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A Study on the Impact of Digital Transformation on Information Technology Systems

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ABSTRACT

The present study examined the impact of digital transformation on the efficacy, performance, and efficiency of IT systems. Other important topics of discussion included the advantages and disadvantages of adopting contemporary technologies. The study used a descriptive and analytical research design along with a quantitative research technique based on primary and secondary data sources. The basic data used in this study, which came from 200 respondents who completed a structured questionnaire, was examined using techniques like percentage analysis, mean, standard deviation, Chi-Square test, and correlation analysis. With a mean score of 4.13, the results showed that digital transformation had a favourable effect on the performance and efficiency of IT systems. Cloud computing technology was found to be the most adopted technology (24%), and operational efficiency was identified as the biggest opportunity to take advantage of (26%). However, challenges like cybersecurity and data privacy risks (26%) and implementation cost (24%) were mentioned. The positive correlation relationships between the digital technology, and the IT system performance were found using correlation analysis, and a significant association between the digital technology and IT system efficiency was found using Chi-Square test ($p = 0.013$). Digital transformation was found to be a significant factor in the effectiveness of the IT system and the productivity of the organisation, but it was only successful when a sufficient level of investment occurred and cyber security and technical expertise were in place.

Keywords: Digital Transformation, Information Technology Systems, Cloud Computing, System Performance, IT System Efficiency, Digital Technologies.

1. INTRODUCTION

Digital transformation has emerged as a crucial component of the modernisation and development of information technology systems in the digital age. Cloud computing, artificial intelligence, big data analytics, automation, and cybersecurity are just a few of the rapidly developing technologies that have changed how businesses handle information, carry out operations, and provide services. The process by which a business or system integrates new digital technologies to boost productivity, boost efficiency, and enable data-driven decision-making is referred to as "digital transformation". In today's tech-savvy world, digital solutions are now crucial for organisations to maintain a competitive advantage, promote innovation, and improve productivity.

Information Technology systems are very crucial in managing organisations' activities, processing information, communicating, and supporting business activities. The adoption of digital technologies helps in improving the efficiency of the system, the rate of processing, management of data and the reliability of the system and services. The technologies such as

artificial intelligence and automation reduce the amount of manual labor while the cloud computing offers a flexible data storage and access. Similarly, the big data analytics helps in making informed decisions, and advanced cybersecurity technologies offer protection for the sensitive data. Therefore, due to all these technological developments, the performance of the IT systems can be improved.

Despite the fact that there are various advantages of digital transformation, there are certain challenges that can put at risk the successful digital transformation process. Some of the major challenges include high costs of implementation, cybersecurity challenges, data privacy issues, lack of technical skills and organizational change management. These challenges can only be resolved by proper technological planning, financial investment, employee training and proper security measures in the organization. Concurrently, Digital transformation opens the door to cost savings, operational efficiency, data management, customer service and technological innovation.

The current study intends to investigate how digital transformation affects information technology systems' efficacy, performance, and efficiency. It also emphasizes examining key opportunities and challenges when implementing digital technologies. The study aims to gain insight into the role and impact of contemporary technological solutions on the improvement of IT operations, the reinforcement of organisational productivity, and the promotion of technological development, highlighting the main factors needed for effective digital transformation.

Research Objectives

The research objectives of the study are:

- To explore the implications of digital transformation on efficiency, performance and effectiveness of Information Technology Systems.
- To analyse the obstacles and opportunities in the implementation of digital technologies in IT systems.

2. REVIEW OF LITERATURE

Strømmen-Bakhtiar (2020) explored the concept of digital transformation and its influence on society. The study clarified the impact of the development and use of digital technologies on social, economic, communication and organisational structures. It brought out the need for technology advancement that would allow for easy access of information. The research also revealed the need for understanding the broader implications of the digital revolution on society and organizations.

Ulez'ko, Demidov and Tolstykh (2019) investigated the effects of digital transformation on digital farming. This study focused on how traditional farming practices, processes, and administration are affected by new digital technology. It stressed the significance of technological innovations for improving efficiency, management of information, and decision-making processes. The research revealed that the digital revolution had created new opportunities for modernization and sustainable development in different sectors.

