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Cloud Computing Adoption and Organizational Performance: Examining the Role of Security and Scalability

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Abstract

The present study examined cloud computing adoption and organizational performance, with particular emphasis on the roles of security and scalability within organizational settings in Punjab and Sindh, Pakistan. The study was significant because the increasing reliance on cloud-based technologies has created opportunities for organizations to improve operational efficiency, flexibility, productivity, and resource management, while concerns related to data security and the ability of cloud systems to accommodate changing organizational requirements remain important challenges. A quantitative, cross-sectional survey research design was adopted, and data were collected from 433 respondents working in relevant public, private, and semi-government organizations and institutions. A structured and adopted questionnaire was used to measure cloud computing adoption, security, scalability, and organizational performance through a five-point Likert scale. Data were collected through an online Google Forms questionnaire, which was distributed electronically to eligible respondents in Punjab and Sindh. The collected responses were initially organized and screened in Microsoft Excel and were subsequently transferred to IBM SPSS for statistical analysis. Descriptive statistics, Cronbach's alpha reliability analysis, Pearson correlation, multiple linear regression, independent-samples t-test, one-way ANOVA, and Tukey HSD post-hoc analysis were conducted. The findings demonstrated that cloud computing adoption was positively associated with organizational performance, while security and scalability also showed positive relationships with organizational performance. The regression findings further indicated that cloud computing adoption, security, and scalability made significant contributions to organizational performance, while the group-comparison analyses showed that organizational performance differed significantly across different levels of cloud computing adoption. Overall, the study concluded that effective cloud computing adoption, supported by strong security and scalable technological infrastructure, can contribute substantially to improved organizational performance. The study provides useful implications for organizational managers, IT professionals, policymakers, and decision-makers seeking to develop secure, flexible, and performance-oriented cloud-computing strategies.

Keywords: Cloud Computing Adoption, Organizational Performance, Cloud Security, Scalability, Information Technology, Digital Transformation, Pakistan, Organizational Technology

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Introduction

Cloud computing is a modern technology that allows people and organizations to use software, store data, and access digital services through the internet. It makes information easy to access, manage, and share without relying on physical storage devices or expensive computer systems.

Flexibility and collaboration increase with access to the cloud. Organizational agility improves. Research has shown improvements in profitability and performance for an organization as a whole, operational and unit level efficiencies and improved productivity following the adoption of cloud computing (Lu et al., 2022; Subramaniam & Teh, 2026).

The benefits of cloud computing largely depend on the state of the technology supporting the cloud-based services. Some functions, such as organizational data and system security, are paramount. Organizational systems can be scaled or reduced depending on varying operational needs. In order to sustain benefits, organizations must look at cloud computing from a security and scale perspective (Gangwar & Date, 2016; Martins et al., 2015).From the descriptions above, the goal of this study is to analyze the effects of cloud computing adoption on organizational performance while also addressing the roles of security and scalability. This study also uses cloud computing adoption as the primary variable and organizational performance as the primary outcome. Security and scalability provide the dimensions of cloud computing that require emphasis (Amir & Zaheer, 2025).

Cloud Computing Adoption

Cloud computing adoption describes the integration of cloud-based computing services to run business operations and processes of an organization. It involves the purchasing of cloud services, alongside the incorporation of Infrastructure-, Platform- and Software-as-a-Service in the organization's information systems and processes. With the adoption of cloud computing, organizations require no infrastructure to provide required services and run applications or store or process information (Mell & Grance, 2011). Factors such as technology, organization, and environment affect the adoption of cloud computing. The Technology-Organization-Environment framework defines some of these factors and includes relative advantage, complexity, organizational readiness, and management support, as well as competitive pressure, security and privacy, and the trust of the employees. cloud adoption is an organizational decision, more than a technical one, because organizations today are demanding more flexibility and better efficiency, collaboration, and digital transformation (Gangwar et al., 2015).

For this study, cloud computing adoption means how organizations implement cloud services to improve their operational and strategic functions. A higher level of adoption suggests that cloud services are integrated extensively to manage information and to facilitate organizational resources and services across the entire organization. Recent studies confirm that cloud computing can improve an organization's flexibility and agility, as well as its performance and business value, and that recent studies provide further evidence to support the more extensive impacts of cloud computing on the organizations (Alshamaila et al., 2013).

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Organizational Performance

Organizational performance describes the achievement of operational, financial, and strategic aims along with the achievement of the competitive edge. This diversity of performance generates performance dimensions that include operational and financial performance, productivity and profitability, cost-effectiveness, performance and service quality, and innovation, customer satisfaction, and adaptability. Performance dimensions are predominantly analyzed in technology-centered research as performance outcomes of the organization's technological capabilities, as a range of information and communication technologies impact the efficiency and effectiveness of organizational processes (Chang et al., 2021).

