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A Review of Cloud-based ERP in Security Perspective

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ABSTRACT
Enterprise Resource Planning (ERP) system provides a wide range of benefits and facilities to the organization whether small, medium or large in the current era. ERP systems can help organization to share and transfer data and information in all departments in an organization both inside and outside the organization. Data and information can be shared between departments in an organization can help improve the performance and productivity of a work process with the aim of achieving organizational objectives. Cloud computing is a computing model that operates through internet communication and can provide security features of scalability, reliability, availability with low operating costs of computer systems. Implementing the used of Cloud-based ERP systems through the internet can offer various advantages to organizations, although there are various difficulties and challenges to run Cloud-based EPR system, especially in aspect of data and system security issues. This paper discussed a review of explore the benefits and security challenges regarding the implementation of cloud-based ERP systems in organizations.

Keywords **-** Cloud, Cloud-based, Cloud Computing, Cloud-based ERP, Cloud-based Security

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I. INTRODUCTION

In this advanced era of technology, most organizations are willing to invest in high -tech tools and systems to assist employees in improving their performance and productivity as well as producing high quality products and services. In addition, the use of high-tech tools and systems such as Cloud-based ERP system can also reduce overhead costs and can help managers to make decision making by using Cloud-based ERP System. According to Baldini in his research mentioned, cloud-based services has become important to the industry to maintain and keep best performance for the productivity and able to achieve the competitive advantage among the sector of the industry [18].

II. LITERATURE REVIEW

Various studies conducted have highlighted some of the current perspectives that use cloud-based ERP system software by micro, medium and large organizations.

These include a support expertise perspective, a technology perspective, and an economic perspective, which each address efficiency issues in IT parity, systems evaluation processes and financial issues in organizations.

Previous studies conducted exclusively have provided various insights and aspects that are beneficial in implementing cloud-based ERP, such as comprehensive business process model proposals, insights into real-time in transactions, data integrity issues, information retrieval accuracy, and management effective information.

Seethamraju in his research mentioned that, the low total cost of ownership, low investment cost and supplier participation in product improvement and value of co-creation is important. This potential determinants proposed by Seethamraju using a cross-sectional field study.

III. METHODOLOGY

A systematic literature review performed as proposed by the researcher Kitchenhan. The selection of papers was performed in Jan 2019. Hence, we covered studies published up to that time.

To ensure that all of the research papers selected are precisely, Pre-defines a set of keywords of inclusion or exclusion criteria being used. The objective for this process is to reduce the selection of research papers are not bias and to ensure that the scope for the research papers selected are fits to the scope. [15][16]

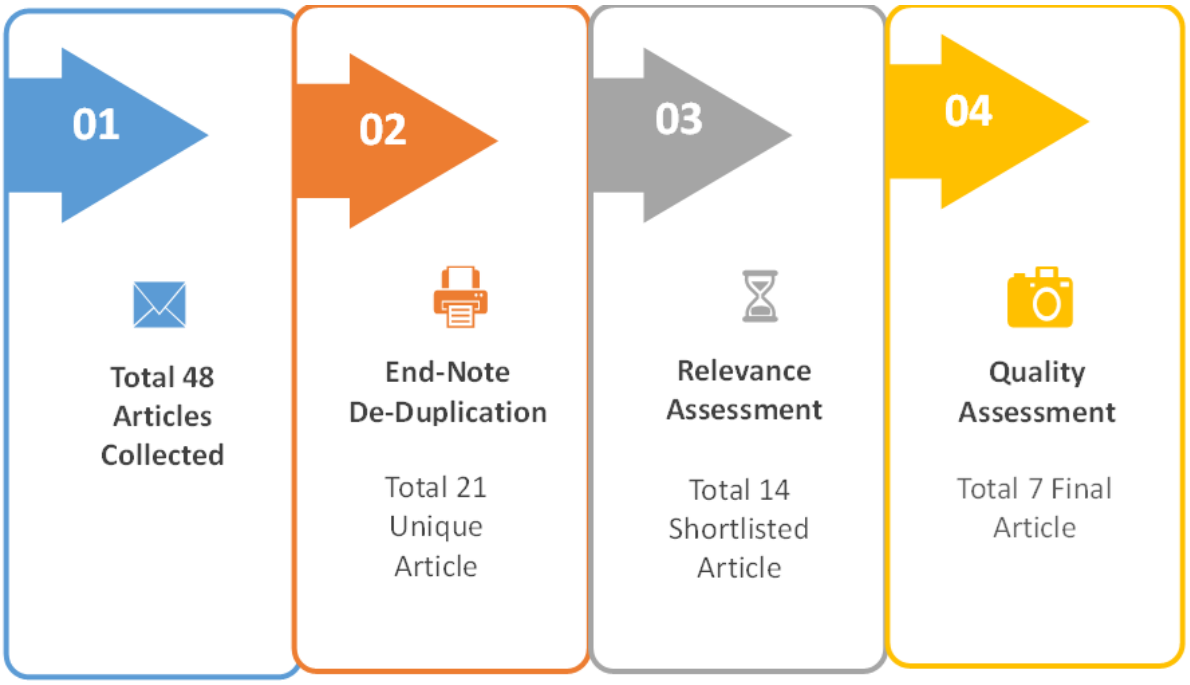

Figure 1: Identification and Selection Procedures for Research Article Papers.