Verhoef et al. (2021) examined digital transformation from a multidisciplinary perspective and suggested a research agenda for understanding various aspects of digital transformation.

The study focused on the changes of business models, organisational structures, customer experiences and competitive approaches as a result of the use of digital technologies. It provided a definition of the relevance of digital resources, organisational capacities, technological innovation for successful transformation. The study revealed that for digital transformation to occur, it had to happen in a holistic way where technological, organizational and strategic changes were critical components.

Wessel et al. (2021) compared the idea of digital transformation with IT-driven organizational transformation. In this research, the researcher explained the implementation of new IT systems as part of the overall digital transformation process, which had gone past the stage of simply introducing new technologies and moved on to make major changes in processes, structure, and business models. The necessity to understand the overall organizational effect of digital technologies was highlighted. The research provided valuable information about the impact of technology on organizational development and management.

Zhang, Xu and Ma (2023) looked at the relationship that existed between the investment in Information Technology and digitalization, paying particular attention to the role that digitalization strategy and top management played in this relationship. The paper concentrated on how IT investments helped with digitalization and the technological advancement of the organization. It stressed on the importance of adopting a strategic approach and management involvement in achieving positive outcomes of investments in technology. It revealed the importance of having good leaders and the right use of digital strategies.

3. RESEARCH METHODOLOGY

The study's descriptive and analytical research design aims to investigate the impact of digitalisation on the information technology system quantitatively. The primary sources of data for this study were structured surveys, books, journals, academic publications, and industrial reports. To obtain pertinent information, appropriate sampling and data gathering methods were used. To ascertain how the usage of digital technologies affects the efficacy, performance, and efficiency of IT systems, independent and dependent factors were examined. Several statistical techniques were used to analyse the collected data in a meaningful way and make inferences. Frequency distribution, percentage analysis, mean, standard deviation, Chi-Square test, and correlation analysis were among them.

3.1. Research Design

The research was analytical and descriptive in nature. To comprehend the idea, uses, and key elements of digital transformation in IT systems, the descriptive method was employed. An analytical approach was used to analyse the effects of digital technologies on system efficiency, operational performance, productivity, security and overall effectiveness. It also assisted in analysing opportunities and challenges introduced by the digital transformation.

3.2. Nature of the Study

The influence of digital transformation on information technology (IT) was examined in this study using a quantitative research approach. It considered aspects associated with analyzing

and adopting the latest technology such as artificial intelligence, big data, and automation. Their impact on the functioning of IT systems was also included in the analysis.

3.3. Sources of Data

The study was based on both primary and secondary sources of data.

- **Primary Data:** Primary data collection was done using a structured survey. This was done with an aim of collecting data regarding the use of digital technology, performance of IT systems, efficiency of operations and opportunities/challenges in the adoption of digital technology. Data collection was done from persons that are well conversant with IT system and digital transformation techniques.
- **Secondary Data:** Scholarly articles, academic journals, books, industry reports, government reports, organisational reports, and trustworthy internet sources were used to gather secondary data. They helped to collect theoretical knowledge about digital transformation and impact of digital transformation on IT systems.

3.4. Sampling Design

An appropriate sampling strategy was used to choose respondents who were pertinent to the study's subject. The sample included individuals who were associated with or knowledgeable about Information Technology systems, including IT professionals, technicians, and other technology users. The high response rate helped gain insights into different aspects of the implementation and effect of digital technologies from the respondents' point of view.

3.5. Sample Size

The size of the sample was determined by the study's scope, respondent availability, and research necessity. Participants in the focus groups provided pertinent information about the usage of digital technologies, enhancements to IT system performance, and challenges experienced throughout the transition to digital.

3.6. Data Collection Method

The data were gathered using a structured questionnaire with related questions on digital transformation in Information Technology systems. The questionnaire comprised various items including technology adoption, system efficiency, operational effectiveness, productivity, security of data, infrastructures development and barriers to development. Relevant academic and professional publications were also used as a source of secondary data.

3.7. Variables of the Study

The following variables were also included in the study to examine the connection between information technology (IT) systems and digital transformation.