Cloud computing's relation to performance is based on the idea that performance should be measurable with technology investments. Cloud computing enables organizations to reduce their physical infrastructure, manage computing and information resources efficiently, and improves responsiveness. However, the adoption of technology alone does not ensure improvement of performance, as cloud resources alone are of little value to an organization without sufficient management, technology, human, and social resources. Several studies have reported positive relationship between cloud computing and the performance of organizations in terms of profitability, market value, process excellence, cost savings, and organizational flexibility.

In this research, performance is about the capabilities of organizations to improve operational effectiveness and productivity through the integration of technology and management. Cloud computing has the potential to enable this performance. It is anticipated that the integration of cloud computing would prove beneficial for an organization in terms of efficiency and cost savings while also helping them build their technological resources and capabilities and enhance overall outcomes (Alrasheed et al., 2026).

Security

In cloud computing, security consists of the tools and practices that an organization uses to ensure that its data, applications, services, and computing resources in the cloud are safe from unauthorized access and use, disruption, loss, and manipulation. There are a lot of broad concepts in security, including maintaining data integrity, availability, identity, authentication, encryption, and protection from cyber threats, to name a few. Because an organization's data and applications may no longer be under the organization's direct control and may be outside of the organization's traditional physical boundaries and be managed by a third party, security is even more important to maintain the integrity, privacy, and control of an organization's data and resources (Hashizume et al., 2013).

Security is one of the major components of cloud computing adoption. By its nature, organizations are reluctant to adopt cloud technologies because of data privacy and confidentiality issues, third-party control, regulatory issues, and possible unsecured data breaches (Subashini & Kavitha, 2011). These issues create uncertainty, lack of trust, and undesirable effects to the adoption of cloud services, especially when organizations move sensitive information and critical core processes to cloud environments. Security and privacy of data have been extensively studied in cloud computing research, and recently, published studies have focused on addressing security issues in computing environments that are regulated and have data protection laws (Oliveira, 2021).

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In this study, the focus is on the capability of cloud computing systems to protect an organization's data, systems, applications, and resources. Thus, security is also perceived as an organizational capability rather than an afterthought, defensive, stand-alone, add-on technology when implementing security controls for the adoption of Cloud Computing. New evidence strengthens that security, particularly, the integration of security and scalability, can enhance the performance of organizations and their projects in Cloud Computing environments (Qatawneh, 2024).

Scalability

Scalability is a cloud computing concept describing the capability to dynamically change computing resources in response to a given demand from the user. For instance, if a user requires more processing power, cloud computing offers more flexibility in adjusting processing power, storage capacity, and other technological assets installed on the user's premises. Scalability, flexibility, elasticity, resource optimization, and technology adaptation to the enterprise's requirements are all interrelated (Benlian et al., 2018; Marston et al., 2011).

Scalability is an important consideration for businesses with unpredictable changes in demand, rapid business growth, digital transformation, and a greater need to process and analyze larger volumes of data. Efficiently managing scalability by increasing the number of available computing resources regardless of demand, and removing unused resources, helps manage and improve the use of resources that improves operational flexibility and cost efficiency (Weinstock & Goodenough, 2006).The capacity for an organization to rapidly fulfill demand, and efficiently manage unused resources, is an important consideration for the adopted cloud services. Along with security, scalability can provide positive technological conditions for cloud computing, as empirical evidence has shown that both security and scalability can improve organizational performance and project results (McSherry et al., 2015).

Research Objectives

- To examine the relationship between cloud computing adoption and organizational performance.
- To assess the role of security in cloud computing adoption and organizational performance.
- To evaluate the role of scalability in cloud computing adoption and organizational performance.

Problem Statement

Cloud computing shows positive correlations with improvements in organizational performance. However, existing literature has provided limited integrated research on how security and scalability impact this correlation. Most studies focused on the determinants of adoption or general performance outcomes, whereas security and scalability were examined in isolation as factors of adoption or technology (Nuthalapati et al., 2025). The evidence shows security and scalability have a positive impact on company performance, but studies examining their role in the cloud adoption-performance relationship in the developing countries, for instance, Pakistan, are still limited (Durowoju et al., 2011). This study aims to fill this research gap by analyzing cloud

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computing adoption and the impact on company performance with a focus on security and scalability (Khayer et al., 2021).

Significance of the Study

This study is important because it examines cloud computing's impact on an organization's performance while considering the dimensions of security and scalability. Cloud computing can improve an organization's performance on numerous dimensions of effectiveness and efficiency. But the level of performance will ultimately depend upon an organization's capability to manage and address security risks and be prepared to meet new and changing demands and requirements of technology. It is expected that this study will provide valuable insights to organization managers and decision makers on the importance of the protection of organizational data and information and the infrastructure to support workloads that can change rapidly and without notice. These results may help organizations develop efficient cloud strategies, resource allocation, mature security practices, and use scalability offerings to enhance their capabilities to sustain operational processes with greater productivity.

