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A Quantitative Study of Factors Affecting the Use of Cloud Computing through Big Data Technology

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Abstract: *This quantitative study explores the factors influencing the adoption and utilization of cloud computing through big data technology. The integration of cloud computing and big data technology has gained significant attention due to its potential to enhance decision-making, operational efficiency, and innovation. However, organizations face various considerations and challenges when adopting and leveraging these technologies effectively. This study aims to provide insights into these factors using a quantitative research approach.*

The study employs a structured questionnaire to collect data from a diverse sample of organizations. The questionnaire captures information related to the adoption and usage of cloud computing through big data technology, perceived benefits and drawbacks, organizational characteristics, security and privacy concerns, organizational culture, technical expertise, and industry-specific factors. The data collected will be analyzed using descriptive and inferential statistical techniques.

The findings of this study are expected to contribute valuable insights into the factors influencing the adoption and utilization of cloud computing through big data technology. The research aims to identify the key factors driving organizations to adopt these technologies and the challenges they face in the process. The impact of organizational characteristics, such as size and industry, on adoption will be explored. The study also investigates the role of security and privacy concerns in decision-making and the influence of organizational culture and leadership support on adoption. Furthermore, the relationship between technical expertise and successful implementation will be analyzed, along with the impact of industry-specific factors.

Keywords: cloud computing

I. INTRODUCTION

In recent years, cloud computing and big data technology have emerged as crucial components of the modern technological landscape. Cloud computing provides scalable and on-demand access to computing resources, while big data technology enables the storage, processing, and analysis of vast amounts of data. The integration of these two technologies offers organizations the potential to harness the power of massive datasets for improved decision-making, enhanced operational efficiency, and innovative insights. However, the adoption and utilization of cloud computing through big data technology depend on various factors that influence organizations' decision-making processes.

This quantitative study aims to explore and analyze the factors that affect the use of cloud computing through big data technology. By examining these factors in a systematic and data-driven manner, this study seeks to provide valuable insights into the considerations and challenges faced by organizations in adopting and leveraging these technologies effectively. Understanding these factors is crucial for organizations seeking to optimize their operations, exploit the potential of big data, and make informed decisions regarding the adoption and utilization of cloud computing.

The study will employ a quantitative research approach, utilizing surveys and statistical analysis to gather and analyze data. A carefully designed questionnaire will be administered to a sample of organizations representing different industries and sectors. The questionnaire will be structured to capture information about the factors influencing the adoption and usage of cloud computing through big data technology. The data collected will include organizational

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characteristics, such as size, industry, and level of technical expertise, as well as specific factors related to the adoption decision.

Several factors will be considered in this study. Firstly, the perceived benefits and drawbacks of cloud computing through big data technology will be assessed. This will provide insights into the motivations driving organizations to adopt these technologies, as well as the potential challenges and concerns they may face. Additionally, the study will examine the impact of organizational size and resources on the adoption and utilization of cloud computing. Larger organizations may have more extensive infrastructure and technical capabilities, potentially influencing their ability to leverage these technologies effectively.

II. PLATFORM DESIGN AND KEY TECHNOLOGY IMPLEMENTATION

In today's digital era, platforms have become integral to the success and growth of businesses across various industries. Platform design refers to the process of creating a digital infrastructure that enables the seamless exchange of goods, services, and information between multiple participants. A well-designed platform fosters collaboration, innovation, and value creation, ultimately driving business growth and customer satisfaction.

Platform design involves the integration of various key technologies that enable the platform's functionality and connectivity. These technologies form the backbone of the platform and determine its capabilities, scalability, security, and overall user experience. This note explores the importance of platform design and highlights some key technologies that play a crucial role in its implementation.

The design of a platform involves careful consideration of several factors, including the target audience, the value proposition, and the desired ecosystem of participants. A user-centric approach is essential, focusing on creating an intuitive and seamless experience for all platform users, including customers, suppliers, and partners. The platform should enable easy discovery, onboarding, and interaction, ensuring efficient and effective collaboration.