- **Independent Variables:** Digital technology adoption, cloud computing use, automation and artificial intelligence, big data analytics, cyber security technologies, and the growth of digital infrastructure were among the study's independent factors. The following variables were taken into account to explore the effect of the implementation and use of modern digital technologies on the operation, growth and progress of Information Technology systems.

- **Dependent Variables:** The dependent variables of the study included the efficiency of IT systems, system performance, operational effectiveness, organisational productivity, quality of IT services and overall effectiveness of Information Technology systems. These were used to evaluate the outcomes of digital transformation and to assess its relevance for the enhancement of the IT operations, IT service delivery, productivity and organisational performance.

3.8. Statistical Tools and Techniques

The data collected was organized, sorted and analyzed using appropriate statistical tools and techniques. Per cent analysis and frequency distribution were used to analyze the opinion of the respondents and the level of the use of digital technology. The average responses and variations among respondents' opinions were measured using mean and standard deviation. The Chi-Square test was employed to investigate the link between specific categorical variables related to digital transformation and IT system performance. Furthermore, correlation was employed to ascertain the connection between digital technology usage and the efficacy and efficiency of IT systems.

4. RESULTS AND DISCUSSION

This study examines the impact of digital transformation on IT systems through the examination and interpretation of data gathered from 200 individuals. Opportunities and problems associated with digital technology deployment are the main points of discussion, along with the effects of digital technologies on the efficacy and efficiency of IT systems. To analyse the data and uncover the beneficial association between digital transformation and the performance of IT systems, several statistical methods were used, such as frequency distribution, correlation analysis, percentage analysis, mean, standard deviation, and a Chi-Square test.

4.1. Demographic Profile of Respondents

In order to understand the context and nature of the respondents taking part in the research, their demographic profile was studied based on gender, age and occupation. This is because the study is being conducted for Information Technology systems and thus the demographic categories included Male respondents, Female respondents, age, gender and occupation.

Table 1: Respondents' Demographic Profile

Demographic Variables	Categories	Frequency	Percentage
Gender	Male	118	59.0%
	Female	82	41.0%
Age	Below 25 Years	42	21.0%
	25–35 Years	78	39.0%
	36–45 Years	52	26.0%
	Above 45 Years	28	14.0%
Occupation	IT Professionals	85	42.5%
	Technical Employees	65	32.5%
	Other Technology Users	50	25.0%

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Total		200	100%

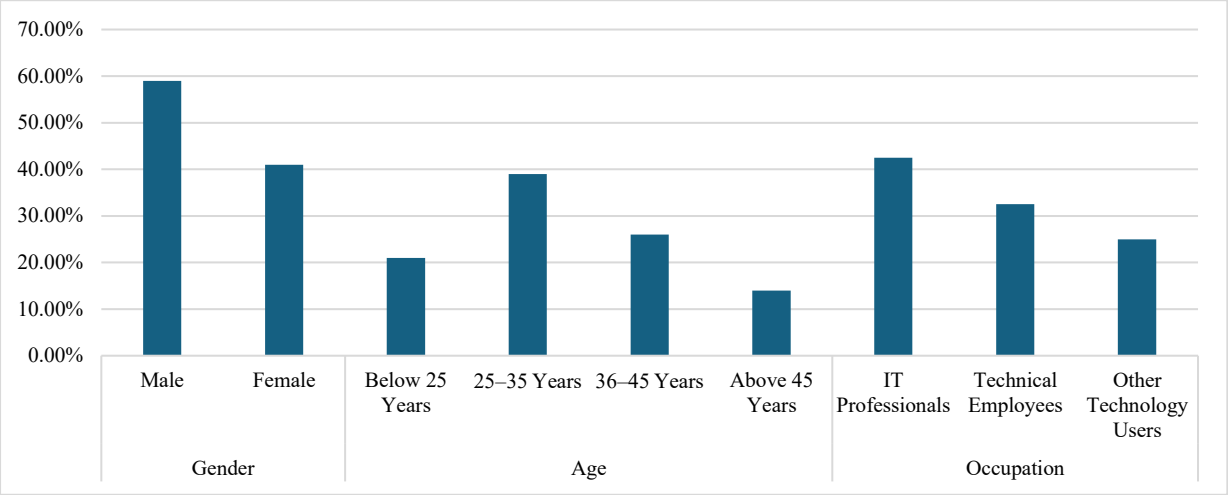


Figure 1: Graphical Representation of Percentage in Demographic Profile of Respondents

According to the findings, women make up 41% of responders, while males make up 59%. Age-wise, the majority (39%) are between the ages of 25 and 35, while 26% are between the ages of 36 and 45. Most of the Information Technology specialists are 42.5% while technicians are 32.5 percent and other technology users are 25 percent. This means that the sample had a wide spread of respondents across different demographics and professional groups, with more respondents in the IT industry and age group 25-35.

