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Xiaotian Qi (✉ ivytian0818@sina.com)

HuaXian Ministry Agricultural rural affairs YiNong operating center

Shanmugan Joghee

Skyline university

Abdul Salam Mohammed

Skyline university

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E-Commerce Combined with Enterprise Management using Cloud Computing for Business Sector

Xiaotian Qi ^{1*}, Shanmugan Joghee ², Abdul Salam Mohammed ³

^{1*}HuaXian Ministry Agriculture Rural Affairs YiNong Operating Center, HuaXian, HeNan 456400, China

^{2,3}School of Business, Skyline University College, Sharjah, United Arab Emirates

*Corresponding author : ivytian0818@sina.com

Abstract

In the techno world of today, with the rapid advancement of new economic construction, a diversity of information expertise is emerging. Through implementing the advanced cloud computing business model, enterprises have resolved the problems with the shortage of capital, workforce, and technology, which are vital in e-commerce operations to handle the conflict with the e-commerce undertakings of enterprises and the scarcity of resources. Cloud computing can play a critical role in increasing business processes through e-commerce applications, leading to higher financial value for enterprises. Hence, in this paper, Cloud Computing assisted Enterprise Resource Planning (CCAERP) has been proposed to base on an e-commerce application for enterprise management. Currently, most internal e-commerce systems and ERP systems are relatively autonomous. Nevertheless, a single method of operating proved capable of satisfying the requirements of business growth with growing fierce market competition. Effective enterprise resource planning and e-commerce convergence have been one of the subjects of business growth in the new era. This paper first analyzes the relationship between Enterprise Resource Planning

and e-commerce and then examines and explores the incorporation requirements and feasibility of the enterprise.

Keywords: E-commerce, Enterprise management, cloud computing

1. Research overview on business enterprises

In today's business enterprises, Information Technology plays an important part, and it is useful to create products and services for their customers [1]. Currently, through innovation in IT has driven enterprise organizations to rely on the use of advanced technology to meet the technological demands of the company, help their services, goods and serve their operating needs to create a broader information and resources infrastructure [2]. E-commerce is an e-business subset that may define e-Commerce as selling and buying over the Internet of goods and services [3]. In e-commerce, the emphasis is on digitally powered transactions between companies and individuals [4].

E-commerce involves value exchange (it is necessary) since no transaction exists without value exchange [5]. A significant aspect of electronic commerce is the rendering of Internet money by company purchases [6]. Mostly, the unique elements of e-commerce technologies must be well understood [7]. Maintaining a competitive advantage depends on fast innovation and digital business transformation on modernization and the replacement of traditional systems with new technologies [8]. Although this necessity is expanding throughout the business, particular attention is being given to SMEs [9]. These small businesses drive the economy increasingly and typically fail to achieve innovation and competition [10]. A cloud is a sort of parallel and centralized network consisting of the dynamically supplied set of interconnected and virtualized resources as one or more fused computing services depending on the service level contracts formed by negotiation between the provider and the customers [11]. Online computing is an open resource that helps businesses to meet their criteria and goals [12]. Cloud computing is a great tool to benefit the enterprise, particularly in small companies [13]. All companies must respond to competition and

provide incentives to make better use than competitors of internet services [14]. Cloud computing will enable businesses to concentrate on creating successful business applications of actual business benefits [15].

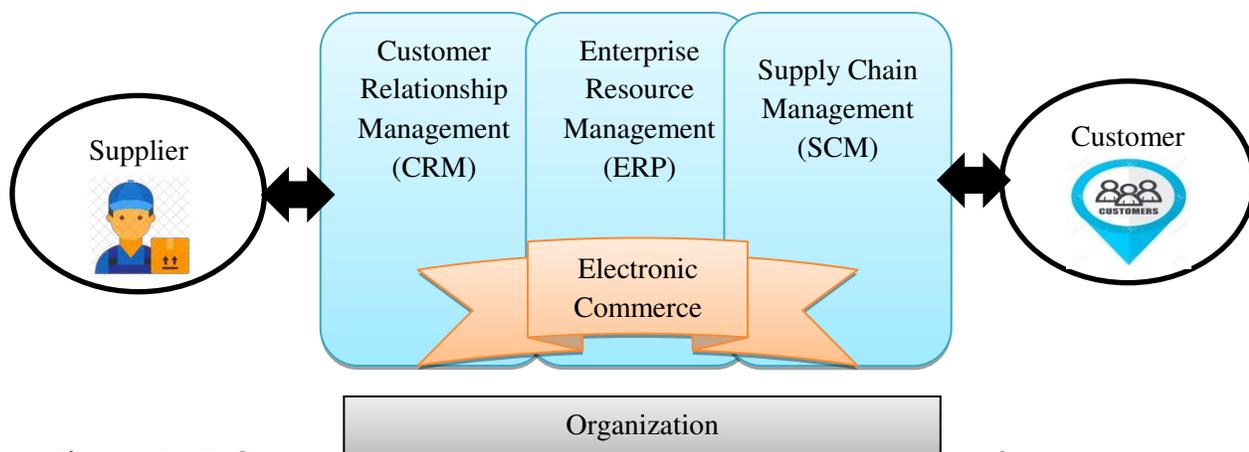


Figure 1: E-Commerce by Integrating Enterprise Management

Figure 1 shows the e-commerce by integrating enterprise management. Electronic commerce is the external management of the company's resources. The business cycle of downstream and upstream partners is involved, as well as brand marketing, online sales, and other businesses [16]. It includes Customer Relationship Management, Supply Chain Management, and the management of product development. In other words, Electronic commerce is based on Enterprise Resource Planning applications, and ERP is to support e-commerce' activities [17]. The same applications are needed in e-commerce, and for the essential subsidiary platform for the growth of companies that are vital elements in the construction of company information. Enterprise resource planning is the platform to develop electronic commerce [18]. ERP deals with planning for logistics resources, internal production, and distribution of other resources [19]. E-business is the association between the company and the world of networks, depends on the Internet, enables customer contact, sales orders, and physical profits to be improved. Both structures are closely connected and compatible functionally. It can not necessarily consider them as two separate items,

because of the interconnectivity of e-commerce and ERP. It must utilize the point of contact to recognize and research them [20].