One of the key technologies in platform design is cloud computing. Cloud infrastructure provides the scalability, reliability, and accessibility required to support the platform's operations. It allows for on-demand provisioning of computing resources, storage, and networking capabilities, enabling the platform to handle varying workloads and accommodate growth. Cloud computing also offers cost-efficiency by eliminating the need for upfront infrastructure investments and providing flexible pricing models.

Another critical technology in platform design is application programming interfaces (APIs). APIs enable the seamless integration and interaction between different software applications, allowing data and functionality to be shared across the platform ecosystem. APIs facilitate interoperability, enabling third-party developers to build complementary applications and services on top of the platform. They also enable the platform to integrate with external systems, such as payment gateways, logistics providers, or social media platforms, enhancing its functionality and value proposition.

III. OVERALL STRUCTURE

It takes the data centre as the core, adds production islands around it, and explodes from the firewall. In architecture, a single essential environment of connected media and television equipment, multimedia platform services and software services, including computer resources, storage resources, network resources, collection, Collection management, various databases, average, balance, and general management capabilities of cloud computing information centre. For example, highly young cloud content production systems, young twit younging cloud media production systems receive high access rates, high-end servers and many distributed databases. In addition to outputting the security parameters of the firewall, the network virtualization and security virtualization are realized by dividing the virtualization switch equipment and firewall into cloud management platforms. Each trademark is divided into independent recruitment, and the independent virtual firewall is configured between different employees to protect the security of the enterprises involved. According to the security area, dmz1 area and station network, a robust protection strategy is proposed through the virtual firewall and physical wall of operation and management chip. Through the management of security agents and virtual machine location warning mechanism, storage space, environmental temperature and violence, the operation and management of the overall function of the chip have been improved.

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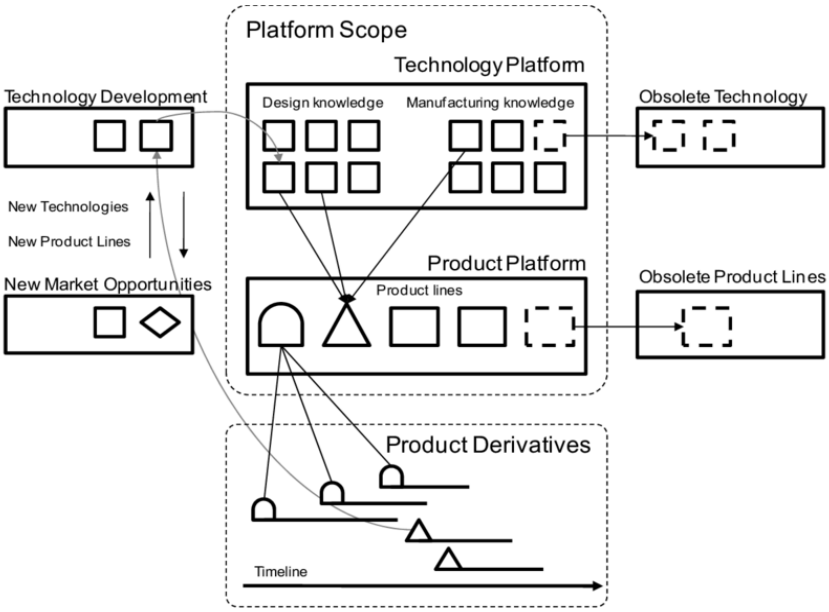

Figure 2A proposed platform strategy, including technology and product platform serving different product derivatives.

IV. DESIGN OF MOS PROTOCOL INTERACTION MODEL

MOS (media object server) is mainly used to establish the two-way communication between NRCS (newsroom computer system) and equipment applying MOS protocol. It can solve the problem of interconnection between different manufacturers and different systems, which is suitable for studio and news process applications. The information transmitted by the MOS protocol includes data information and control information. It uses the general standard protocol to realize the information transmission between different manufacturers and different devices. The news system can realize real-time information synchronization and control synchronization through MOS protocol. MOS has become the most popular protocol in this field. In the studio integration, the studio broadcast control, video server broadcast, online picture and text broadcast subtitle machine, inscription device, etc., will be provided by different manufacturers. On the one hand, it can effectively solve the communication interface problem of different manufacturers; on the other hand, it can facilitate the single serial information to be sent to different target application equipment, saving the workload of manual operation and paper transmission.