4.2. Adoption of Digital Technologies

The adoption technology of digital technology in the Information Technology systems was assessed in order to understand the most critical technologies which have been adopted by the respondents and the extent of adoption of the same. Cybersecurity, Big Data Analytics, Cloud Computing, and AI/automation are among the most important technologies.

Table 2: Adoption of Digital Technologies in IT Systems

Digital Technologies	Frequency	Percentage
Cloud Computing	48	24.0%
Artificial Intelligence and Automation	42	21.0%
Big Data Analytics	35	17.5%
Cybersecurity Technologies	38	19.0%
Digital Infrastructure	37	18.5%
Total	200	100%

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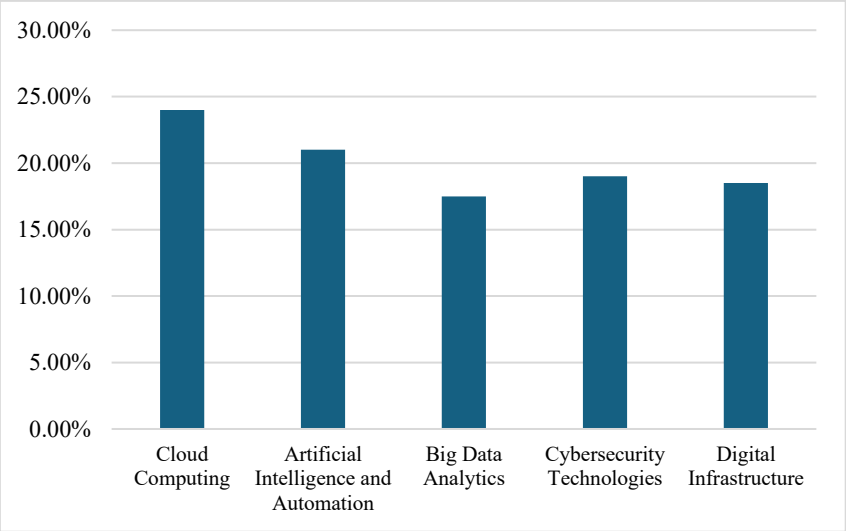


Figure 2: Graphical Representation of Percentage in Adoption of Digital Technologies in IT Systems

According to the results, the leading technology that is implemented is cloud computing with 24%, then followed by artificial intelligence and automation with 21%. The technologies related to cybersecurity took 19%, digital infrastructure 18.5%, and big data analytics 17.5%. This means that cloud computing and artificial intelligence are some of the most common technologies that are used, thus their importance in the improvement of IT processes cannot be ignored.

4.3. Impact of Digital Transformation on IT System Efficiency

The impact of digital transformation on the efficiency of IT systems was analyzed in order to study the perceptions of respondents regarding the enhancement of operations, processing time, utilization of resources, and the efficiency of the entire process. The responses collected were then classified into five categories starting from strongly agree to strongly disagree.