Literature Review

Studying the use of cloud computing services by organizations is an essential part of researching how organizations use information systems. Use of externally delivered services for conducting business functions, information management and communication and digital transformation all require the use of cloud services. Adoption refers to the accepting, implementing, integrating, and using of cloud services in organizational activities. Much of previous research has examined the technological, organizational, and environmental factors associated with adoption. Of these, the Technology-Organization-Environment framework is the most cited. Studies have cited the importance of factors such as relative advantage, compatibility, security, and privacy concerns, reliability, cost effectiveness, top management support, and competitive pressure as major factors associated with cloud service adoption (Hassan et al., 2017).

More recently, the focus of research has shifted to include the mentioned factors and security, compliance, and changing business models. Systematic research has also found that adoption can be influenced by legal, technical, and financial factors, as well as organizational factors. Privacy and security concerns and the protection of data have remained most important in this regard. From this perspective, the decision to adopt cloud technologies is more complex than a one-time decision. It involves an integration of cloud technologies in an organization, which requires a continual process of balancing the expected outcome of adoption against the risks of adoption (Azizah, 2024).

Essentially, though, the existing scholarship captures essential aspects of cloud service adoption, the main gap is that many studies are focused on cloud service adoption intention or a simple decision to adopt rather than a detailed and holistic study of the extent and impacts of cloud service use by an organization. Previous researchers have identified the need for studies that investigate various configurations of cloud services and different organizational environments in order to connect adoption more clearly with organizational results (Wulf et al., 2021). Therefore, this study aims to advance existing studies by addressing the relationship between cloud computing adoption and organizational performance and considers security and scalability as important aspects of a cloud environment.

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Organizational Performance

Organizational performance describes an organization's ability to reach operational, financial, strategic, and competitive outcomes. In information-systems research, performance is often a result of the IT-enabled capability of an organization. Information technology can enhance an organization's performance. Cloud computing provides businesses with flexible capacity for computing, readily available information, and potentially less demanding infrastructure. It has been researched that if an organization has the proper IT capabilities and properly integrates cloud computing into its processes, cloud-aided processes can be a performance enhancer for that organization (Almatrooshi et al., 2016).

Recent studies prove cloud computing's positive impact on organizational performance. Organizations that have adopted cloud computing have seen improvements in profitability, market value, operational efficiencies, cost savings, organizational agility, and competitiveness. Mkhize et al. (2025) in a systematic review of 90 studies, revealed that operational efficiency and cost savings are the primary effects of cloud computing. Scalability and advanced technology also aid competitiveness. It is evident that the effects of cloud computing are not just positive from a financial perspective, but operationally and competitively as well.

While adoption of a cloud computing service by an organization is positive, performance improvement in an organization due to cloud computing is not inevitable. The effectiveness of cloud computing in an organization is dependent on the implementation, the maturity of the organization, available IT infrastructure, security, and matching organizational requirements to available cloud resources. Cloud security is critical. Insufficient cloud security negatively impacts operational efficiency, customer confidence, financial performance, and the organization's reputation. Thus, the literature positions cloud computing adoption positive in relation to the performance of an organization, but emphasizes security, scalability, and other technological challenges in the transformational value of cloud computing to an organization (Gavrea et al., 2011).

Security in Cloud Computing

An important challenge in cloud computing is security. Organizational data, applications and computing processes are transferred to externally managed or shared environments. Cloud computing environments present risks and concerns such as unauthorized access, data breaches, misuse, identity management, data integrity, loss of control and service disruptions. Two primary concerns in cloud computing witnessed by research are security and privacy. This shows that organizations must do a comprehensive analysis to determine the exposures and risks to their information and IT resources (Ogunlolu & Rajanen, 2019).

Security, and privacy in particular, is one factor that influences the confidence and willingness of an organization to use cloud services. When an organization believes that the cloud services protect data and provide services that are accessible and reliable, then the concerns that lead to reluctance to use the services are minimized. Unaddressed privacy and data breach concerns, lack of control, threats and compliance obligations drive an organization to use cloud services with extreme caution or avoid integrating cloud services in mission critical functions in the organization. Security of cloud services is an important consideration not just for an organization's IT function, but also for making decisions to adopt cloud services (Ukeje et al., 2024).

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An organization's performance is also a contributing factor. Effective security can prevent Cloud-based services from disruptions and data loss. Optimized Cloud services can prevent loss of data, compliance breaches, and financial penalties for the IT resources of the function. While Cloud Computing can improve the IT resources of an organization, the absence of security can lead to service outages, loss of data, non-compliance, and financial penalties, and lose the stakeholders' confidence. There are many studies on security in the context of cloud computing adoption. However, security as an issue of an organization's performance is as important, and is often overlooked. Therefore, this study investigates the relationship between cloud computing and security, and how it affects organizational performance (Ramgovind et al., 2010).