In this paper, Cloud Computing Assisted Enterprise Resource Planning (CCAERP) has been proposed and based on an e-commerce application for enterprise management. Cloud ERP is regarded as a business software package that promotes reconciliation of company processes and transfers the information throughout the association through a platform that allows connectivity to be insignificant institutional or limited co-operative activities and beneficial platform. The ERP cloud is seen as a new factor in the market. During operational management, ERP Software brings some financial benefits to the user. Economic aids for Enterprise Resource Planning users are higher than non-users. Enterprise Resource Planning Systems manage information and data resources in enterprise organizations. The data are stored in shared and centralized data stores. Data is an essential resource for companies, and it is critical, from this perspective, that all details in the company's IT system be accessible in real-time. The importance of the ERP system is mobility. Cloud computing and SaaS can be used to operate at a low cost. Cloud computing is simply a virtual operating device web-service edge.

The significant contribution of the study is,

- To propose Cloud Computing Assisted Enterprise Resource Planning (CCAERP) based on e-commerce application for enterprise management.
- Designing the statistical model for storing the data in the cloud platform and effective solution of ERP.
- The numerical results have been performed, and the proposed method enhances performance and efficiency when compared to other existing approaches.

The rest of the paper organized as follows: section 1 and section 2 discussed the overview and existing works on e-commerce and enterprise management. In

section 3, Cloud Computing Assisted Enterprise Resource Planning (CCAERP) has been proposed. In section 4, numerical results have been performed. Finally, section 5 concludes the research paper.

2. Related Survey

Mingwu Zhang et al. [21] proposed the Accountable mobile e-commerce transaction (AMECT) in an intelligent cloud system. The concrete construction is recommended, and they show that the suggested method can deliver effective safety in the transaction procedures and allow the practical positioning of smart information services in cloud computing systems. They conduct and show that the study in terms of computational problem difficulty and communication costs is effective and functional compared with similar approaches. They have provided the concrete concept and evaluated security. Their scheme is more practical and efficient compared to the related scheme.

M. S. MuraliDhar et al. [22] suggested the Policy-Oriented Secured Service Model (POSSM) for the electronic commerce applications in cloud computing. The proposed model is a combination of an efficient, intelligent coding system, and a trust-aware policy algorithm. The dynamic, policy-oriented service is used by the cloud service provider to distribute the demand of the cloud user, and an intelligent agent is used to store data safely in the cloud database using an efficient and encryption method. The recommended model guarantees reliability, scalability, and security for storing data and connections to resources in e-commerce.

Hsien-Yu Lee et al. [23] initialized the web-based enterprise resource planning (e-ERP). In this paper, they discussed the development of electronic commerce and enterprise resource planning by referencing to internet technology and some main web topics. They often explore the implications of this proposed approach based on an open model – view – controller E-ERP and service distribution tools. They discuss the uses of cloud services and models for the

efficient hosting of a reliable ERP platform, based on information systems architecture's evaluation and results. Moreover, they address various comprehensive models of the creation of web applications from technological and market perspectives in a comparative sense focused on a study of literature and associated emerging technologies. As the findings of the deployment show, the method can be used to host a secure cloud ERP effectively.

Xiaoli Du et al. [24] introduced the K-means Algorithm (KMA) for business intelligence based on big data in electronic commerce data analysis. In the context of large data, the usage of data mining knowledge will take maximum advantage of business opportunities. Furthermore, to offline sales, a variety of companies often carries out online transactions with distinctive benefits, and they collect details concealed from massive e-commerce data, access to that details, and target ads for different client classes. This study primarily revises the benefits in the data analysis of electronic business companies of extensive data and traditional business intelligence, focusing on the K-Means clustering analysis algorithm and its implementation on customer consumption data mining on e-commerce websites. The study of clusters divides clients into three categories. It lets businesses classify consumers, to accomplish differentiated marketing goals, according to the attributes of different customer classes.

K.H. Leung et al. [25] proposed the Fuzzy Association Rule Mining Approach (FARMA) for the B2B flexible pricing DSS for handling the demand for quotation progression under the electronic commerce corporate environment. B2B electronic commerce retail companies, explicitly Smart-Quo, have been implemented and developed in a pricing DSS based on Business to Business electronic commerce. A six-month test period demonstrates that pricing decisions on each commodity have greatly increased in performance and efficacy. The study shows that artificial intelligence techniques can be applied

to marketing management in the current digital age and can be of potential benefit.

To overcome these issues, in this paper, Cloud Computing Assisted Enterprise Resource Planning (CCAERP) has been proposed and based on an e-commerce application for enterprise management. External and internal relations are directly linked between e-commerce and ERP for enterprises. A successful business information system has the quality of sustaining, even if very delicate modifications are directly transferred to other correlated links during the actual function. When ERP is out of touch with electronic commerce, many essential data will be contained in a relatively independent model. Therefore, the business performs redundant work, contributing to reduced job performance and increased operational costs. The state of enterprise resource planning and e-commerce alone has, therefore, been unable to satisfy corporate development desires. The incorporation between e-commerce and ERP based on cloud computing would lead to the complete convergence of supply chain management, consumer service, market analytics, e-commerce, and enterprise automation. This leads to the sharing of resources and data. Electronic Commerce and ERP integration are, therefore, necessary.

