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Investigating the use of an Artificial Intelligence Model in an ERP Cloud-Based System

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Abstract**—***Enterprise Resource Planning (ERP) systems are necessary to improve an enterprise's management performance. However, the perception of information technology (IT) professionals about the integration of artificial intelligence (AI) and machine learning with ERP cloud service platforms is unknown. Few studies have examined how leaders can implement AI for strategic management, but no study has qualitatively explored AIs integration in the cloud ERP system. This qualitative phenomenological study explored IT professionals' perceptions regarding the integration of AI and Supervised-machine (S-machine) learning into cloud service platforms in the enhancement of the cloud ERP system. Two research questions were developed for this study: 1) What are the perceptions of IT professionals regarding the use of an AI model to integrate SaaS and ERP? and 2) What are the perceptions of IT professionals regarding how AI can be integrated in order to enhance the security of using an ERP cloud-based system? Through a hermeneutical lens and a focus on integrating the Application Programming Interface (API), purposive sampling was used to interview five AI experts, three Machine Learning (ML) experts, five Cybersecurity experts, and two Cloud Service Providers provided their lived experiences with AI and S-machine learning. Five main themes emerged, including 1) use of an AI model to integrate SaaS and ERP helped perform work efficiently, 2) challenges for integrating AI into cloud service ERP and SaaS, 3) resources needed to fully implement an AI into cloud-service ERP or SaaS, 4) the best practices for developing and implementing an AI model for ERP and SaaS, and 5) how security of an ERP clouds-based system is optimized by integrating AI. The culmination of these findings has positive implications for individuals and organizations to improve management performance. While this study does not proposal a new theory, this study extends current literature on the application of theories related to technology integration.*

Keywords**—***Artificial Intelligence (AI), Enterprise Resource Planning (ERP), Machine Learning (ML), Software as a Service (SaaS), Supervised Machine Learning (S-machine learning)*

I. INTRODUCTION

Enterprise Resource Planning (ERP) systems offer widespread benefits and services to the entire enterprise. ERP systems aid an enterprise by sharing and transmitting information and data across all functions units inside and outside the enterprise (Mayeh et al., 2016). Sharing information and data between enterprise departments aid in several aspects and aims to attain dissimilar objectives. Cloud computing is a computing model which occurs over the internet and offers reliability, scalability, availability, and low price in terms of computer resources (Acar et al., 2017). Executing and operating ERP systems over the cloud provides excellent benefits and advantages despite several challenges and problems.

Artificial Intelligence (AI) is a relatively new technological innovation that further provides leaders the opportunity to improve management performance (Borges et al., 2020; Brock & Von Wangenheim, 2019). There is still limited knowledge regarding how AI can be strategically integrated into the management practices of leaders, particularly in cloud ERP systems (Brock & Von Wangenheim, 2019). In this study, the researcher explored the perception of IT professionals regarding the integration

of AI and S- machine learning into cloud service platforms in the enhancement of the cloud ERP system.

This chapter introduces the proposed research topic on AI and cloud ERP systems. The sections included in the chapter are the following: (a) overview, (b) background and problem statement, (c) purpose of the study, (d) research questions, (e) theoretical framework, (f) limitations, (g) assumptions, and (h) definition of terms. The researcher concludes the chapter with a summary of the most critical aspects of the proposed research study.

II. LITERATURE REVIEW

2.1 INTRODUCTION TO ENTERPRISE RESOURCE SYSTEM

Enterprise Resource Planning (ERP) applies to the software and programs used to prepare for and control all a company's essential supplies, development, facilities, finances, and other operations. Digital interruptions have culminated in businesses modifying their workflows. AI and Machine Learning (ML) contribute greatly to revolutionizing how software runs and functions within organizations. The software available today for ERP is complex compared to their predecessors, even those utilized only five years earlier.

Traditional ERP systems are grouped into Cloud ERP and hosted ERP. In Cloud ERP, the business runs and operates the device license ERP framework and shoulders the cost of service, repair expenses, disaster recovery, system loading, and operation across the business networks, devices, machines, or servers (Zeebaree et al., 2019). In addition, the hosted ERP involves running a device in an external host on a server outside the country and, most of the time, through a direct network with the resources available (Shekhar et al., 2017). In today's highly competitive climate, companies are under great pressure to satisfy their customers' particular requirements, and a modern subscription increased ERP-centred distribution model. The main variant is the provision as a function of the networks and the ERP (Carutasu, 2016). Using an internet framework to access the SaaS ERP model, a cloud service provider organizes and monitors the data and provides the user with a monthly charge (Opara-Martins, 2017).