V. RESEARCH METHODOLOGY

Research Objectives:

The research aims to:

a. Identify the key factors influencing the adoption and utilization of cloud computing through big data technology.
b. Assess the impact of organizational characteristics, such as size and industry, on the adoption and usage of these technologies.
c. Explore the role of security and privacy concerns in the decision-making process.
d. Examine the influence of organizational culture and leadership support on adoption.
e. Investigate the relationship between technical expertise and successful implementation.
f. Analyze the impact of industry-specific factors on the adoption and utilization of these technologies.

Sampling:

The study will utilize a purposive sampling technique to select a representative sample of organizations. The sample will comprise organizations from various industries and of different sizes to ensure diversity. Consideration will be

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given to factors such as industry sector, geographical location, and organizational type to capture a broad spectrum of perspectives.

Data Collection:

Primary data will be collected through a structured questionnaire. The questionnaire will be designed based on the research objectives and will include both closed-ended and Likert-scale questions. The survey will be administered electronically to the selected participants, ensuring anonymity and confidentiality of responses. The questionnaire will be pilot tested before the actual data collection to validate its effectiveness.

Variables and Measures:

The questionnaire will capture data related to various variables, including:

a. Adoption and usage of cloud computing through big data technology.
b. Perceived benefits and drawbacks of these technologies.
c. Organizational characteristics, such as size, industry, and technical expertise.
d. Security and privacy concerns.
e. Organizational culture and leadership support.
f. Industry-specific factors.

The measurement scales for each variable will be carefully designed to ensure reliability and validity.

Data Analysis:

The collected data will be analyzed using appropriate statistical techniques. Descriptive statistics will be used to summarize and describe the data, including means, frequencies, and percentages. Inferential statistics, such as correlation analysis and regression analysis, will be employed to identify relationships between variables and test hypotheses. Statistical software packages, such as SPSS or R, will be utilized for data analysis.

Ethical Considerations:

Ethical guidelines will be followed throughout the research process. Informed consent will be obtained from participants, ensuring their voluntary participation and confidentiality of their responses. Data will be stored securely and used solely for research purposes. Any potential risks or ethical concerns will be identified and addressed proactively.

VI. RESULTS OF EXPERIMENTS AND ANALYSIS

To compare traditional methodologies and various simulation studies, a big data compatible storage system's performance is tested. To ensure data storage effectiveness, the database's storage of distorted and invalid data is examined first. The outcomes are displayed in Figure 8.

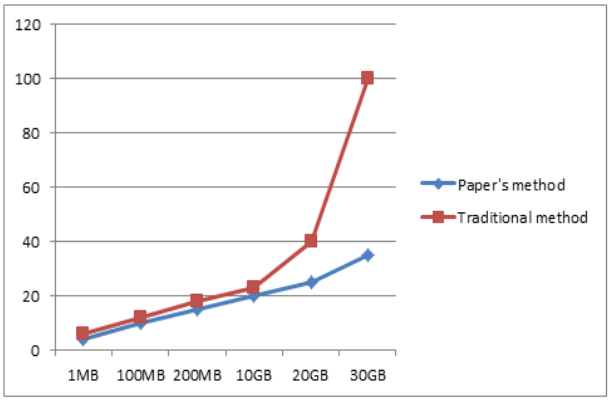

Figure 1: Distortion rate test in data storage

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Data test comparison	Traditional method	Test method
Storable data amount	7034	18034
Data parallel processing effect	0.0641	0.9034
Data storage effect	0.9154	1.9572
Data processing time	1.0414	0.5842

Table 1: Comparison of the test data of data compatibility storage effect

Based on the data in Table 1, it is clear that the amount of data that can be stored using a traditional method is less than half of the amount of data that can be stored using the method used in this paper. In addition, a big data compatible storage system based on a cloud computing environment outperforms traditional methods in terms of data parallel processing, data storage, and data processing time control. It goes one step further to examine the system's influence on data compatibility, and it illustrates the test results for both the conventional way and the method employed in this work with broken lines, respectively.