3. Cloud Computing assisted Enterprise Resource Planning (CCAERP)

In this paper, Cloud Computing Assisted Enterprise Resource Planning (CCAERP) has been proposed and based on an e-commerce application for enterprise management. Electronic commerce is a widespread and growing Web app that makes it possible for partners, customers, and employees to meet a wide range of objectives and services. The Electronic Commerce association typically describes e-commerce as: "electronic business involves any commercial transaction or knowledge exchange or administrative activity, carried out by using the application of knowledge and communication." Commonly, Electronic commerce can be classified as Business to Business Electronic commerce (B2B Electronic commerce): The Electronic transactions between

Enterprises, Consumer to Business E-commerce (C2B Electronic commerce): Consumers can sell products to the Enterprises, Consumer to Consumer E-commerce (C2C Electronic commerce): The Electronic payments between consumers itself, Business to Consumer Electronic Commerce (B2C Electronic commerce): Enterprises can sell to the consumers directly. Enterprise Resource Management is primarily a collection of integrated procurements, which may be used by a company to store and monitor data, including manufacturing, promotion, and distribution, inventory, shipment and payment, the expense of product preparation and development, over a term of time. The development of the Internet offers new ways for SMEs to grow operations. However, the virtual characteristics of the Internet often present unique challenges, and SME websites have even less confidence and reputation. The efficient deployment of network infrastructure environments like wireless sensor networks, e-commerce, and social networks are affected by the trust as a key factor. To these companies, it is important that how they build trust and establish a presence in online markets. In recent years, computing enterprises, management society, and service science have been focused on theoretical models linked to reputation and trust. A new computing system for B2C electronic commerce is introduced in this study called Dynamic trust and reputation. In the suggested design, complex trust and reputation assessment processes for Business to Consumer electronic commerce are implemented by utilizing a statistical model.

Preposition 1: Direct Trust Model

Solution 1: The direct trust computation task f_{dir} can be stated by

$$f_{dir} = f(R_e(t), R_b(t), R_q(t)) \quad (1)$$

As shown in equation(1) where $R_e(t)$, $R_b(t)$, and $R_q(t)$ are trust values regarding atmospheres, the service provider, the values, and service clients, which are restricted in the field $[0,1]$, and t is time. If the explicit equation form (1) is used

with a simple multifunction, the direct trust assessment function f_{dir} can be expressed by

$$f_{dir}(t) = R_e(t) * R_b(t) * R_q(t) \quad (2)$$

In the progression of development of the values of $R_q(t)$. There are three significant levels: improvement phase, establishment phase, and stabilization phase. The derived function of $R_q(t)$ can be replicated by the following expression,

$$\frac{dR_q(t)}{dt} = \beta \left(1 - \left(\frac{e^{\beta t} - e^{-\beta t}}{e^{\beta t} + e^{-\beta t}} \right)^2 \right) \quad (3)$$

As inferred from the equation (3) where β is the variable of the derived function of $R_q(t)$. From equation (3), $R_q(t)$ can be resolved by

$$R_q(t) = \frac{e^{\beta t} - e^{-\beta t}}{e^{\beta t} + e^{-\beta t}} \quad (4)$$

As discussed in equation (4) where $R_q(t)$ are the transformation of a hyperbolic tangent, and its derived function demonstrates that in the trust formation phase, the value of trust does not improve continuously. Thus, expression (4) pretends the progressions of the development of trust values. The derived function of the progress of the value decrement $R_q(t)$ can be expressed as

$$\frac{dR_q(t)}{dt} = -\beta \left(1 - \left(\frac{e^{\beta t} - e^{-\beta t}}{e^{\beta t} + e^{-\beta t}} \right)^2 \right) \quad (5)$$

The respective function $R_q(t)$ can be resolved as

$$R_q(t) = \frac{e^{-\beta t} - e^{\beta t}}{e^{-\beta t} + e^{\beta t}} \quad (6)$$

There are two levels of decrement progressions. In the initial level, values of $R_q(t)$ fall rapidly. Further, the values of $R_q(t)$ will be comparatively small.

Proposition 2: Reputation Computation Model

Solution 2: As the suggested B2C e-commerce reputation scheme is focused on other customer services, and buyer trust review records, firstly, the trust value measurement process is addressed for various categories of service customers. The integrated reputation model that incorporates the multiple trust values is

then introduced. The dynamic trust computation function f_{dir} can be expressed by

$$f_{dir}(t) = R_e(t) * R_b(t) * \frac{e^{\beta t} - e^{-\beta t}}{e^{\beta t} + e^{-\beta t}} \quad (7)$$

As discussed in equation (7) where values of $R_e(t)$ is preassumed constant B, and $R_b(t)$ is relative to service clients. Let's assume $R_e(t)$ indicates three categories of service clients, that is conservative, cautions and risk-taking, which can be expressed by,

$$R_b(t) = R_b = \begin{cases} G, & \text{if service client is risk taking} \\ N, & \text{if service client is cautions} \\ K, & \text{if service client is conservative} \end{cases} \quad (8)$$

As inferred from equation (8), where G, N, and K denotes the risk-taking, cautions, and conservative correspondingly.

In the suggested model, the trust value lifetime is often taken into account. For time-sensitive trust evaluation, weight function consistent with lifetime is utilized. The latest trust value is significant. Weight function $S(t)$ can be stated as the following expression,

$$S(t) = \lambda^{t-t_0} \quad (9)$$

As derived in equation (9) where $\lambda \in (0,1)$ is a weight factor, $t \geq t_0$, and t_0 is the reference endpoint time. The trust value of weighted calculation function f_{dir} is

$$f_{dir}(t) = B * R_b * \lambda^{t-t_0} \frac{e^{\beta t} - e^{-\beta t}}{e^{\beta t} + e^{-\beta t}} \quad (10)$$

Figure 2 shows the service-oriented network circumstances based on trust records. There are M overall service clients, and the reputation assessment calculation articulate $r(t)$ can be expressed as,

$$r(t) = \frac{1}{M} \sum_{j=1}^M f_{dir}^{(j)} = \frac{1}{M} B^{(j)} * R_b^{(j)} * \lambda_{(j)}^{(t-t_0)} \frac{e^{\beta^{(j)} t} - e^{-\beta^{(j)} t}}{e^{\beta^{(j)} t} + e^{-\beta^{(j)} t}} \quad (11)$$