Scalability in Cloud Computing

Scalability is the ability for cloud computing software and services to be reframed or adjusted in order to address the shifting needs of an organization. Structures built with physical elements such as hardware are unable to meet the fluctuating needs of an organization. Cloud computing provides the advantage of flexibility in the services offered by the vendor within the cloud. The potential for flexibility in the services offered by the cloud computing vendor allows an organization the ability to scale the cloud computing services in alignment with the needs of the organization. Use of cloud services for competitive advantage is an area of agreement with many researchers. Scalability is one of the cloud computing services that supports competitive advantage by enhancing operational efficiency and agility. The rapid increase of computing resources in cloud computing services supports the continued provision of organizational services at a high level, while the reduction of computing resources in response to a low demand supports optimal use of resources and corporate budgets. Scalability of cloud services contributes to operational efficiency and effectiveness of an organization's response to business needs (Lehrig et al., 2015).

Scalability is limited by other cloud computing services such as security, reliability, governance, and readiness. In the absence of adequate integration of scalable resources into the organization's processes, technology and organizational challenges persist. Cloud computing provides the foundation on which the operational effectiveness and efficiency of an organization is built. Cloud computing services support the flexibility and responsive of an organization to the needs of customers. Because of scalability and performance improvements that are inherent to cloud computing, this study analyzes the impact of cloud computing adoption on organizational performance. Cloud computing has the potential to enhance organizational performance by providing scalability, flexibility, and a performance improvement over a traditional 'institutional' IT infrastructure (Ghandour et al., 2023).

Research Gap

Although previous research has established a positive association between cloud computing adoption and organizational performance, the literature remains fragmented regarding the specific technological conditions through which these benefits are achieved. Earlier studies have largely focused on adoption intentions, determinants, and general technological factors, with comparatively limited attention to post-adoption performance outcomes (Yeboah-Boateng & Essandoh, 2014). While cloud adoption has been shown to improve profitability and market value, security and scalability have often been examined separately as adoption barriers or technological features rather than being integrated with organizational performance (Al-Qerem et al.,

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2025). Recent studies have begun to examine security and scalability together, but evidence remains limited across specific sectors and contexts, creating a clear need for an integrated understanding of how cloud computing adoption, security, and scalability influence organizational performance. Therefore, the present study addresses this gap by examining these variables within a unified empirical framework, particularly across broader organizational contexts.

Hypotheses

- **H1:** There is a significant positive relationship between cloud computing adoption and organizational performance.
- **H2:** Cloud computing adoption, security, and scalability significantly and positively predict organizational performance.
- **H3:** There is a significant difference in organizational performance between organizations with lower and higher levels of cloud computing adoption.
- **H4:** Organizational performance significantly differs across organizations with different levels of cloud computing adoption.

Methodology

Research Design

This study used a quantitative, questionnaire-based, cross-sectional research design to collect and analyze statistics on cloud computing adoption, security, and scalability and their effects on organizational performance. A survey was used to obtain standardized information on cloud computing adoption in the organizations of respondents. A cross-sectional approach was used to collect data over a specified period of time. This study focused on four main components. Cloud computing adoption was the main explanatory variable. The effect of cloud computing adoption on organizational performance was the main outcome variable, with security and scalability being the crucial technical dimensions. The research design helped to answer the research questions and was used to clarify existing gaps in the cloud computing literature, particularly in the areas of organizational adoption, usage, and performance, through the employment of a survey.

Population

The study population consisted of employees, managers, IT professionals, administrative staff, and other professionals from the organizations that have adopted or have experience with cloud computing in Punjab and Sindh, Pakistan. Study participants were selected from major cities, including Multan, Lahore, Faisalabad, Rawalpindi, Sialkot, Gujranwala, Karachi, Hyderabad, and Sukkur. Participants were selected from universities, higher education institutions, IT companies, banks and financial institutions, telecommunications firms, health services, manufacturing firms, software companies, and from both the public and private sectors.

These settings were chosen as participants with relevant exposure to organizational information systems and cloud computing were available. These include data management, communication, storage, hosting, service delivery, collaboration and business process automation.

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Target Audience

The study included employees and professionals from various organizations who were familiar with cloud computing or had practical experience using it. Participants were drawn from the management, administration, technology, professional and operational tiers of organizations as the use of cloud computing extends beyond the IT department to include the management of communication, data storage and dissemination, business and financial activities, services to clients, and the execution of routine activities of an organization. The target respondents covered IT managers and officers, software engineering professionals, IT administrators, faculty, office staff, bank employees, medical professionals, business persons and employees of government and private organizations.

Sampling Method

A purposive sampling method was used to select participants who had sufficient knowledge or practical experience with cloud platforms and service delivery within their organizations. Purposive sampling can be used in this case since participants were selected according to relevance of the sampling frame and not randomly from the entire population. Convenience sampling can also be used to some extent since participants from the selected organizations and institutions in Punjab and Sindh were emailed a questionnaire that was easily accessible through Google Forms. The combination of purposive and convenience sampling was used to reach respondents that were location dispersed, but that used cloud technologies and were able to provide insights on Cloud Computing and its relation to the safety, flexibility, and performance of an organization. Similar studies have used organizational respondents that have expertise and knowledge of the Cloud technologies

Sample Size

The final sample consisted of 433 valid respondents as participants from organizations and institutions in Punjab and Sindh, Pakistan. All 433 survey responses were used in the analysis and were considered sufficient for the statistical analysis and the different types of quantitative analysis used to compute correlations, multiple regressions, independent t-tests, and one-way ANOVA in this study. The sample size was suitable for the research objectives of this study to assess the relationships and predictive functions of cloud computing in terms of security, flexibility, and performance of an organization, and to assess performance of organizations at different levels of cloud computing integration. The sample was larger than most previously studied in cloud-computing research with 403 samples with 280 samples, providing the empirical framework for this study.