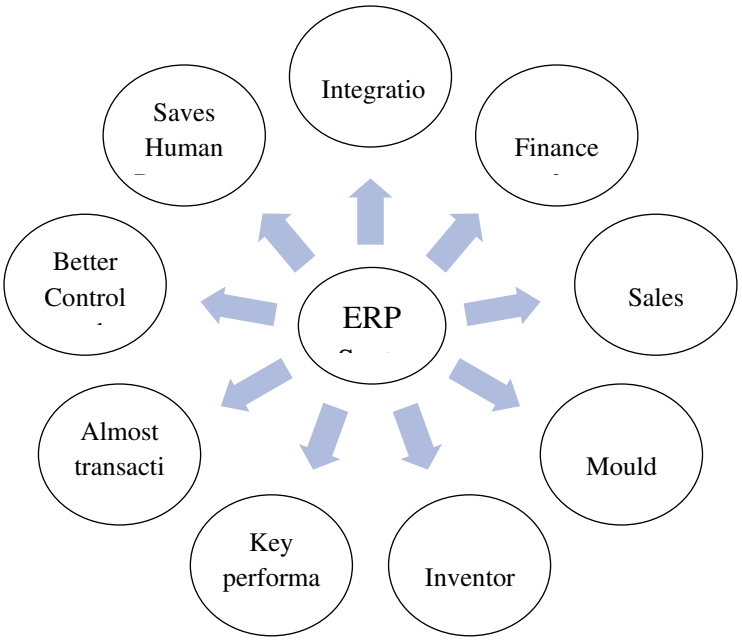

Fig. 1: ERP System

A cloud-based ERP framework utilizes the advantages of cloud infrastructure to increase the flexibility of host ERP systems (Rashid et al., 2018). The main benefits of cloud computing are availability, affordability, and scalability as assured by Service Level Agreements (SLA). Cloud ERP is concerned with incorporating different principles of ERP frameworks and cloud services to improve enterprises' defined viability and efficacy in terms of data storage and management. Cloud computing is an important aspect of the modern period with various technological advances and large data sets that include classified and sensitive data. Cloud technology correlated with reliability in handling large volumes of data and avoidance of data failure by providing a storage network.

Cloud ERP is an aggregation of Cloud with ERP applications, which includes advantages and disadvantages. The realization of the advantages that accompany cloud ERP, as well as the reduction and removal of the different problems that may occur with its application, may increase its performance, ensure the highest competency standard while using this method, and increase the competitive edge of the company in the industry (Battleson et al., 2016). Dynamic capability theory allows companies to achieve this by responding to a long-term approach rather than a short-term approach.

One of the main problems with the rising amount of data is trying to make sense of this data. It is not easy to keep track of the details, but by doing so, valuable lessons are gained in regard to the knowledge about clients, their activities, and the processes of the organization. Certain

activities are carried out routinely and frequently within each company. These activities will be simplified and automated through machine learninginstead of an individual, which is also the same with businesses. If AI is embedded in an ERP framework, it can help recognize workflow issues and keep them from emerging.

2.2 Historical Overview

At the initial stage, resource planning is not very effective. Corporate executives require a novel and effective way of managing, tracking, and controlling the materials, staff, and inventories. Existing management is performed through Software like Material Requirements Planning (Bogataj & Bogataj, 2019). These are rather useful in monitoring and planning the inventory and help in preliminary purchases, manufacturing, and delivery. In the 1970s, many companies began adopting these systems, which improved as per the requirement over the years. Eventually, additional manufacturing processes were added, which included extended abilities and were better than the previous versions. Over the years, as the system improved, the requirements planning system required a new name because it no longer resembled the original material requirement planning of the 1970s. The term Enterprise Resource Planning was first used in the 1990s by Gartner Group (Kenge & Khan, 2020) and had expanded from its initial basic inventory control to include other functions and sections of the company. These systems were the predecessors of ERP, where continuous improvements have been made in the past.

Recently, the latest addition to the ERP systems has been the integration of AI. AI has the capabilities to integrate multiple departments with ease and enables easier management of all aspects of a business. AI-based systems can unite these data into a single database and handle a large amount of data. Modern ERP solutions involve manufacturing, supply chain, and finance capabilities and contain futuristic reports generation and business intelligence, automation, CRM, and project management functionalities.

ERP has been historically responsible for knowledge organization, report creation, and analysis by dashboards of actual real-time results. Today, though, companies want smart technology to understand patterns, suggest steps, take various interrelationships into consideration, and simplify dynamic processes (Appelbaum et al., 2017). The degrees of freedom accessible on-site and cloud models on current ERP systems may add to this market. In accordance with the prerequisite to utilizing intelligent technology, ERP accounts for the system's existing specifications to accomplish similar process changes.

2.2.1 Costing Model

Data must be sent, calculated, and incorporated into cloud services. Migrating to the cloud can significantly reduce the substructure price, but the cost of data communication (i.e., the cost of transporting information between the public and community Cloud) and the cost per unit (e.g., a VM) of computation resource used are still higher than they would otherwise be. An even more serious problem arises when an enterprise's data is spread over many private and public clouds (internal IT substructures) using a hybrid cloud distribution architecture. On-demand computing is only sensible for tasks that need a lot of processing power. If the cost savings do not outweigh the increased data transmission costs, transactional applications like ERP/CRM may not be a good fit for cloud computing. The cost of data integration must also be considered since different clouds typically use interfaces and proprietary protocols. In order to interact with many cloud providers, the cloud client will need to use provider-certain APIs and bespoke adaptors to integrate data resources and heterogeneous resources from several cloud providers, even inside a single business. Clients concerned about cloud security may want to consider breaking up their private data into chunks and storing them on several clouds to avoid any unintended consequences of making a security concession in one location. While separating and mixing data costs a huge amount of money, it also severely damages the system's efficiency (i.e., the time cost).

2.2.2 Charging Model

A cloud provider's cost analysis is more complex because of the changeable resource pool, either via multi-tenancy or virtualization, compared to typical data centres, which typically calculate their pricing based on the consumption of static computing. The core physical server must be replaced with an instantiated virtual machine as the unit of analysis for costing purposes. All of the above-mentioned and VM-related variables, such as virtual network utilization, software licensing, node and hypervisor maintenance, overhead expenses, must be included in a good business model (Dillon et al., 2010). Multitenancy in SaaS cloud providers' contributions can be very costly, which includes the redevelopment and redesign of the software that was originally used for single-tenancy; the cost of offering innovative characteristics that allow for intensive customization, efficiency, and security enrichment for simultaneous user access; and the complications caused by these fluctuations. Because of this, SaaS providers must weigh the benefits of multi-tenancy against the potential drawbacks, such as increased overhead costs due to compensation and a reduction in the number of on-site software licenses,

before offering their services to customers. However, SaaS cloud providers need a viable and strategic billing strategy to maintain and grow their business.