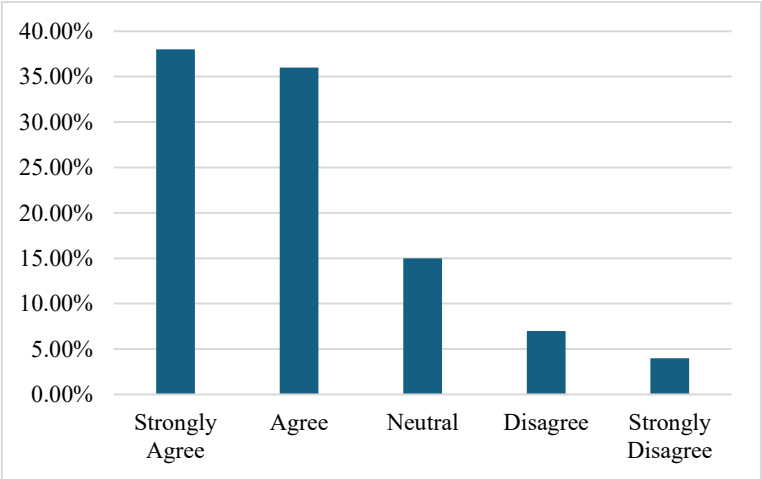


Figure 3: Graphical Representation of Percentage in Impact on IT System Efficiency

Table 3: Impact on IT System Efficiency

Respondents' Opinions	Frequency	Percentage

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Strongly Agree	**76**	**38%**
Agree	**72**	**36%**
Neutral	**30**	**15%**
Disagree	**14**	**7%**
Strongly Disagree	**8**	**4%**
Total	**200**	**100%**

The results reveal that 38% of respondents strongly agreed and 36% agreed that digital transformation improves IT system efficiency. However, 15% were neutral, 7% disagreed and 4% strongly disagreed. This means that most people (74%) have a positive view of digital transformation, and that digital technologies are beneficial to the faster processing of information, better use of resources and greater efficiency of the IT system.

4.4. Impact of Digital Transformation on System Performance

The effect of the digital transformation on the performance of the IT systems was assessed with five performance indicators: processing speed, system reliability, data management, operational productivity and service delivery. The respondents' perceptions of the contribution of digital technologies to the overall performance of an IT system were assessed using mean and standard deviation.

Table 4: Perceived Impact on IT System Performance

Performance Indicators	Mean	Standard Deviation
Processing Speed	4.18	0.76
System Reliability	4.05	0.82
Data Management	4.12	0.79
Operational Productivity	4.20	0.73
Service Delivery	4.08	0.81
Overall Mean	4.13	0.78

Operational productivity got the highest mean score of 4.20, according to the statistics, followed by processing speed (4.18), data management (4.12), service delivery (4.08), and system dependability (4.05). The results showed that digital transformation was generally well-received, with a mean score of 4.13 and a standard deviation of 0.78. The results of this study show that the usage of digital technology has a favourable impact on operating productivity, processing time, data management, and IT system performance.

4.5. Opportunities Associated with Digital Transformation

The potential benefits of using digital technologies in Information Technology systems were identified by analysing the major opportunities of digital transformation. The analysis included the aspects of improved operational efficiency, cost reduction, data management, customer services, innovation and productivity to gain insights into the extent of their role in development and technological advancements of the organisations.

Table 5: Major Opportunities of Digital Transformation

Opportunities	Frequency	Percentage
Improved Operational Efficiency	52	26.0%
Cost Reduction	38	19.0%
Better Data Management	42	21.0%
Enhanced Customer Services	36	18.0%
Innovation and Productivity	32	16.0%
Total	200	100%

The findings show that the most important opportunity is operational efficiency (26%), followed by the improvement of data management (21%), cost reduction (19%), improved customer services (18%) and innovation and productivity (16%). The results reveal a significant number of opportunities in digital transformation to optimise resources, improve data management and deliver better services, in addition to optimising operational processes. The findings point to the need for digital technologies to drive organisational efficiency and innovation.

4.6. Challenges Associated with Digital Transformation

The key barriers of digital technologies implementation were studied to understand the issues organisations are facing when it comes to digital transformation. The analysis focused on high implementation costs, the cyber security and data privacy risks, technical skills deficiency, and resistance to organisational change and technical integration challenges.

Table 6: Major Challenges in Implementing Digital Technologies

Challenges	Frequency	Percentage
High Implementation Costs	48	24.0%
Cybersecurity and Data Privacy Risks	52	26.0%
Lack of Technical Skills	38	19.0%
Resistance to Organisational Change	32	16.0%
Technical Integration Difficulties	30	15.0%
Total	200	100%

The results indicate that cybersecurity/cyber data privacy risks top the list at 26%, followed by high cost of implementation (24%), resistance to change in the organisation (16%), technological integration difficulties (15%) and lack of technical expertise (19%). This proves that there are various technological and organisational challenges facing the organisations in implementing digital transformation. For a successful implementation of digital transformation, therefore, it is necessary to ensure cybersecurity and employee training, and proper planning of finance and technology.