Data Collection

Primary data were collected via a self-administered questionnaire to be completed by participants. It was a self-administered questionnaire based on validated measurement scales. It evaluated the four frameworks of cloud computing adoption, security, scalability, and the performance of an organization. Items for cloud computing adoption were primarily extracted focusing on information protection, confidentiality, and the risks of security and privacy. The items on scalability focused on the flexibility and adaptability of cloud computing systems to meet the changing/growing demand of the organization. The items on the performance of the organization were

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primarily extracted and focused on the productivity of the organization, the efficiency of the organization, the completion of tasks, and the overall performance of the organization. Response options were measured on a five-point Likert scale ranging from strongly agree to strongly disagree. The questionnaire was designed in English but was appropriate and clear to participants in the Pakistani context. It was administered online via Google Forms and the survey link was emailed to participants in Punjab and Sindh via professional and organizational networks. Participation was voluntary. After the data were collected, the responses were downloaded to Microsoft Excel for checking for any missing/inconsistent data, and duplicate or unusable responses were discarded. The dataset was ready for transfer to SPSS after it was finalized with 433 valid responses.

Data Analysis

Responses were first organized and checked for errors in Microsoft Excel. The consistency and completeness of Google Forms responses were checked, and the responses were then imported into SPSS for analysis. Descriptive statistics were used to analyze demographic data and the range of study variables. Reliability of the cloud computing adoption, security, and scalability items and scalability items was assessed using Cronbach's Alpha. The strength and direction of relationships between study variables was assessed via Pearson's correlation. Cloud computing, and adoption of security and scalability, was assessed using multiple regression in order to assess organizational performance and determine the Cloud Computing adoption's security and scalability dimensions. The performance of an organization was assessed using an independent samples t-test in the context of an 'adoption of Cloud computing' division. The performance of an organization was assessed in the context of varying levels of Cloud computing adoption using one-way analysis of variance (ANOVA). The discrepancies in performance were assessed using Tukey HSD post analysis if the outcome of the ANOVA was significant. A significance level of $p < .05$ was used for all inferential analyses and the findings were cleared in the context of the focus of interest, strength of the statistics, and their direction and level of significance.

Table 1: Demographic Characteristics of Respondents (N = 433)

Demographic Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	237	54.7
	Female	196	45.3
Age	18–25 years	108	24.9
	26–35 years	157	36.3
	36–45 years	103	23.8
	46–55 years	49	11.3
	56 years and above	16	3.7
Education	Bachelor's degree	119	27.5
	Master's degree	181	41.8
	M.Phil./MS	89	20.6
	PhD	44	10.2
Job Position	IT/Technical Staff	116	26.8

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Demographic Variable	Category	Frequency (f)	Percentage (%)
	Managerial/Administrative Staff	103	23.8
	Academic/Teaching Staff	91	21.0
	Professional/Operational Staff	123	28.4
Organization Type	Public Sector	168	38.8
	Private Sector	198	45.7
	Semi-Government	67	15.5
Province	Punjab	263	60.7
	Sindh	170	39.3
Cloud Computing Experience	Less than 1 year	67	15.5
	1–3 years	143	33.0
	4–6 years	132	30.5
	More than 6 years	91	21.0
Total		433	100.0

The sample of 433 participants was diverse in terms of gender, age, education level, job position, type of organization, location, and experience with cloud computing. In this sample, 54.7% of participants were male and 45.3% were female. The largest age group (36.3%) was 26–35. Participants with a master's degree (41.8%) comprised the most significant education level in the sample, while the professional and operational activities staff (28.4%) and IT/technical staff (26.8%) composed the largest occupational group. The largest group was from the private sector (45.7%), followed by the public sector (38.8%) and the semi-governmental sector (15.5%). Respondents from Punjab (60.7%) comprised the largest geographical group, while the group from Sindh (39.3%) was less in number. In terms of cloud computing, the participants with 1–3 years of experience (33.0%) made the largest group. Overall, the demographic findings showed an adequate sample of different types of organizations and different levels of professionals to provide relevant experience with cloud computing. Based on the findings, participants were in a good position to analyze aspects of cloud computing including security, adoption, scalability, and impact on performance of an organization.