2.2.3 What to Emigrate

According to a survey by International Data Corporation (IDC) in 2008 (n = 244), the seven IT applications/systems being migrated to the Cloud are Collaborative Applications (25.4%), IT Management Applications (26.2%), Business Applications (23.4%), Personal Applications (25%), Server Capacity (15.6%), Applications Development and Deployment (16.8%), and Storage Capacity (15.5%). Guy-Cedric (2018) states that the results from the survey established that administrations still contain privacy/security concerns in transferring their information to the cloud. At present, peripheral functions like personal applications and IT management are the simplest IT systems for transmission. Because of the prevalence of outsourcing non-core activities to the cloud and keeping mission-critical activities in-house, government agencies prefer IaaS over SaaS. According to the analysis, 31.5% of the company's storage capacity will be moved to the cloud in three years. Compared to Collaborative Applications (46.3%) at that time, this percentage is relatively low.

2.2.4 Effects of ERP Implementation on Organization

In many cases, an ERP deployment is the single most significant project an organization has ever undertaken; thus, it requires a high degree of dedication and resources from everyone in the company. Thus, implementation issues have become one of the most pressing concerns in the sector, which is further complicated by several failures, including a few fatalities, that have led to the liquidation of certain businesses. An ERP deployment has a significant influence on the workplace and the people there. Terzo (2017) highlights that the best people in the company should be selected to form a project team, including a Project Manager and a cross-functional group of key Workers, IT professionals, and outside Counsellors.

It is possible that employees from the corporate headquarters might find in the country where the firm is based. As a result, the objectives of a corporate model must balance with the needs of local law, fiscal policy, and business practices. ERP adoption typically necessitates business process reengineering in tandem since it has been discovered that requiring the ERP to meet current business processes entails heavy customization of the system, which is not desirable. Once the correct product is selected, it is time to rethink the business processes. By removing divisions and hierarchies, ERP systems allow data to be input just once, allowing it to be easily shared across the business. Terzo (2017) illustrates that these organizational hierarchies and functional divides are broken up by the ERP solution, which runs on top of current processes, creating a climate of continual change that causes more opposition in the company; consequently, the ERP Implementation project cannot be done in isolation. In order to grasp the scope, requirements, and expectations of stakeholders, the project team must interact closely with top management and key managers. As a crucial step in ERP implementation, the company's system department must be included in this process.

2.3 SaaS and Cloud

Cloud computing and software as a service (SaaS) are upending how businesses distribute and utilize project programming. Even though SaaS was first popularised in the latter part of the 1990s, it has grown rapidly and is now the standard for distributing new applications across IT organizations (Fauscette, 2013). It is possible to find and use SaaS through the internet, with all the administrations that come with the program, including the introduction, information levels, and other connected administrations. Many of the products used by businesses today are still based on traditional models that rely on a limited number of permitted apps being supplied to the company's premises or facilitated in a third-party data centre (Fauscette, 2013). They are, however, being replaced by cloud-based apps that are based on a more conventional model.

Before considering cloud applications, it may be helpful to establish a set of criteria for exactly what falls under the cloud application "umbrella." For this report, IDC uses the following criteria for cloud computing:

1. Communal, standard service that is either private or public.
2. Solution-packaged turn-key offer that mixes essential resources.
3. Self-service provisioning and administration (may require some onboarding support).
4. Elastic scaling that is energetic and pulverized to enhance performance.
5. Use-based pricing supports service metering (but private cloud may not chargeback).
6. Accessible through the internet.
7. Typical user interface (UI) techniques.
8. Published service interface/API based on Web services or other shared internet API techniques.

The bulk of corporate IT policy has been influenced by SaaS and cloud apps. What began with a small number of tightly focused applications, such as

people management and SalesForce automation (SFA), is now spreading to a far broader range of business tools, including ERP. In the past, ERP was considered too complex for cloud computing in the workplace. Productions of all sizes are interested in cloud deployment options that vary from public to private and even hybrid deployment approaches that include both. New IDC assessments show that cloud ERP is becoming more popular. To survive in an ever-changing global marketplace and compete in a more complicated international economy, businesses face various challenges (Fauscette, 2013). To meet these challenges, businesses are turning to technology as a lever for and a foundation for new and sophisticated ways of doing business. DSS (i.e., decision-assist systems; flexibility; teamwork/social systems) and the cloud are crucial components of that strategy for most firms and support other vital strategies, such as the cloud. Firms may receive a range of advantages by migrating ERP systems to the cloud, including business and technological advantages. The following are some of the main reasons why enterprise IT is moving to cloud-based ERP:

1. Availability of more vigorous, qualities-rich ERP cloud applications from recognized and trusted enterprise software vendors.
2. Effortlessness deployment.
3. Pay calculated based on usage.
4. Requirement to move IT funds from the capital budget to the functioning budget to align commercial benefits with cash discharge closer.
5. Free valuable resources from sustaining legacy software and substructure to emphasize higher-value and innovation-driven events.
6. Quicker deployments result in a shorter time to value and release resources for additional planned initiatives.
7. More scalable and flexible solutions to offer long-term assistance for development and expansion.
8. Simpler incorporation and removal of data silos from cloud-based ERP systems.