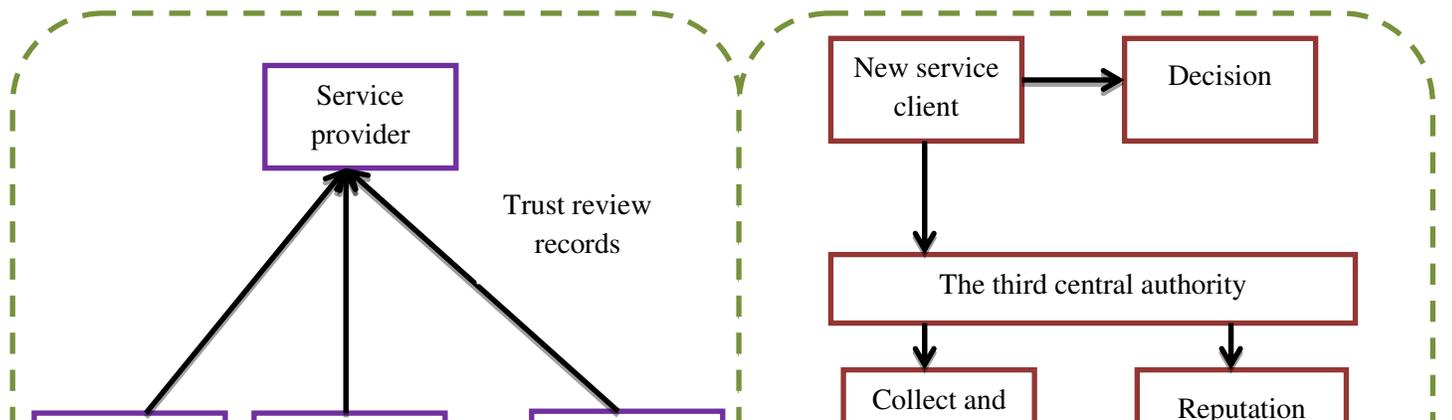


Figure 2: Service-Oriented Network Environments

Cloud infrastructure is a new model, which may not physically extant computing means such as management, storage, and memory on the user 's site. The service company then maintains and operates such services that customers have access to them through the Internet. Amazon Web Services, for example, allows customers to store personal information with its Simple Storage System (S3) and to conduct computer comparisons through the Elastic Compute Cloud (EC2). In utilizing these application systems, the company would benefit. Some of the benefits may be a lower initial investment in capital, shorter times for start-ups, lower maintenance and operations costs, efficient use by virtualization, and most importantly, more uncomplicated recovery from crises. All these points create a striking option for cloud computing. Reports show that computers will migrate to the cloud with several advantages. The key cause of cloud storage drawbacks is insufficient capacity and bandwidth. Cloud computing can effectively be utilized to save energy on smartphones, although it presents certain distinctive challenges. Mobile systems have become the primary computing stage for several users, such as smartphones. As a modern market paradigm, cloud infrastructure has a significant influence on the whole of the Information Technology industry.

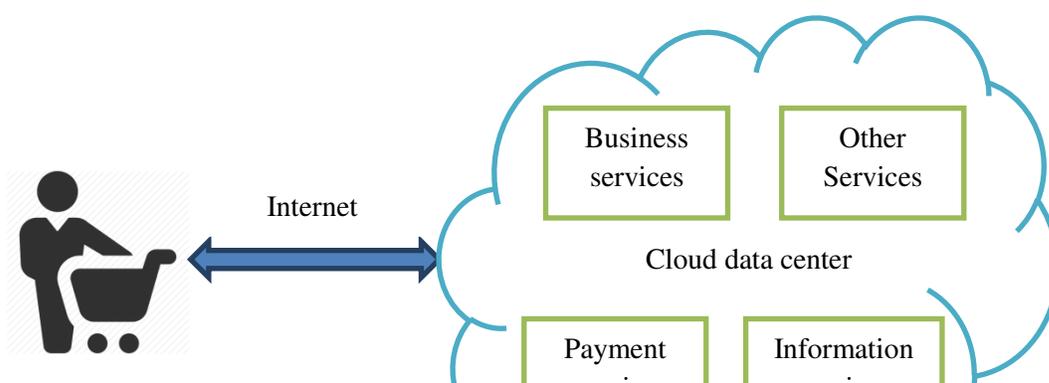


Figure 3: Interaction between the Cloud Server and Mobile Client

Figure 3 shows the interaction between the cloud server and the mobile client. Cloud computing is integrated into all enterprise applications and represents the interest in a profound way. With the help of the rapid growth of cloud computing, organizations may access with greater end Information Technology resources at reduced cost and even access high-performance Information Technology equipment like huge businesses through small and medium-sized firms. Simultaneously, the reduction of IT burdens can help companies focus on their core business. Cloud computer-led process management will accomplish the overall IT quality and efficiency over a large-scale rebuilding of the sector.

