factors influencing adoption include relative advantage, compatibility, complexity, trialability, and observability.
- **Technology-Organization-Environment (TOE) Framework:** This framework emphasizes the interplay between technological factors (complexity, compatibility), organizational factors (resources, culture), and environmental factors (competition, government regulations) in influencing technology adoption.

Barriers to Technological Adoption in Developing Economies

Research suggests several key barriers hindering technological adoption in developing economies:

- **Resource Constraints:** Limited financial resources, lack of skilled personnel, and inadequate infrastructure (e.g., internet connectivity) can significantly impede the adoption of new technologies. (World Bank, 2019)
- **Organizational Culture:** Traditional and risk-averse organizational cultures may resist change and hesitate to invest in new technologies. (Chuang & Hsu, 2010)
- **Lack of Awareness and Skills:** Limited awareness of the benefits of new technologies and a lack of skills required to implement and operate them can hinder adoption. (Wong & Agarwala, 2001)
- **Government Policies:** Unstable political environments, inadequate intellectual property protection, and restrictive regulations can discourage technology adoption. (Lallana & Reddy, 2009)

- **Social and Cultural Factors:** Societal norms, lack of digital literacy, and language barriers can challenge technology adoption at the individual and organizational levels. (Heeks, 2002)

The Case of Pakistan

Pakistan, a developing economy with a large and young population, faces significant challenges in technological adoption. Studies have identified specific barriers within the Pakistani context:

- **Limited Infrastructure:** Pakistan's infrastructure, particularly regarding reliable electricity and internet connectivity, is inadequate for widespread technology adoption. (Asian Development Bank, 2017)
- **Inadequate Skills Development:** The education system in Pakistan struggles to keep pace with the evolving technological landscape, resulting in a skills gap that hinders technology adoption by organizations. (World Bank, 2018)
- **Focus on Short-Term Gains:** Many Pakistani businesses prioritize short-term profitability over long-term investments in new technologies. (Ahmed et al., 2016)
- **Resistance to Change:** Resistance to change among managerial staff can impede the adoption of new technology (Atkin et al., 2017; Bilichenko et al., 2022).
- **Security Concerns:** Security concerns related to cyberattacks and data breaches can deter organizations from adopting cloud-based technologies and other digital solutions. (Haider & Khan, 2019)
- **Limited Financial Recourses:** Insufficient finance is a hindrance to the successful integration of technology into management (Babanova et al., 2017)

Technological adoption is crucial for developing economies like Pakistan to compete globally and achieve sustainable economic growth. Understanding the barriers to adoption and developing targeted solutions is essential. Future research could explore:

- The role of government policies and initiatives in promoting technology adoption.
- The impact of cultural factors on technology acceptance within Pakistani organizations.
- Case studies of successful technology adoption in Pakistani organizations to identify best practices.

By addressing these challenges and fostering a culture of innovation, Pakistan can unlock the potential of technological advancements for its economic and social development.

Research Methodology

This cross-sectional study employs a quantitative approach to analyze the obstacles encountered along the path to innovation. Using a structured questionnaire, 287 respondents, mainly from Karachi working in different production, manufacturing, agriculture, finance, healthcare, and education sectors, submitted primary data for this study's examination. A stratified random sample assures representation of various academic backgrounds, age groups, and engagements.

The primary data were analyzed using descriptive statistics supported by SPSS. Descriptive statistics offer a systematic approach to describing and assessing data, revealing information about the frequency, distribution, and significant characteristics of responses.

Discussion and Analysis

Table 1
Demographics

	Frequency	%
Your Age		
Below 20	1	0.3
20-24	137	47.7
25-29	94	32.8
30-34	25	8.7
35-39	15	5.2
40-44	3	1.0
Above 44	3	1.0
Your Current Engagement		
Student	67	23.3
Job	175	61.0
Business	26	9.1
Job & Business	16	5.6

Source: Authors' Computation

The study's respondents have a diverse range of academic and professional backgrounds. 23.3% of the respondents are the students who will be the future practitioners. This diversity representation helps the study by bringing together a variety of viewpoints and disciplinary backgrounds.