Industries realize that the cloud is upcoming enterprise software that provides several attractive business benefits. Among the most fascinating are the following:

1. More contemporary user experiences (UXs) that raise efficiency and worker fulfilment.
2. Embedded analytics to assist more real real-time business decisions.
3. Embedded social relationship tools to increase teamwork and efficiency.
4. Pervasive mobile access to application services.
5. Effortlessness in finding and sharing information to assist cooperative analysing and increase efficiency.
6. User self-service to make simpler provisioning and system administration.
7. Capability to tie back-office systems more efficiently into the front office to assist the company's client experience policy.
8. Removing data and people silos to make rapid and efficient business decisions.
9. Improve and shorten the close economic process through improved access to data and embedded relationships.
10. Balance the company's economic requirements between capital and functional budgets.

Customary undertaking programming, especially ERP applications, has been frequently conveyed in incorporated suites, either in on-premises data centres or outside facilitated offices. However, with more difficult monetary conditions, there is a developing need for higher cloud acknowledgment in the undertaking because, as a rule, customary models are evolving (Fauscette, 2013). Many organizations have switched to a hybrid IT architecture that uses both cloud and on-premises applications, often relying on SaaS to deliver critical and more current programming tools. Organizations, especially large ones, are typically looking for the most wonderful component breed hidden programming that is cloud-based and present-day and that can boost the worth of the firm in the shortest amount of time when purchasing a new software (Fauscette, 2013). For more than a decade after the introduction of SaaS apps, IT associations did not recognize them as an alternative to on-premises solutions. When SaaS solutions were first introduced, they were generally used in small, hierarchical/utilitarian areas where the line-of-business purchaser (LOB) was in charge of the budget and could make the decision without the help of IT. Early successes using this LOB method were SFA and the ability to the board. SaaS and distributed computing, on the other hand, have gradually replaced on-premises IT systems as the preferred choice over the long term. IDC's Cloud Track Survey, which surveyed 1,109 firms, found that more than 60 percent of those surveyed said they were already using or planning to use cloud advantages at the time of the survey. According to the same survey, 31% of qualifying firms believe that they must have a fully implemented cloud-first approach that is proactively supervised and drives business growth while enhancing IT operational excellence in the next two years. Likewise, the reviewed organizations reacted reliably, paying little heed to geographic locale (Fauscette, 2013).

2.3.1 Network Effects

It has been shown that SaaS and Cloud computing platforms have direct impacts on the network because they offer specific Web services or APIs that drive application designers to change their applications or make it difficult for clients of these applications to transfer platforms. The immediate network impacts are not as authoritative as those among Windows, and programs are created for personal computers or particular smartphone operating systems such as Blackberry, Symbian, or Palm, as apps are designed for these settings (Cusumano et al., 2010). The internet HTTP protocol governs the majority of the SaaS and cloud programming interfaces and methodological guidelines for exchanging data and logic. Nevertheless, some SaaS/cloud platforms have their own set of Web services and APIs. For example, some retail stores or real estate organizations have developed apps that incorporate Google Maps, tying the applications to Google's platform. Other companies have developed e-commerce programs to process payments given by Amazon, linked to Amazon's infrastructure. There are indirect impacts on the network when the popularity of one platform over another among designers makes the platform more interesting to other users or designers. In a positive feedback loop, as more apps seem to be used on a particular platform, more application makers are attracted to the platform itself. SaaS/cloud platform players also try to entice end-users by using their free platforms, which adverts may fund. Data storage, consumption, and other requirements are often taken into account when an application business pays a fee. Platform sellers can charge modest or large fees to attract designers or make certain functionalities of their platforms available (Cusumano et al., 2010). A variation on the "free, but not free" scheme can be found in internet applications and personal computers. Companies like Bungee Labs and Salesforce.com (with Force.com and Visual Force) have taken the SaaS and cloud platform concepts further than simply offering an environment to introduce applications: they also offer program development tools and services that assist firms to build new applications within these challenging platforms environments. Designers may also use Web services from other shops; however, specific APIs or Web services may be proprietary to the platform. This is another example of a policy that is "open, but not open" or "closed, but not closed.

On the whole, SaaS and Cloud platforms have emerged on many levels. First, the general approach of the internet and virtualization to create SaaS as technically feasible has been recognized. Next, companies have used this strategy to provide SaaS or cloud-based versions of their goods. Finally, some businesses provide SaaS versions of their goods (now Web-based services) and expose their method to enable other application developers to create and deploy apps from these platforms. Vendors and customers alike tend to benefit from SaaS or cloud-based services. The usage of networks and hardware may be increased by allowing several customers to use the same services. For instance, Google and Amazon have enormous data centres that are underutilized. Their goods (automated services) may be rolled out simultaneously with apps from other companies without compromising the security of the tenants of the different organizations. Service Level Agreements (SLAs) from providers like Google, Amazon, and Salesforce.com often guarantee the security of their customers' hosting accounts (SLAs).

2.3.2 Service Level Agreement

Though cloud customers do not have any control over the primary computing resources, they are assured of the availability, quality, consistency, and efficiency of these resources when emigrating their central commercial functions onto their trusted cloud. Particularly, customers are required to receive assurances from providers on service delivery (Fauscette, 2013). Generally, through SLAs, assurances are provided based on negotiations between the customer and provider. When it comes to cloud computing, the first challenge is defining SLA provisions that are sufficiently granular, such as the trade-offs between complexity and expressiveness, so that they can meet most customer expectations and are relatively modest to be confirmed by the cloud's resource allocating mechanism. The SLAs of different cloud providers (e.g., SaaS, PaaS, DaaS, and IaaS) must also match the requirements of the provisions (Fauscette, 2013).