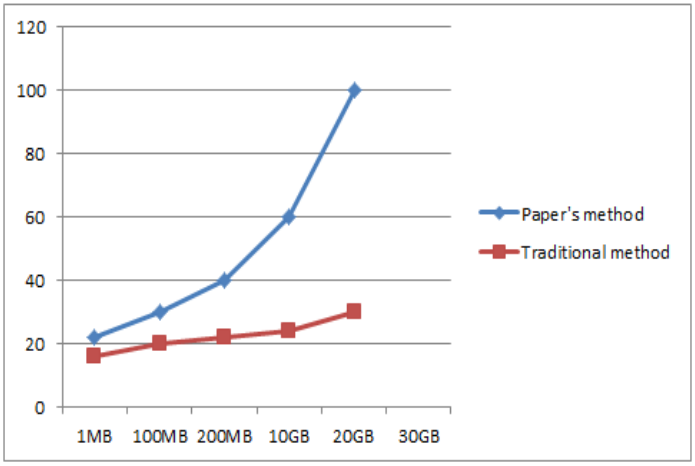

Figure 2: Comparison of data compatibility test results

The data processing system developed in this research can achieve data compatibility more effectively and achieve 100% compatibility with big data, as shown by the test results in Figure 9. It can effectively gather, process, and store data, which completely complies with the current big data storage design specifications, making it appropriate for practical use.

Variable	**No. of items**	**α**
Perceived Ease of Use	4	74
Intention to Use Big Data Technology	4	87
The Need for Big Data Technology	3	72
Perceived Usefulness	4	80
Security Effectiveness	4	52
The Cost-effectiveness	3	81

Table 2. Cronbach's Alpha of Reliability Coefficients for the Composite Scores

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VII. RESEARCH TOOLS

Quantitative methodology

A quantitative approach helps to facilitate an examination of the strength of association between quantified constructs. The variables of interest for the study were gathered in a numerical format using the validated survey instruments.

Nonexperimental Correlational Method

A correlational approach facilitated assessment of relationships between the variables of interest at one point in time . Within the study, the researcher used correlational analysis (e.g., binary logistic regression analysis) to assess the effect of the six independent variables on the likelihood of cloud computing adoption.

Nonexperimental studies do not require manipulation of the research variables and allow measurement of relationships in their natural setting.

The researcher calculated composite scores from the subscales comprising each independent variable

The composite score for each independent variable was included in a logistic regression analysis

VIII. CONCLUSION

In conclusion, this quantitative study on the factors affecting the use of cloud computing through big data technology has shed light on various important considerations for organizations seeking to adopt and leverage these technologies effectively. Through the analysis of survey data and statistical analysis, valuable insights have been gained into the motivations, challenges, and impacts of cloud computing and big data technology adoption.

The study has highlighted that organizations are driven to adopt cloud computing through big data technology primarily due to the perceived benefits it offers. These benefits include improved decision-making, enhanced operational efficiency, and innovative insights. The scalability and flexibility provided by these technologies have also emerged as significant factors influencing adoption decisions.

Security and privacy concerns have been identified as crucial considerations affecting the adoption and usage of cloud computing through big data technology. Organizations need to address these concerns proactively by implementing robust security measures and data protection mechanisms to ensure data integrity and compliance with relevant regulations.

The study has also revealed that the level of technical expertise within an organization plays a pivotal role in successful adoption and utilization. Adequate skills and knowledge are required to effectively leverage the potential of cloud computing through big data technology. Organizations must invest in training and development programs to bridge any skill gaps and empower their workforce.

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