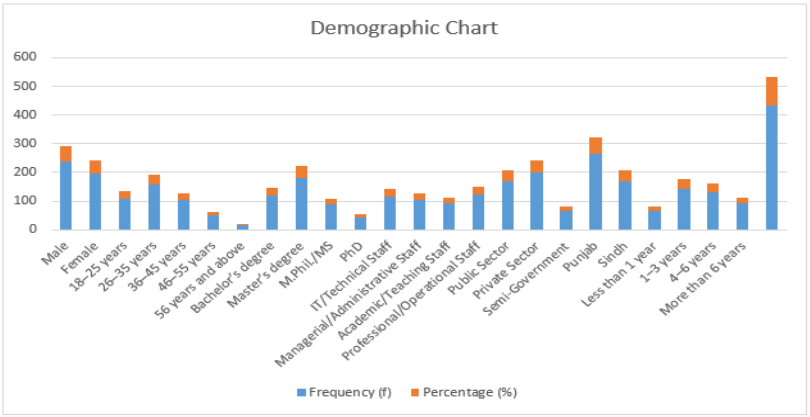

Fig.1 Demographic Chart

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Table 2: Reliability Statistics and Descriptive Statistics of Study Variables (N = 433)

Variables	Number of Items	Cronbach's Alpha (α)	Mean (M)	Std. Deviation (SD)
Cloud Computing Adoption	8	0.921	3.76	0.68
Security	7	0.895	3.71	0.71
Scalability	6	0.887	3.79	0.69
Organizational Performance	8	0.934	3.83	0.65
Overall Scale	29	0.956	3.77	0.68

The reliability and descriptive analyses confirmed that all study variables exhibited high to excellent internal consistency with Cronbach's alpha between 0.887 to 0.934, and the overall scale had an alpha value of 0.956. Cloud Computing Adoption was scored at 3.76 (SD = 0.68), Security had a score of 3.71 (SD = 0.71), Scalability was scored at 3.79 (SD = 0.69), and the highest mean score of 3.83 (SD = 0.65) was scored by Organizational Performance. Based on these results, respondents perceived moderately high levels of cloud computing adoption, security, scalability, and organizational performance. The low standard deviations provided evidence that the mean value for each of these factors was generally consistent. The reliability coefficient analysis confirmed that the items are internally consistent and may be analyzed further.

Table 3: Pearson Correlation Analysis of Study Variables (N = 433)

Variables	1	2	3	4
1. Cloud Computing Adoption	1			
2. Security	.614**	1		
3. Scalability	.587**	.632**	1	
4. Organizational Performance	.648**	.571**	.619**	1

Note. p < .01 (2-tailed).

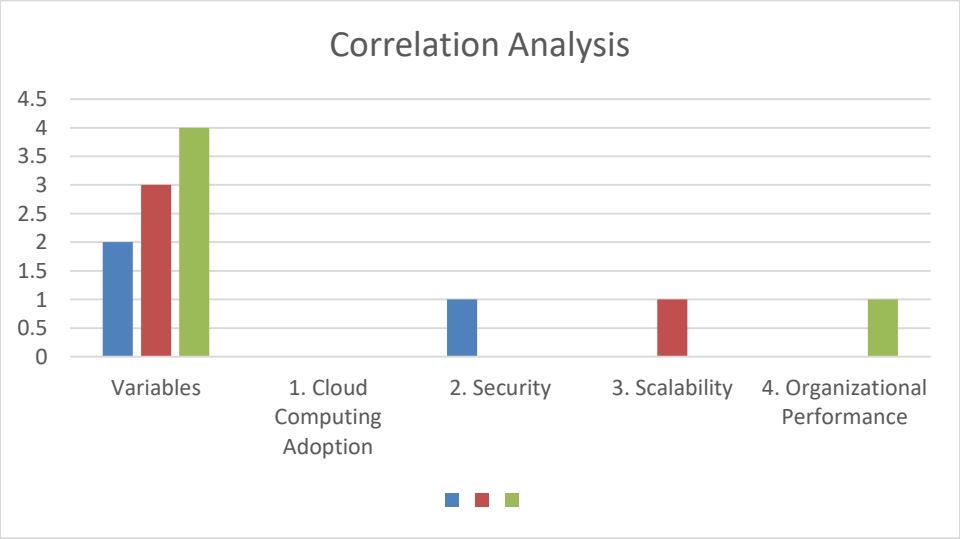

Fig. 2 Correlation Analysis

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Positive correlations for all study variables were apparent in the Pearson correlation analysis. The adoption of cloud computing was positively related to an organization's performance with a correlation of r = .648 and a p value of less than .01, suggesting an upwards relationship. Higher degrees of adoption of cloud computing positively affect the performance of an organization. Security was positively related to performance of an organization with a correlation of r = .571 and a p value of less than .01. The same correlation between performance of an organization and the scalability of a system was found, r = .619 with a p value of less than .01. Results indicated that cloud computing adoption is positively related to both security and scalability of a system with correlation values of r = .614 and r = .587 respectively and a p value of less than .01. A positive correlation was found between security and scalability of a system, r = .632 and a p value of less than .01. Overall, positive correlation results suggest that performance of an organization improves with an increased external adoption of cloud services, and more effective security and system scalability.