Additionally, this raises a number of challenges for cloud service providers. Resource managers, for example, must have precise and up-to-date information on how resources are being used in the cloud at any given moment (Fauscette, 2013). To ensure that SLA implementation is as accurate as possible, resource managers use real-time assessment and modification algorithms and fast and efficient decision models appointed by optimization algorithms to monitor and respond to changes in the cloud environment. It may be essential to discard requests of specific resources when SLAs cannot be encountered. It is essential that these are performed in a virtually automated fashion because of the ability of "self-service" in cloud computing (Fauscette, 2013). Additionally, it is essential for innovative SLA mechanisms to continually integrate feedback of user and customization qualities into the SLA assessment context.

2.3.3 The Cloud Business Advantage

Pressure is felt within organizations to transform from an assortment of monetary issues, just as new

advancements that set out huge businesses open doors (Fauscette, 2013). Since the 2008 worldwide downturn, the economy has constrained organizations to do considerably more with significantly less, including pressuring organizations to be progressive with a contracting labour force driving organizations to search for better approaches for work that go past what computerization can yield. The "consumerization of IT" pattern has changed the speed of advancement, moved the wellspring of development away from the venture, and made new assumptions for innovation from workers, clients, and accomplices (Fauscette, 2013). Most of the adjustments on the internet have come to fruition due to the fast expansion in the number and capacity of cell phones, increasing utilization of the monstrous measures of information to help businesses become more successful, and better approaches for systems administration and teaming up that has occurred from the individual social web (Fauscette, 2013). Workers insist on working contrastingly with devices that look similar to and have the same capacity as their Web encounters. The need to work cooperatively and unite individuals and information in a work setting is testing customary ERP frameworks. Clients search for better, more individualized encounters from brands they communicate with on a common premise (Fauscette, 2013). The idea of client experience begins to grow what was considered "client confronting" to incorporate back-office works that should work successfully or unsuccessfully. Exercises like effectively invoicing clients on schedule or delivering the correct item when expected are significant to guarantee that the client

Organizations are engaging to discover better approaches to maintaining increment profitability in this changing climate while managing the framework difficulties to help new exercises that are made by obsolete and resolute advancements (Fauscette, 2013). ERP cloud-based frameworks may assist fill up the innovation gap for various reasons. Customers now have a more modern ERP cloud-based framework that includes enhanced customer experience capabilities, integrated community capabilities, as well as research to maintain constant mobility, which is essential in today's rapidly changing business environment,

The new method of business is done heavily on collaboration. Most companies nowadays have a pressing need for tools that promote teamwork. According to IDC's Social Company Survey, conducted in February 2013 (n = 701), 79% of firms have transferred major business informal communities (ESN). Social collective apparatuses, or endeavour interpersonal organizations, are fundamental devices for establishing a community climate for representatives and are best installed inside ERP applications at the work process level. Some ERP cloud-based frameworks currently have inserted ESN abilities. Building community-oriented endeavour measures stretch out across all business capacities. Delegates in customer service must work together on a regular basis to resolve customer concerns and provide a great customer experience in order to get the job done. Closed-loop processes like month-to-month, quarterly, and year-end closure consume a large amount of time in the back office and are the only source of group engagement. ESNs play a critical role in smoothing out the near-term cycles.

There are various benefits to using cloud-based software for business purposes. It is possible for cloud enterprises to make resources available to the company rather than just to executives. The frameworks are more current and incorporate the key highlights recorded beforehand. They are generally more adaptable, more readily adjusted to changing business necessities, and versatile.

2.4 Artificial Intelligence

Machine-controlled AI has the capacity to execute tasks usually correlated with the intelligence of human beings. AI also possesses the characteristic intellectual processes of humans, such as the ability to comprehend, locate significance, generalize, or benefit from previous experience. It has been shown that machines can be configured to execute extremely complicated tasks after the advent of the digital computer (Muniswamaiah et al., 2019).

AI has proven transformative and can unleash the next phase of digital transition in industries with exponential development across the last decade (Erro-Garcés, 2019; Salam, 2019). AI technology produces modern human resources management functions and transforms the way an enterprise handles its human resources (Dhamija & Bag, 2020). Global cognitive and AI solutions expenditure is growing 50% annually, which is expected to hit USD 57.6 billion by 2021. In India, AI adoption is restricted and sluggish, and just 22% of Indian organizations use AI for a company (Aayog NITI, 2018).

AI has taken on a crucial significance of handling human capital and has grown into the human resources management framework at three stages: aided knowledge, enhanced intelligence, and self-intelligence (Charlier & Kloppenburg, 2017). AI technology standardizes time spent for routine jobs. Chatbots and AI apps enable a wide variety of job functions. For example, primary interviews for hiring job applicants are performed by chatbots. Intelligence enhancement occurs when AI technology helps man and computers communicate and make choices about operating. For example, bots use conversational AI to enable people to build human, engaging, and real-time environments across multiple channels through interview

preparation, answering applicant questions, and driving recommendations. Autonomous intelligence fully transforms the workspace. AI technology is self-active, and findings are collected. The knowledge is gathered and analysed on a subconscious basis. For example, according to a certain criterion, AI offers the results of the candidate selection (Charlier & Kloppenburg, 2017).