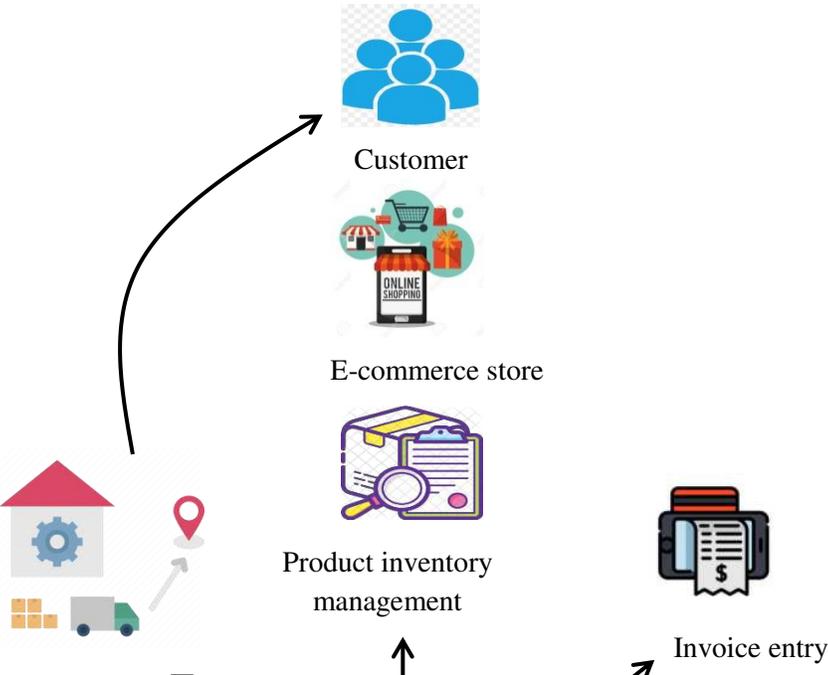


Figure 4: E-Commerce ERP integration benefits

Figure 4 shows the electronic commerce and Enterprise Resource Planning integration. The feasibility of Enterprise Resource Planning and electronic commerce integration can be derived from ERP 's association with e-commerce, which is based on Enterprise Resource Planning's creation. ERP was the e-commerce help program. Thus, the detailed connection between Enterprise Resource Planning and electronic commerce can be defined as: based on the supply chain compatibility, on the significance of customer relations, and many more. Enterprise Resource Planning and electronic commerce are linked to the business development restructuring and require the re-division and integration of Enterprise Resource Planning and electronic commerce application software. The combination of ERP and e-commerce is progressing in the current market world such that the management of companies has become mindful of the effect of globalization on the fundamental profitability of undertakings. Thus, the integration of Enterprise Resource Planning and electronic business is entirely reasonable from the integrated demand viewpoint. To bring these two features into integration. In

the area of Enterprise Resource Planning, priority is given to modules that are narrowly linked to capital flow and logistics, including production procurement plans, marketing, and sales and stock and finance; website management modules, online selling module, online buying module, and online payment module should be taken into account in the field of electronic commerce to form a modern application arrangement, both modules shall be integrated.

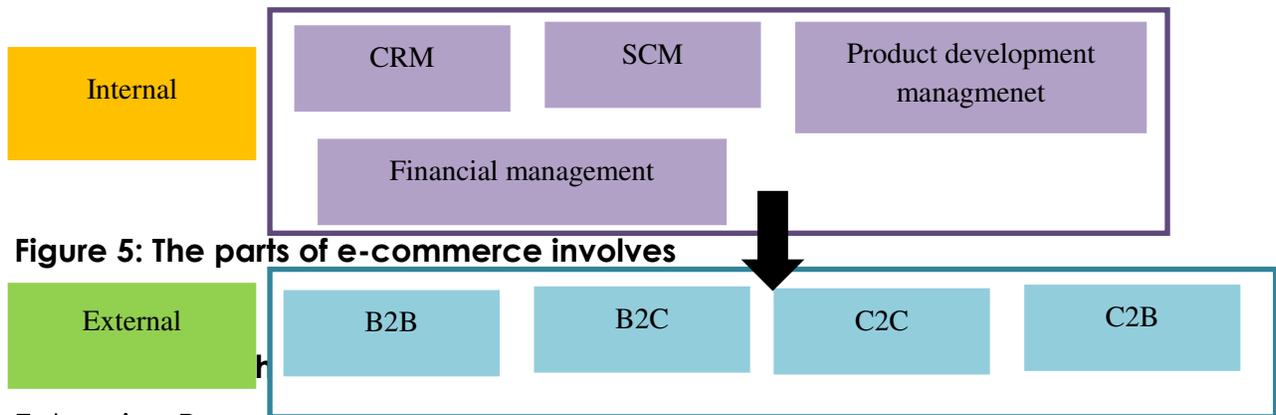


Figure 5: The parts of e-commerce involves

Enterprise Resource Planning and electronic commerce incorporation involve the cooperation of the entire business. Companies have to continue to enhance the existing business schemes and rearrangement, modify employee structures, and conventional work practices to develop a modern business viewpoint. Temporarily, changes in the business scheme will have profound impacts on the architecture of e-commerce, endorsing the growth of the electronic commerce structure to aid the business better. Such an organizational transformation would create a virtuous circle between. Enterprise Resource Planning and electronic commerce, which would endorse all sides' coordinating growth and the sustainable creation of companies.

4. Numerical Results

(i) Adaptability Ratio

To ensure sustainability in this open environment, enterprises must be interoperable and to be able to exchange knowledge at the technological level and the company level quickly through organizations, adaptable to specific network conditions across all phases of the life cycle. However, enterprises face issues with the exchange of valuable information, even while working in related business contexts, due to various specific frameworks, semanticists, and information systems. In the end, market dynamics result in failure of harmonization, leading to the loss of the stability of the interoperable environment of the enterprise. Adaptability and dynamic potential for analyzing, designing, and testing responses and approaches for structural and organizational changes that may be needed to create a new degree of consistency in the collaborative network. The proposed CCAERP method enhances the adaptability ratio. Figure 6 displays the adaptability ratio using the suggested CCAERP model.