IV. CLOUD-BASED ERP SYSTEM

The advantages of cloud-based ERP system can provide convenience to staff in the organization to achieve more accurate and efficient information to provide the services needed by customers in order to provide a more competitive advantage with organizations that operate traditionally.

According to Khalik & Jorge in their research mentioned that, the cloud-based model is keep increasing in order to provide benefits to an organization [1].

Table 1: Data Security Issues.

Security Issue	Confidentiality	Integrity	Availability
Lack of Data Control	√		
Lack of Staff Control from Cloud Provider	√		
Uncertainty on Data Storage Arrangements	√		
Lack of Control Over Security Protocols and Standards	√		
Lack of Uniformity on Stored Data		√	
Information Leakage by Third-parties over Organization using Cloud Providers		√	
Lack of Trust between the Cloud provider and Client		√	
Beware of Provider's Transaction Management Standards		√	
Depends on Cloud Provider			√

According to the information collected as shown in Table 1 , it is shown that Security issue is remains a major concerns should consider in order to implementing Could-based ERP System. Authentication is a process to verifying and making sure about the user information registered with the system is match. This is mean that the user get authenticity when in integrity aspect and both are subset together. According to Khin Su and Thanda in their research mentioned that Brute Force Attack is the big challenge for the user authentication securely login to the system and users require a stronger encryption technique that able to against resistance of brute force attacks [19].

Table 2: Major Security Issues Concerns

	(Salih et al., 2021) [12]	**(Eya & Weir, 2021) [15]**	**(Huang et al., 2021) [17]**	**(Hustad et al., 2020) [8]**	**(Hrischev, 2020) [6]**	**(Ahn & Ahn, 2020) [2]**	**(Egbon, 2020) [4]**
Security Concerns	√	√	√	√	√	√	√
Regulatory or Compliance Issues	√	√	√	√	√		√
Reliability Concerns in Service Availability Aspect	√	√		√	√	√	
Concerns Cloud-based Cannot Support the Operational	√	√	√	√		√	√
IT Governance Issues (including challenges related to defining standard services)	√	√	√	√	√	√	
Immaturity of Cloud	√				√	√	√

Table 2 shows that, majority of the researcher finding that the Security Issues of Cloud-based ERP System is the concerns for implementing in the organization. Next, the issue of regulatory or compliance also consider as a major concerns for implementing the Cloud-based ERP System in an organization. According to Kelvin mentioned that staffs of an organization is responsible to make sure all of the policy, regulations and procedures must comply by every users in the organization. To achieve this objective, staffs training for the system policy, regulations and procedures is necessary [18].
As mentioned by Sorheller, Saa and Razzaq, data security in cloud-based ERPs is the major concerns by the micro, small, medium and large size organizations. Security concern is the major concern because data protection for the sensitive information such as financial statement or customer information store to the cloud-based storage is reliable to the third party provider for safe keeping the organizations important and sensitive information to the cloud-based ERP system. Therefore, a secure and comprehensive encryption and decryption system is for provide cloud-based ERP solution is an essential [7][11][10][13].

V. QUALITY OF SERVICE (QOS)

Quality of Service (QoS) is an important principle to provide quality services to users of cloud-based systems, especially for cloud-based ERP systems. There are various cloud-based service models today, such as Software as a Service (SaaS), platform as a service (PaaS), and Infrastructure as a service (IaaS). Therefore, QoS must be constantly monitored and improved in order to achieve the set QoS index, especially for the aspect of user acceptance [14]. Table 3 is shown the comparison of the traditional ERP system with the current and expected cloud-based ERP system.

Table 3: Comparison of Traditional ERP System, Current and Expected Cloud-based ERP System.

	Traditional ERP System	**Current Cloud-based ERP System**	**Expected Cloud-based ERP System**
System Usage	Complex	Moderate	Easy
Implementation Cost	High	High	Moderate
Maintenance Cost	High	High	Low
Time Access to System	Slow	Moderate	Fast
Licensing	Paid	Subscription	Open Source

VI. CONCLUSION

Cloud-based ERP system is a system that combines all ERP modules and all transactions, business processes are done online, and all data is stored in an internet store. With the expansion of the Information Technologies aspects, cloud-based ERP system is the potential to growth and provide high speed productivity for organizations in any industries. Therefore, the expected cloud-based ERP system must provide easy system usage, moderate implementation cost, low maintenance cost, fast time accessing to the system and free for open source licensing is the important parameter to consider for implementing the cloud-based ERP system.

Data security is also an important aspect and presents the most significant concern in the context of cloud-based ERP systems. In this study, it was found that most of the articles stated that data security is an aspect that needs to be emphasized and needs an encryption and decryption system to protect the data during online transactions and data stored in cloud-based storage. There are various reasons why organizations are concerned about data security in cloud-based systems. One of the important aspects for organizations to worry about is data security because, sensitive data is an asset for an organization and will cause losses if the strategy to protect business information is not closely monitored. This also includes the use of encryption and decryption techniques in the protection of sensitive data for an organization that uses a cloud-based ERP system.

In this study, it has shown that there are gaps in the literature with respect to the implementation of cloud-based ERP systems compared with the size of the organization. Johansson and colleagues identified in their study that SMEs and large businesses are currently facing different challenges regarding the implementation of this cloud-based ERP system [17] and mentioned that there is too little research comparing them. Therefore, this has confirmed that the matrix we shared is valid. Therefore, We suggest that more studies need to be done in this direction [3][7][8][9][11].

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