The way AI has altered HR manager's work, augmented reality, botts, robots, chatbots, automation of robotics operations, deep learning, semantic conversation, the internet, natural language processing (NLP), and increased reality (Bersin, 2018). AI shifts the operation of the HR department at the three stages above, helping to reduce the recurring administrative duties of HR managers by helping HR managers decide and forecast employee comportment at work (Growth business, 2017). AI is used specifically for recruiting, preparation, staff participation, and retention to minimize expenses, save time and execute HR activities with greater precision (Kumar, 2019). According to Alexander Mann's research, 96% of HR professionals surveyed agree that AI innovations increase skills acquisition. Talent Management means a "strategic way to identify, attract and embed top talent to effectively and efficiently meet dynamic business needs" (Bugg, 2015).

Cloud computing is a critical factor that improves convenience and on-demand functionality to attaining a shared pool regarding the configurable computing-related tools (Battleson et al., 2016). Although the identified cloud infrastructure technology to improve operating performance has attained much coverage in the numerous literatures, it is essential to understand how it will aid the companies in attaining dynamic capacities and a higher competitive edge in the industry. This can be achieved by attaining a lower cost of service and improving productivity and activities.

2.5 Intelligent ERP

The Intelligent ERP is not focused on a single technology but on an ERP system's capacity to access several smart function technologies. This begins with the automation of repeat repetitive operations in the backdrop of most businesses (Moll & Yigitbasioglu, 2019). Over time, there are additional functionalities, such as artificial learning and deep learning, to identify errors in the output, predictive demand planning research and estimates, natural language processing of production or warehouse voice commands, and autonomy learning algorithms.

Intelligent ERP guarantees economic productivity and simplifies the adoption of developments in daily work. IDC Research Manager Alexandros Strati noted that "The function of the intelligent ERP is vital to enabling today's knowledge workers to become tomorrow's digital knowledge workers" (Woollacott, 2019). While actual dialogue interfaces remain a future target, interaction efficiency can increase with time, enabling flagrant companies, a fluent work climate, and a goal-oriented approach. Therefore, ERP systems should incorporate and develop according to organization specifications with creative applications.

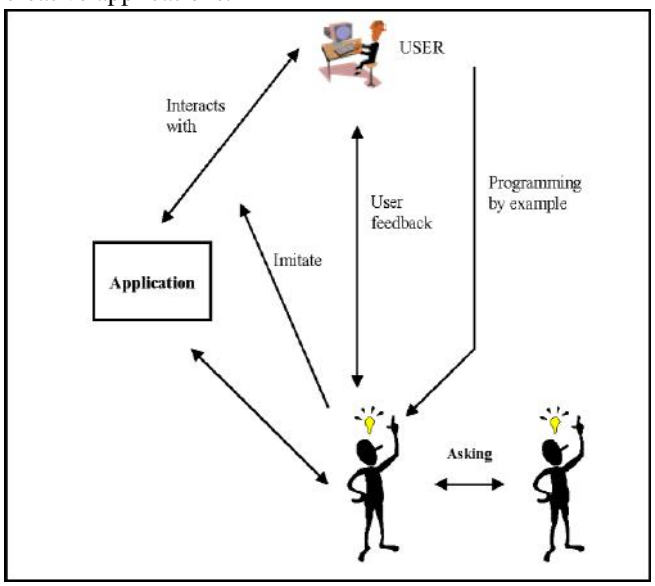

Fig.1: Intelligent ERP

Smart systems require much data to recognize trends, patterns, and associations and understand conclusions. The IT systems needed are only economically relevant as cloud or web providers (Yi et al., 2020), yielding two strong results: access to smart technology for businesses of all sizes and implementation no longer being a problem due to the IT budget. Technologically, however, the modernization of the ERP framework is required centred on a relevant software industry portal, such as Microsoft.NET, for streamlined access to Azure's services (Kumar & Vidhyalakshmi, 2018). Forty-four percent of respondents in the automotive and produce sectors regarded AI as very important for their manufacturing functions in the next five years and nearly one-half (49%) as "absolutely critical for their success" (Insights, 2018).

Although it is simpler for businesses to benefit from connections to intelligent technology by online platforms, they are not an off-the-box industrial solution. It is critical to work with a supplier who understands the particulars of business and the semantics of ERP knowledge. An ERP provider's domain experience for some industry needs or functional areas is essential for smart systems to efficiently and rapidly accomplish the necessary optimization in processes (Mahmood et al., 2019).

The unpredictable economic environment has caused administrators to rely on their optimization.

Seventy-seven percent of CEOs worldwide are dedicated to driving sales development through internal operating performance enhancement. Organic development is of primary significance, with a secondary position for emerging opportunities or strategic partnerships (PWC, 2019). For businesses that create high levels of quality in IT processes, ERP modernization often has great hopes and creative benefits. If a current ERP framework is to be rehabilitated, it is also called a basic modernization as a plan for greater automation by leveraging innovative technology (Heilig et al., 2017).

2.6 Enterprise Cloud Computing

Cloud computing is a new paradigm in which the user does not physically have technological tools such as storage, memory, and processing. Instead, service providers manage and regulate these services and consumer access through the internet (Sadeeq et al., 2018). For instance, users can store personal data with Amazon's web services by using Simple Storage Service (S3) and use Elastic Compute Cloud (EC2) to measure the stored data (Johansson et al., 2015). The company would profit from the usage of this kind of machine platform. Some benefits involve minimizing the initial expenditure in the capital, reducing the period needed to begin the new operation, reducing operational and running costs, and productive virtualization (Rashid et al., 2019). Cloud storage is an unbelievable alternative from all of these perspectives. In the transfer of machines to the cloud, there are several benefits. The key source of cloud storage drawbacks is insufficient capacity and bandwidth.