Table 4: Multiple Linear Regression Analysis of Cloud Computing Adoption, Security, and Scalability on Organizational Performance (N = 433)

Predictor	B	SE	β	t	p
Constant	0.842	0.173	—	4.87	< .001
Cloud Computing Adoption	0.384	0.047	.401	8.17	< .001
Security	0.218	0.045	.238	4.84	< .001
Scalability	0.291	0.046	.309	6.33	< .001

Model Summary

R	R^2	Adjusted R^2	Std. Error of the Estimate	F	p
.731	.534	.530	.446	164.35	< .001

Note. Dependent variable = Organizational Performance. B = unstandardized coefficient; SE = standard error; β = standardized coefficient.

Fig.3 Multiple Regression Analysis

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The multiple linear regression analysis indicates that cloud computing adoption, security, and scalability have a positive relationship to the performance of an organization that is significant and positive. The overall regression model was statistically significant, $F(3, 429) = 164.35$, $p < .001$, with an R value of .731 and an R^2 of .534. The prediction of the three elements of cloud computing within the performance of an organization explained 53.4% of the variance in the performance of that organization. The adoption of cloud computing ($\beta = .401$, $p < .001$) was the strongest of the three elements, while the other two, scalability ($\beta = .309$, $p < .001$) and security ($\beta = .238$, $p < .001$) of cloud computing, were also of significant importance. From the results of the regression analysis, it can be inferred that greater adoption of cloud computing within an organization, greater security, and greater scalability of cloud computing would add to the performance of an organization. From the results of the regression analysis, it can be concluded that the three elements of cloud computing have a significant and positive impact on the performance of an organization.

Table 5: Independent-Samples t-Test for Organizational Performance by Level of Cloud Computing Adoption (N = 433)

Cloud Computing Adoption Group	N	Mean (M)	Std. Deviation (SD)	t	df	p
Lower Adoption	198	3.47	0.61	-10.21	431	< .001
Higher Adoption	235	4.13	0.58			

Note. Dependent variable = Organizational Performance. Statistical significance was considered at $p < .05$.

The independent-samples t-test showed a significant difference between respondents with low and high cloud computing adoption and their reported organizational performance, $t(431) = -10.21$, $p < .001$. Respondents with high cloud computing adoption reported overall better performance of the organization ($M = 4.13$, $SD = 0.58$), compared to the lower adoption group ($M = 3.47$, $SD = 0.61$), with a mean difference of 0.66. These results indicated that the adoption of cloud computing positively impacted the reported performance of the organization. The overall results from the research also showed that performance of the organization differed significantly depending on the level of cloud computing adoption. These results showed that cloud computing adoption had a positive impact on the performance of the organization.

Table 6: One-Way ANOVA Analysis of Organizational Performance by Cloud Computing Adoption Level (N = 433)

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p
Between Groups	28.746	2	14.373	42.816	< .001
Within Groups	144.346	430	0.336		
Total	173.092	432			

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Group Descriptive Statistics

Cloud Computing Adoption Level	N	Mean (M)	Std. Deviation (SD)
Low Adoption	126	3.31	0.56
Moderate Adoption	169	3.78	0.57
High Adoption	138	4.15	0.55
Total	433	3.77	0.63

Tukey HSD Post-Hoc Analysis

Comparison	Mean Difference	Std. Error	p
Low vs. Moderate	-0.47	0.073	< .001
Low vs. High	-0.84	0.075	< .001
Moderate vs. High	-0.37	0.068	< .001

The one-way ANOVA indicated that performance of the organization differed significantly based on the levels of cloud computing adoption, $F(2, 430) = 42.816$, $p < .001$. The high-adoption group ($M = 4.15$, $SD = 0.55$) and the moderate-adoption group ($M = 3.78$, $SD = 0.57$) reported lower levels of performance of the organization, when compared to the low-adoption group ($M = 3.31$, $SD = 0.56$). The results of the Tukey HSD post-hoc analysis revealed that all pairs of groups ($p < .001$) were significantly differed, confirming the increase of performance of the organization from the low-adoption group to the high-adoption group. The high-level adoption of cloud computing positively impacted performance of the organization.

Discussion

The purpose of this study was to understand the relationship between cloud computing adoption and organization performance with respect to security and scalability issues faced by organization respondents in Punjab and Sindh, Pakistan. Results showed a positive, significant correlation of cloud computing adoption and organization performance ($r = .648$, $p < .01$) and indicated that organizations with greater cloud adoption reported better performance. This is consistent with existing literature that indicates cloud computing positively impacts operational efficiency, flexibility, cost effectiveness, competitiveness and firm performance (ADEBAYO, 2024). There is sufficient evidence to argue that cloud computing positively impacts the performance of an organization.