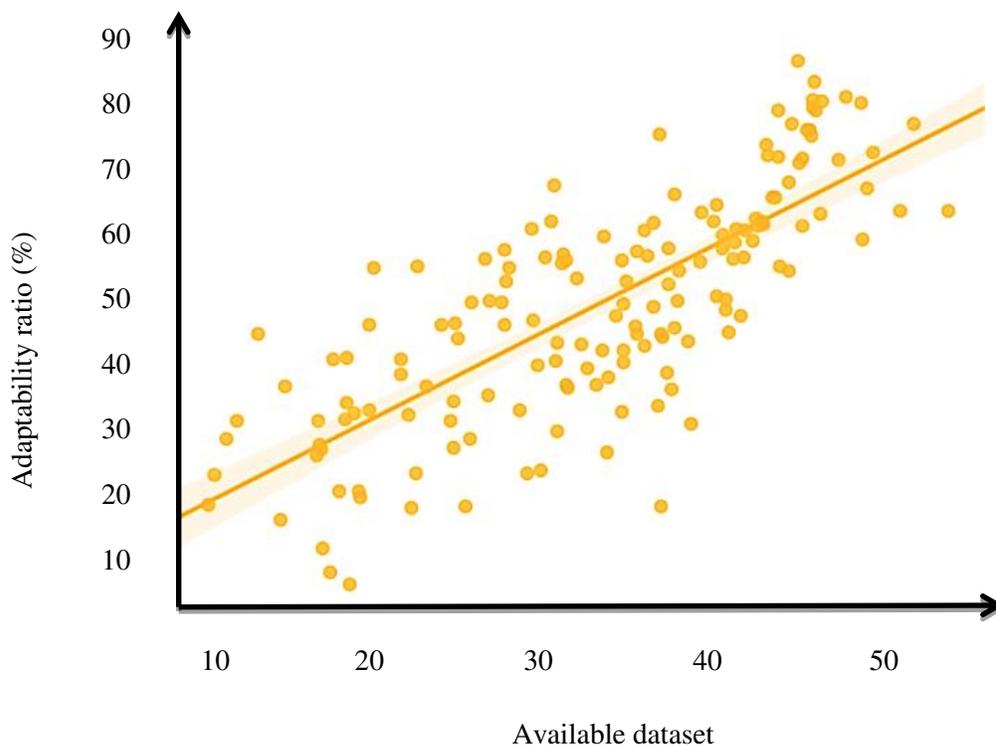


Figure 6: Adaptability Ratio

(ii) The total sales improvement rate

E-commerce provides 24X7 online customer services, both for presales and post orders. This allows companies to improve trust and brand loyalty among their clients. Inventory is one of the most significant advantages of online business. The vendors do not have to store the full variety of items listed on their pages; instead, they can buy the same as they do when the consumer buys. For B2B and B2C, internet businesses provided an unlimited ability to both buyers and sellers to trade, saving them time and energy without traveling to each other's country. It helped to deliver excellent quality goods at much more competitive rates due to reduced selling costs. The world of today moves from a sales market to a buyer market, and e-commerce has played a major role in this change. Figure 7 shows the total sales improvement rate using the proposed CCAERP method.

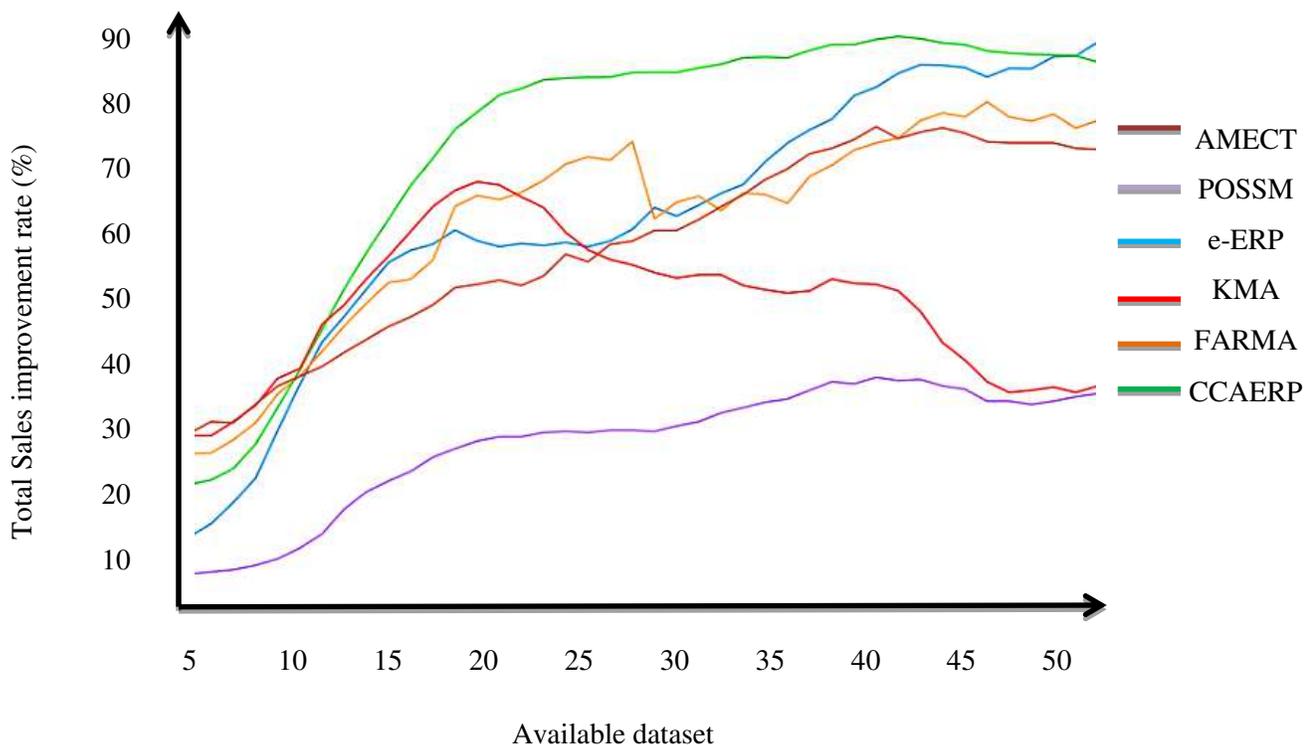


Figure 7: Total sales improvement ratio

(iii) Performance ratio

Typically, cloud enterprise resource planning provides more performance than on-site ERP. For best network performance Cloud ERP is built on the ground by suggesting improved usability as opposed to traditional ERP systems. ERP offers optimized performance, which can be based on the requirements. Cloud computing provides a real way to run these ERP management systems within the Cloud, without costly and time-consuming improvement, maintenance and investment costs by Cloud ERP providers as soon as ERP systems move to the Cloud. Enterprises have spent considerable amounts in funding and energy in designing their existing internal ERP programs, and the update that would come would render it more efficient for the cloud. Most companies choose cloud computing for cost savings and improved system performance, so they transfer their services to the cloud. The proposed CCAERP method enhances the performance ratio when compared to other existing approaches. Figure 8 shows the performance ratio of the suggested CCAERP system.