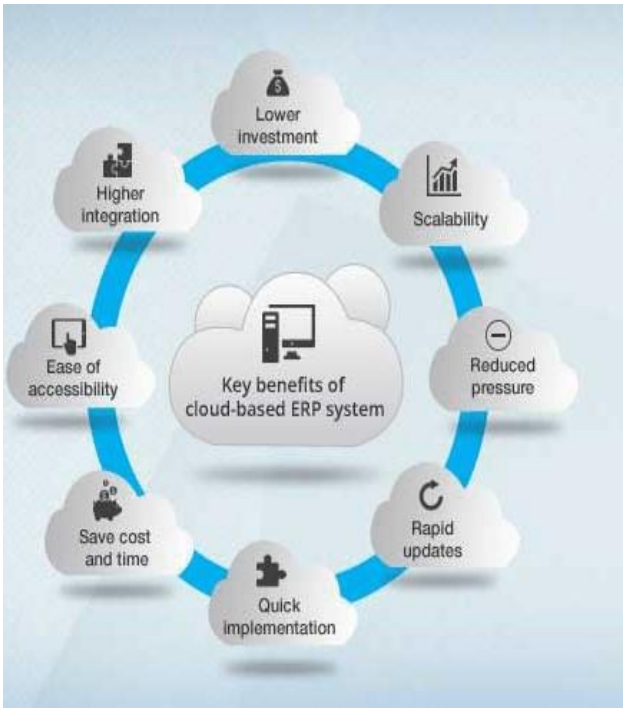

Fig.2: ERP in Cloud Computing

2.6.1 Cloud ERP

The SaaS model is used to provide cloud ERP solutions. Cloud-based ERP solutions are available from a number of vendors in the market (Cheng, 2020). ERP systems are cloud-based if the cloud computing feature impacts them. Instead of requiring the end-user to set up or install any software, a cloud-based ERP system may be accessed directly from their browser through the internet. SAP Business by Design is a well-known Cloud ERP in the software industry.

Organizations are pushing ERP programming out from the centre to public and private entities, which may interest certain people. For a long time, small and medium-sized businesses have been using public ERP cloud suites. It is an innovation getting attention in large-scale projects, particularly as a two-level ERP system for auxiliaries where the financial combination is done at the corporate level using standard on-premises ERP suites. A crucial decision for each organization is whether to use a public, private, or hybrid cloud. Each model comes with its own set of benefits, costs, and risks, just as administrative processes and standards vary from sector to industry. Numerous factors play a role in a company's decision to deploy some or all of its apps to the public cloud. Figure 4 shows the top five reasons to migrate to the cloud. Despite the fact that these motivations are common to all organizations, there are significant differences between large and mid-sized ones in how ERP cloud solutions are purchased and organized and their advantages.

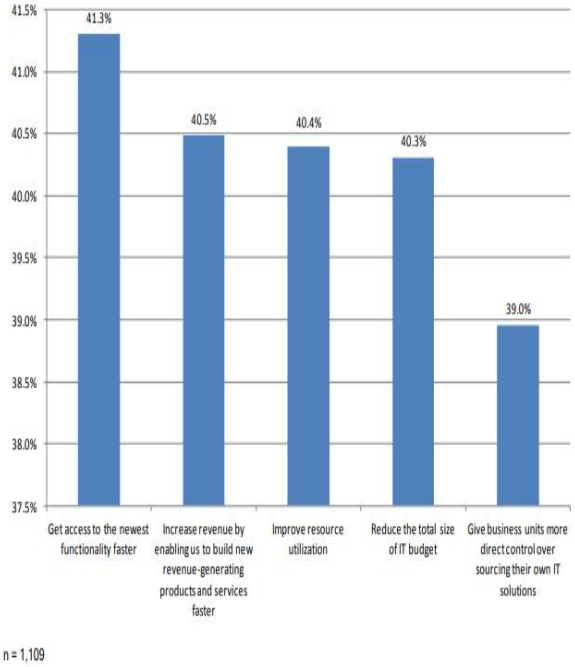

Fig.3: Top 5 Reasons of Moving to the Public Cloud (% of Respondents)

2.6.2 ERP Cloud in Large Enterprises

ERP, generally arranged on-premises or accommodated, is the norm for large organizations since they have been using a wide range of software solutions for some years. These systems include in-house developed options to third-party vendor-provided combinations (Fauscette, 2013). The ages, talents, and levels of complexity of the solutions also varied greatly. Several IT organizations have previously functioned in a hybrid model (i.e., a combination of on-premises and cloud), having organized one or more precise solutions, such as salesforce computerization or talent administration in the cloud. There are numerous reasons why businesses embrace the ERP cloud, including the following; accessibility of more vigorous, characteristics-rich ERP cloud applications (best of breed) from recognized and trusted enterprise software vendors.

1. Easy implementation.
2. Accessibility of more reasonable and controllable upgrades.
3. Pay calculated depending on usage.
4. Allows shifting IT funds from the capital budget to the operating budget in a close-fitting financial setting.
5. Increasing expenses of sustaining on-premises solutions and customizations.
6. Subsidiaries or developed companies rapidly mix financial values into the financial close and business rollup.
7. Faster implementations result in a quicker value and release of resources for additional tactical initiatives.
8. More contemporary user experiences.
9. Implanted analytics.
10. Implanted social relationship and networking tools.
11. Easily shared information.
12. Customer self-service.
13. Simplified, complete IT environment.
14. Normalize on the exact platform.
15. More scalable and flexible.