Multiple regression analysis indicated that together with cloud computing adoption, security and scalability accounted for 53.4% of organization performance. Of the three constructs, cloud computing adoption was the most important, followed by scalability and security, respectively. The findings show that the performance of an organization cannot be explained in the absence of the implementation of cloud technologies and the accompanying constructs. The most important issue is security. Cloud systems will be used effectively and confidently if the privacy and security of digital resources and information of an organization are protected (Ashraf et al., 2026).

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This argument is consistent with Naidoo (2024) noted information security and privacy as key aspects of cloud adoption. Likewise, the added value of scalability demonstrates that flexibility, effectiveness of resources, and efficiency of operations may be improved by cloud systems that respond to changes in workload, users, and organizational needs. It also supports existing documentation highlighting the performance advantages associated with scalable cloud environments (Lal & Bharadwaj, 2016).

The results of the group comparison confirmed the positive relationship between cloud computing adoption and organizational performance. Results from the independent-samples t-test showed that respondents in the high-adoption group ($M = 4.13$, $SD = 0.58$) indicated higher organizational performance than the respondents in the low-adoption group ($M = 3.47$, $SD = 0.61$), $t(431) = -10.21$, $p < .001$. Similarly, a one-way ANOVA also indicated significant differences in organizational performance of the low-, moderate-, and high-adoption groups, $F(2, 430) = 42.816$, $p < .001$. The performance of the organizations in the high-adoption group ($M = 4.15$) was significantly better than in the moderate-adoption group ($M = 3.78$) and the low-adoption group ($M = 3.31$). It was also demonstrated by the Tukey HSD analysis that there were significant differences among the three adoption groups. The results of multiple analyses (correlation, regression, t-test, and ANOVA) support the most important finding that higher cloud computing adoption leads to better performance of the organizations (Øverdal et al., 2022).

The results of this study also demonstrate its importance for cloud computing in developing countries such as Pakistan. Financial resources, IT infrastructure, the availability of technical personnel, protection of data, and cybersecurity in general demonstrate obstacles that may impact the benefits that organizations may gain from the cloud. The findings indicate that successful adoption of cloud computing requires the appropriate combination of infrastructure and security. This finding is consonant with recent research that suggests that the advantages of cloud computing adoption depend on the organization's inclusive innovation practices, technology, security, and the ability to manage the dynamics of the organization (Santos et al., 2024). Cloud computing should be perceived beyond a pure technology investment. Its value to the organization relies on how strategically cloud resources are integrated with the organization, secured, and tailored to address the evolving needs of the organization (Panda et al., 2025).

The literature indicates that security and scalability strengthen organizations and that both areative in their contribution to outcomes. Cloud computing adoption together with appropriate security measures and flexibility to meet the organization's changing needs has the potential to enhance the organization's competitiveness, productivity, flexibility, and other business performance indicators. The empirical and systematic reviews of the literature add support to the premise that cloud computing is instrumental in accomplishing these ends (Pradivta et al., 2024). The study endorses the need for an integrated perspective to cloud computing and organizational innovation in order to improve the performance of organizations.

Conclusion

The findings indicate that cloud computing adoption is positively related to the performance of organizations in Pakistan's Punjab and Sindh provinces. The research indicated better organizational performance in companies that embraced cloud computing more. This indicated a potential positive influence of cloud technologies on key processes affecting the operational efficiency,

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productivity, flexibility, and overall effectiveness of an organization. As expected, (R2 = .22), cloud computing adoption influenced organizational performance in a positive direction. The t-test ($p < .000$) and ANOVA ($F = 1.92$, $p = .015$) results showed distinct performance of the organizations across varying levels of cloud adoption. These results indicated that cloud technologies, when optimally adopted, provide organizations with a competitive advantage by improving performance and enabling organizations to meet changing customer needs.

The study concluded that cloud computing adoption impacts organizational performance positively. The results indicated that security and scalability of cloud computing services are critical parameters for realizing the benefits of cloud computing in an organization. Security is critical to the confidence of both the organization and the end-user. Furthermore, scalability of cloud computing resources influences organizational performance by supporting flexibility and efficiency. It may thus be stated that adoption of cloud computing when combined with higher levels of security and scalability has a positive influence on performance and an organization's ability to achieve its operational outcomes in the long run.

Future implications

Future research should consider factors such as organizational readiness, the support of upper management, cost effectiveness, employee digital skills, data protection, cyber safety, and technology integration in addition to existing cloud computing technologies. Longitudinal and experimental studies will provide more definitive answers about how cloud adoption will impact the performance of an organization over time. Future studies may cover various cloud service models (infrastructure as a service, platform as a service, software as a service) in various industries, for example banking, healthcare, education, manufacturing, and IT. Comparative studies may provide more insight into contexts of developing and developed countries and/or various provinces, and analyze how cloud adoption and performance of organizations differ in those contexts. Further studies are encouraged to use large enough samples, which include a sufficient degree of randomness, in order to increase the generalizability of the results. They should study the relation of the size of organizations, their industry, technology adoption, and cyber security to the Cloud adoption benefits.

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