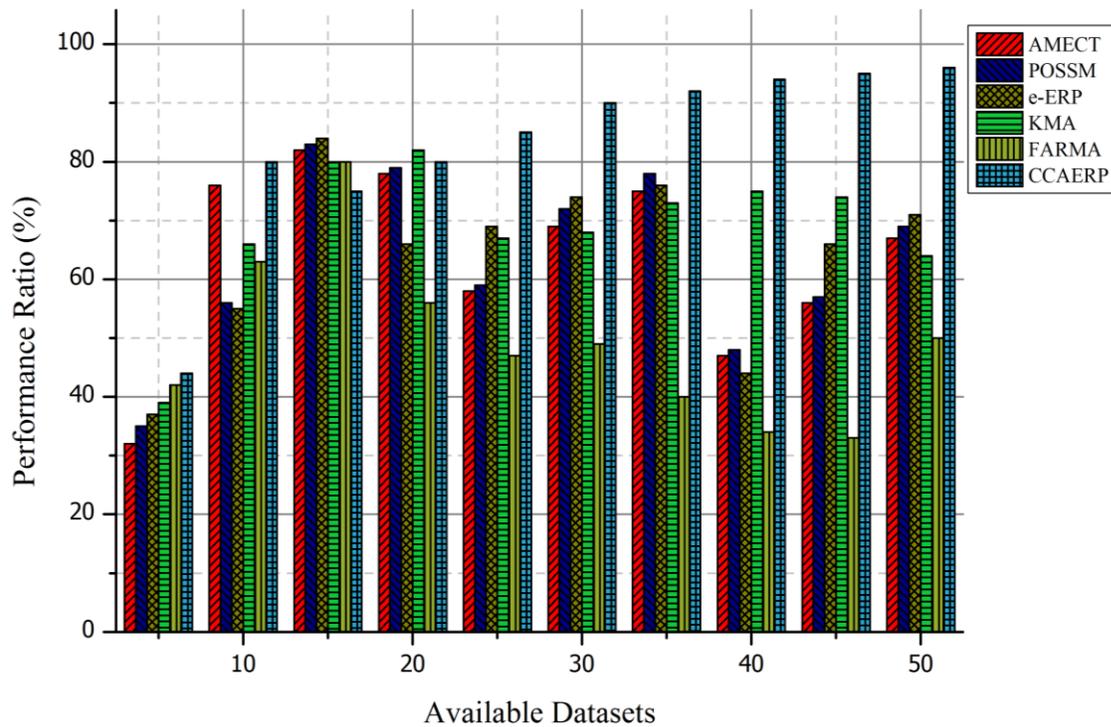


Figure 8: Performance Ratio

(iv) Efficiency ratio

ERP is a packaged software system for businesses that enables one to manage resource efficiency and productivity by providing an integrated solution to the information processing requirements of the organization. To maintain and create a cost-efficient and user-friendly Enterprise Resource Planning system with an extremely high standard of quality and strong dependence on the system. The program is supported and maintained by a different business or organizational concepts. Its program will provide the IT maintenance/administration for organizations consistent with high-quality services. Business is satisfied and the companies are willing to work efficiently and effectively to consolidate and strengthen all its belongings in esteem or for the savings in money, energy, and time. Enterprise resource planning software depends heavily on the software

platform, information, database, security, and other applications of a third party. Figure 9 demonstrates the efficiency ratio of the suggested CCAERP system.

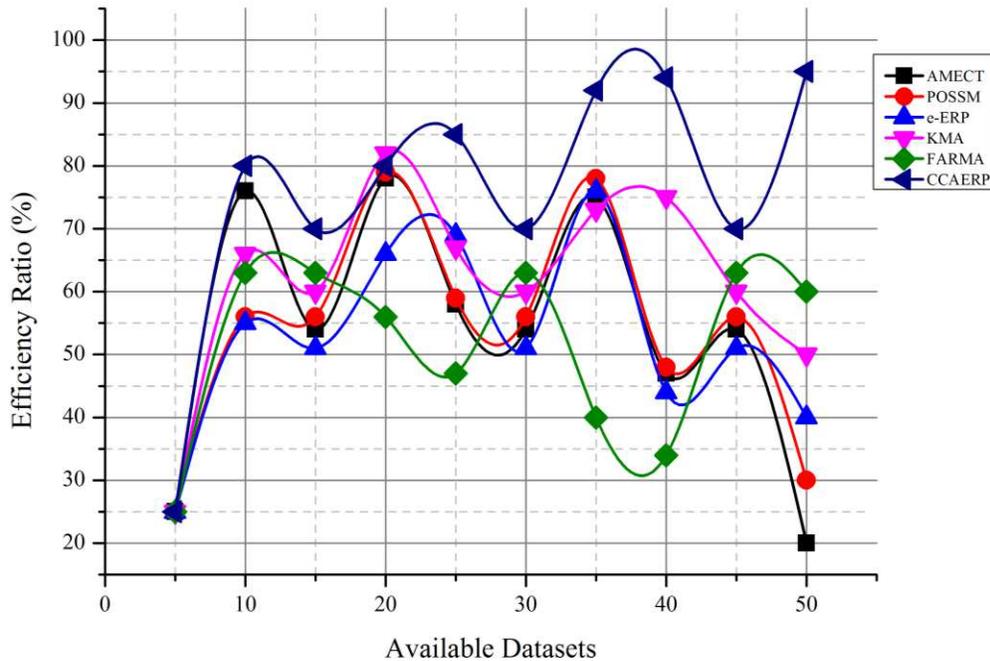


Figure 9: Efficiency ratio

(v) Computational cost

Electronic commerce is the modern age enterprise technology that promotes and serves the varied demands of companies all over the world, where buyers and sellers communicate electronically, helping to minimize transaction expenses and improve the pace of production and profitability. Electronic data exchange, emails, and electronic fund transfers are made free of papers in an e-commerce business. E-commerce offers a range of services, including no physical money, the use of credit cards , debit cards, intelligence cards, transfers to banks, and other online methods of payment and applications. Although ERP systems, often called on-site systems, are traditionally locally operated by larger organizations, cloud-based ERP