4.7. Relationship Between Digital Transformation and IT System Effectiveness

The correlation analysis approach was employed to establish the link between the adoption of digital technology and IT systems effectiveness. Several critical areas were considered: IT

systems efficiency, systems performance, effectiveness and productivity. The correlation coefficients and significance levels were established using the Pearson approach.

Table 7: Correlation Analysis

Variables	Correlation Coefficient (r)	Significance (p-value)
Digital Technology Adoption and IT System Efficiency	0.684	0.000
Digital Technology Adoption and System Performance	0.712	0.000
Digital Technology Adoption and Operational Effectiveness	0.658	0.000
Digital Technology Adoption and Organisational Productivity	0.695	0.000

The findings show positive relationships between use of digital technologies and all measures of performance selected. The system performance ($r = 0.712$) had the highest correlation with the research variables, followed by organisational productivity ($r = 0.695$), IT system efficiency ($r = 0.684$) and operational effectiveness ($r = 0.658$). Results of all relationships were statistically significant ($p = 0.000$, $p < 0.001$). The results indicated that the digital technology adoption strongly correlates with the performance and effectiveness of the IT system, in terms of efficiency and organisational productivity.

4.8. Chi-Square Test

The Chi-Square test was employed to examine the connection between the adoption of digital technologies and the effectiveness of IT systems. The goal of the analysis was to find out if the use of digital technologies had a significant correlation with the efficiency of Information Technology systems. The significance level used for the test was 5%The significance level for the test used was 5%.

Table 8: Association Between Digital Technology Adoption and IT System Efficiency

Particulars	Values
Chi-Square Value	12.684
Degrees of Freedom	4
Significance (p-value)	0.013
Level of Significance	0.05
Result	Significant

The p-value is 0.013, DF is 4, and the chi-square value is 12.684. The correlation is meaningful at the 0.05 threshold of significance, as the p-value of 0.013 is smaller. Thus, we may conclude that there is a statistically significant relationship between digital technology adoption and efficiency of IT systems, and we reject the null hypothesis. What this means is that digital technology is crucial in making IT systems more efficient.

4.9. Discussion of Findings

The results from the study show that there is a positive relationship between Digital Transformation and Efficiency and Performance of Information Technology systems. It can be noted that modern digital technologies are getting more and more important for IT sector: Cloud computing (24%) and AI/Auto (21%). Furthermore, 74% of respondents stated that digital transformation improves the efficiency of IT systems and, according to the mean performance rating (4.13), respondents are generally positive about the efficiency and performance of their systems and services. It is evident from the correlation analysis that the usage of digital technology had strong positive correlations with system performance ($r = 0.712$), organizational productivity ($r = 0.695$), IT system efficiency ($r = 0.684$) and operational effectiveness ($r = 0.658$).

Moreover, the study highlights that operational efficiency (26%) and data management (21%) are the largest opportunities with digital transformation. However, there are further pertinent concerns, such as hazards to data privacy and cyber security (26%), high implementation costs (24%), and a lack of technical skills (19%). A strong association between the utilisation of digital technology and IT system efficiency was shown by the Chi-Square test ($\chi^2 = 12.684$, $p = 0.013$). In general, the results confirm that IT system effectiveness and organizational productivity are increased by digital transformation but a successful implementation of digital transformation needs to be accompanied by appropriate cybersecurity measures, financial investments and technical expertise and effective organizational planning.

5. CONCLUSION

The study has found that digital transformation is positively affecting the efficiency, performance and effectiveness of IT systems significantly. The results showed that technologies like cloud computing, artificial intelligence, automation and big data analytics boost operational productivity, processing time, data management and service delivery. The key opportunity identified was the potential for improvements in the efficiency of operations, while key challenges identified were cybersecurity and data privacy risks and high implementation costs and lack of technical skills. Thus, organizations should pay attention to necessary technological investments, sufficient measures in cyber security, employee training, and efficient planning for successful digitalization and improving the overall performance of their IT systems.

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