In terms of age demographics, respondents between the ages of 20 and 29 make up the vast majority of responders (80.5%); these respondents are assumed to be more innovative with technology, which makes the research very interesting to find out the youth's perception regarding technology integration and its challenges. The following primary cohort consists of

people aged 30 to 34. The remaining responses are then divided into different age groupings. The sample's age variety increases the breadth and representativeness of the opinions gathered in the research.

Table 2

Challenges

	Mean	Std. Deviation	Ranking
Limited financial resources	2.34	1.098	1
Concerns about data security and privacy	2.30	1.054	2
Resistance to change among management staff	2.26	1.111	3
The rapid pace of technological advancements	2.20	1.078	4
Lack of awareness about the benefits of technology	2.16	1.071	5

Source: Authors' Computation

This research offers significant insights into the fundamental challenges companies must overcome to traverse the complicated environment of technology adoption effectively. Based on the primary and secondary data, the following challenges are discussed:

Challenge#1:

Limited financial resources hinder the effective integration of technology in management.

The data analysis validates a distinct order of challenges organizations face in implementing new technology. According to primary data, insufficient financial resources and the significant impact of budget limitations appear to be the primary challenges when organizations opt for initiatives of advanced technology adoption. This requires organizations to plan budget and resource allocation effectively so that firms can integrate with new technology resourcefully. The financial barrier, in particular, has a detrimental impact on the outcomes of technology integration projects, particularly in developing economies. (Mahfoudhi & Faiz, 2008) For instance, the automobile industry lacks regulatory frameworks due to an interim focus on capital and, therefore, faces challenges in integrating technology. (Chen et al., 2007) Similar resource constraints, including time, money, and experience, prohibit SMEs from utilizing integration technologies like Web Service. These limits significantly influence how choices are made, making it more difficult for management to

deploy technology properly. Handling budgetary restrictions and connecting technology transfer programs with the environmental context is critical for effective integration.

Challenge#2

Concerns about data security and privacy hinder the adoption of new technologies in management.

According to primary data, Data security and privacy concerns rank second, emphasizing the need to protect digital assets and adhere to legal obligations. Concerns about privacy and data security impede the adoption of modern management technology. While mobile devices and wireless communication technologies in healthcare have increased, data breaches threaten patient privacy. (Saidi et al., 2022) Federated database solutions recognize the necessity to incorporate privacy risk mitigation into the design process of new technologies. (Kroll et al., 2019) COVID-19 exposure notification applications and contact tracing have prompted issues about privacy and trust, potentially making everyday usage and acceptance difficult (KulykOksana et al., 2022). Although the rise of IoT and AI has created avenues for improving healthcare and patient services, the primary challenge of securely storing and exchanging data remains (Almalawi et al., 2023). Because of technological improvements, data security, dependability, and privacy have become increasingly critical, and research is needed to develop effective and efficient data protection technologies (Bertino, 2016).

Challenge#3

Resistance to change among management staff is a challenge in adopting new technologies.

The prevalence of resistance to change among management staff shows that organizational culture and leadership dynamics influence technology adoption strategies. Regarding open innovations, employee resistance to change typically happens individually and can be handled with motivating and educational tactics. (Schweiger et al., 2018) In various cases, employee opposition to the new procedure in Pakistani organizations was observed due to inadequate rewards and fear of compensation reductions. (Wick et al., 2023) “The literature on organizational change and resistance to change presents a variety of perspectives, with some researchers viewing resistance as a barrier and others as a valuable source of data.” (Harrison et al., 2022) The literature suggests that the effective implementation of technology depends on the management team's capacity to manage change-related reluctance.

Challenge#4:

Rapid technological advancements make it challenging to keep up with management.