systems have become more relevant for small and medium-sized enterprises over the past few years, mainly because of the possibility of starting up at a low cost. Cloud computing, and is often referred to as on-demand services. It has offered small and medium-sized enterprises an unprecedented opportunity to take on a wide range of cloud technologies customized to the market needs. The proposed cloud computing assisted ERP model reduces the cost when compared to other existing methods as shown in the Figure.10.

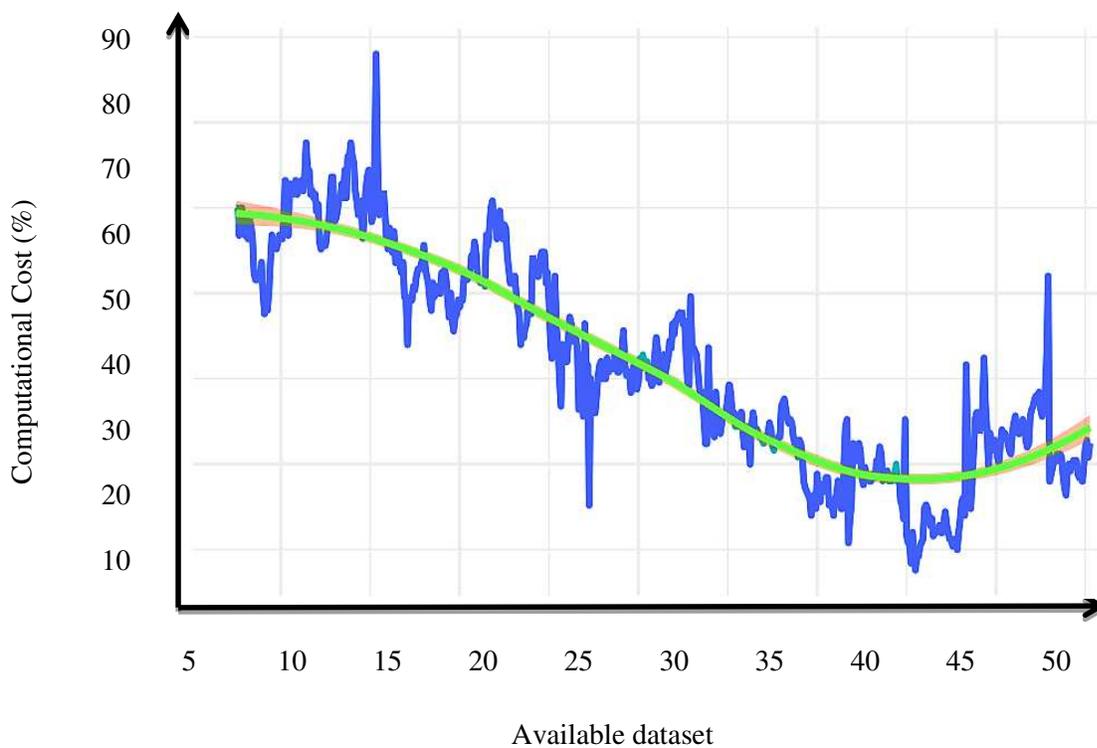


Figure 10: Computational Cost

The proposed Cloud Computing assisted Enterprise resource planning (CCAERP) based on an e-commerce application for enterprise management. It achieves high performance, efficiency, and improves the sales rate when compared to other existing Accountable Mobile E-Commerce Transaction (AMECT), Policy-Oriented Secured Service Model (POSSM), web-based Enterprise Resource

Planning (e-ERP), K-means Algorithm (KMA), Fuzzy Association Rule Mining Approach (FARMA) methods.

5. Conclusion

This paper presents Cloud Computing Assisted Enterprise Resource Planning (CCAERP) based on an e-commerce application for enterprise management. B2C electronic commerce is focused on the trust histories of all consumers of the e-commerce reputation. It then proposes an aggregate reputation calculation model that incorporates the trust values of all service customers. The integration of Enterprise Resource Planning and Electronic Commerce is a type of technological innovation, and a form of management innovation, as well as a need to address market competition in the network economy ecosystem for businesses. Efficient ERP and e-Commerce integration will optimize enterprises' responsiveness to the dynamic market, respond to consumers' individual needs, and allow businesses to gain more significant business advantages in a modern digital economy environment. Based on their current scenario and consumer choices, businesses will aggressively establish plans aimed at combining Enterprise Resource Planning and electronic commerce to build an innovative market environment. New benefits in distributed computing include cost efficiency, adaptability, and sustainable IT, which are a result of these benefits. At present, as understood from the many tests, it has carried out a simple analysis and study of the existing practice and methodologies concerning cloud portable to investigate how aspects of safety are treated in such methods. The paper points and discusses elaborately the current speculations, which were used to measure the appreciation of improvements' achieved and the analysis of other concept implementations to assess the factors that affect the decision of an organization to adopt cloud-based ERP.

Ethics Declarations

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Author Statement

Conception and design of study : Xiaotian Qi

Acquisition of data : Xiaotian Qi , Shanmugan Joghee,

Analysis and/or interpretation of data : Shanmugan Joghee , Abdul Salam
Mohammed

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