Furthermore, the rapid pace of technology improvements is a significant challenge, underlining the necessity for firms to adapt and innovate in response to changing industry trends. Managers encounter difficulties keeping up with management approaches and being relevant in a changing environment due to rapid technological developments (Chiavenato, 2001). Increasing cross-border business travel and the globalization of management techniques increase the need for managers to respond to technical advancements (Rao et al., 2009). Although it was thought that advancements in performance evaluation and information technology would lead to accountability, they are still inadequate in ensuring responsible administration in many sectors of government services (Grazulis & Jagminas, 2008). Proactive human resource management organizations can help public managers develop new techniques for taking responsibility for these concerns (Ott & Dicke, 2001). To successfully navigate the rapidly changing management, managers must be prepared to adapt to continuous technological changes and aggressively incorporate human resources into organizational improvements.

Challenge#5
There is a lack of awareness about the benefits of technology integration among employees.

Finally, a lack of understanding of technology's benefits emphasizes the need for education and communication to encourage technology use and recognize its potential benefits. There is evidence that employees aren't entirely aware of the benefits of technology integration. Even though different field experts had an excellent grasp of digital technology, these technologies were not widely used in execution. (Oyelana & Thakhathi, 2015) It has been observed that using information and communication technology has both benefits and drawbacks in different domains in Pakistan. Even if technology enhanced flexibility and work-life balance, one of the biggest drivers of stress was the requirement to be always accessible. (Ninaus et al., 2015) When it comes to human-technology collaboration, companies implementing new skill sets frequently find it challenging to preserve the psychological health of their workforce. Ensuring the psychological well-being of employees is crucial for maximizing the benefits of new technology (Oke et al., 2023). Digital transformation incentivizes employees to learn in the digital age. Still, perceived electronic surveillance might obstruct this process, making them less inclined to adopt a learning attitude and participate in voice behavior. (Fraboni et al., 2023)

Conclusion and Recommendation

The study has identified substantial challenges organizations of developing economies face in implementing changes, particularly related to new technology adoption. The major obstacle is the limited and scarce financial resources that organizations in Pakistan encounter, which negatively affect their ability to adopt new innovative technologies. Moreover, firms' ability to foster competitiveness and innovation is hampered due to their incapability of allocating adequate finances to technological advancement. It is, therefore, crucial for organizations to plan finances and resource allocation meticulously when they rationalize their operations with technology.

Another essential barrier identified by the study is data security and privacy, which organizations prioritize while protecting digital assets and adhering to regulations. With the growing and dynamic nature of cyber risks and stringent legal frameworks, organizations are increasingly concerned about data protection, neglecting to which may compromise the security of firms' sensitive information and legal statuses. Organizations must plan strategically to safely implement advanced technologies, including strict policies and cybersecurity surveillance, affirming regulatory protocols.

Resistance to change is another significant barrier faced by firms in developing economies, where management personnel lack motivation and energy and fear being replaced. This barrier accounts for the existing organizational culture, leadership vision, and strategies that management practices while opting for any change, particularly new technology adoption. Organizations promoting a culture of open communication, practicing active involvement of stakeholders, and using change management strategies supported by visionary leadership can overcome resistance and prosper a culture of change, innovation, and idea generation. Promising technology can succeed within a corporation through proactive measures to overcome organizational resistance and establish a shared vision for technological advancement.

Another significant barrier is how technology progresses and evolves, requiring organizations to regulate and innovate continuously. Organizations can overcome this challenge, employ technology for strategic advantages and transformative power, and maintain competitiveness by fostering a culture of adaption, perpetual learning, continuous improvement, and flexibility. It also requires networking and strong collaboration with external partners for joint efforts on analyzing market trends and innovative research and development (R&D).

Furthermore, a lack of realizing technology returns stresses the need for education and communication to foster technology adoption and cultivate an innovative culture. Organizations can effortlessly integrate technological change through effective training, user-friendly interfaces, required information and skills, and a clear understanding of the value proposition. This smooth integration can inculcate enthusiasm and make employees efficient, thereby enabling firms to attain sustainable progress and competitiveness.

The study has highlighted barriers to adopting new technology, demanding a comprehensive and effective strategy to tackle financial limitations, concerns for data security, resistance to change, and the risk of technical obsolescence. These challenges demand revolutionary leadership that prioritizes necessary transformation and resource allocation, enhances cybersecurity measures, nurtures creative culture, embraces adaptability, and intensifies education and communication efforts.

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