A comprehensive replacement approach is not always the best option for businesses; therefore, many choose to replace parts of their infrastructure piecemeal, moving from one organization or subsidiary to another and doing so for an indefinite amount of time. This method enables businesses to prioritize the aspects of their operations that will provide the most value while still relying on appropriate systems for their current business requirements (Fauscette, 2013). Each sector and firm have its unique mix of hybrid applications and the sequence they are implemented. It is not uncommon to find a major retail chain already in a hybrid environment, with an on-premises legacy system operating alongside Cloud retail vertical apps and a number of other cloud-based services like customer community platform monitoring and response and customer support. A few concerns with the company's operations might serve as an impetus for a transfer to the cloud for financial records. Over the last two-and-a-half years, the business has bought three distinct rivals' operations and is now operating four different financial systems in its own data centre, all on-premises. The firm manually consolidates the output of the three purchased systems in its existing core financials on a monthly, quarterly, and yearly basis for the close process, which significantly increases the closing time and complexity and the chance for mistakes. On-premises core system implementation was seven years old. Thus, it is possible to transition the three purchased businesses to the system. Despite being functionally contemporary, the user interface is archaic, and the system requires a large IT team to maintain it and its infrastructure.

Cloud-based financial systems are ideal in instances like these because they allow for a smooth transition from one system to another. These address the nearby issues while also bringing about a slew of other advantages for the company. If chosen, it is possible that the new system will include a contemporary UI and UX and built-in collaboration features, which would allow for faster closing processes and a more collaborative work atmosphere. Data silos between operating units may be eliminated if a cloud-based solution was used to consolidate and integrate older, unintegrated systems across operating units. On-premises computing resources might be reallocated to higher-value initiatives if the trend away from it is successful. Most significantly, the new system could give current analytics spread across the process, allowing for faster, more accurate, and better-informed business choices. A hybrid strategy would be used for as long as it makes sense for the organization to continue utilizing on-premises systems, integrating them into the new cloud financials, and migrating the other systems to the cloud as appropriate.

Cloud storage can effectively be utilized with the indigenous energy used in cell phones. The primary device interface for many consumers is mobile systems such as smartphones (Alonso-Monsalve et al., 2018). As a modern business concept, Cloud computing significantly influences the whole IT sector. Integrated cloud infrastructure is represented at a higher level of importance in all aspects of enterprise applications. Businesses can access low-cost, high-performance IT services, and small businesses can access high-performance IT services such as broad-scale IT services through quickly expanding

cloud infrastructure. At the same time, corporations may concentrate on their core sector and reduce the pressure on IT (Jacksi et al., 2016).

The optimization of cloud-based processes can be accomplished by major business consolidation and enhanced IT standards and competition in general. Another drawback of cloud infrastructure is that communicators have major advantages, including the following: many technical programs can be accessed, process capacity can be superior, specialized storage can be accessed, and knowledge can be conveniently exchanged and stored. All of this information is observable via an internet connection on the browser anytime and anywhere. Computer power, in other terms, may be simple to use in the form of devices, such as coal, water, and energy. The cloud storage sector comprises experienced network firms, including Google and IBM, to access the data conveniently via cable and through the browser from the data centre(Jacksi et al., 2015).

Service tiers function in the cloud similarly to decrease costs and capital. Coordinating these three layers would enable increased efficiency, stack harmonization (central load power management), and full server functionality, and reveal that cloud storage is a more effective way of utilizing resources, which lowers the expense of maintenance (Li et al., 2019) because businesses will utilize handheld devices and cellular data communication networks, a huge and complicated infrastructure may not need to be implemented in the sales department. This will directly supply the group headquarters and managers with revenue and return records (Cabrera et al., 2016). Mobile networks like UMTS will be applied in every nation in the immediate future by the third generation without sparking a revolution and are reforming networking technologies by supplying mobile users with rich content.

Cloud computing can display application resources delivered at any hardware stage. The software-based cloud computer corporation offers cloud-based applications. Cloud service providers usually offer services categorized into three groups (Abd Elmonem et al., 2016), SaaS, PaaS, and IaaS, collectively known as SPI services (Mahmood, 2021). The SaaS application feature is offered on-demand as a service. Multiple terminal providers or consumer organizations use a single implementation of cloud computing (Loukis et al., 2019).

Higher-level operations may be built using PaaS, which is a service. There are two schools of thought on PaaS in terms of the service viewer or consumer creator. (Costache et al., 2017). Customers are supplied with an operating system, middleware, and application software framework developed by the PaaS developer as a production environment. It is delivered using an API approach as an encapsulation service, and the API allows the developer to access the platform. The platform then uses the management and extension processes required to have a certain service standard.

IaaS incorporates essential resources as organized network services, such as space storage and commitment. The collective servers, devices, switches, and routers may control and manage high-power computing applications (Ibrahim & Hemayed, 2019). In the meantime, HaaS is a method that empowers an enterprise to outsource resources and maintain businesses.

Over the years, ERP has started as a system that only big manufacturing enterprises could operate (Salih & Abdulrazaq, 2019). ERP was then moved and widened to all retail, medical, state. This can be explained by web and web technology that is the base of ERP creation in web ERP (Ng & Ip, 2003). The ERP, therefore, became more dynamic and focused on clients. A number of online services such as e-commerce and e-business have also been established. These web services have helped ERP become a web-based company and web-based system. The core aspect of the system's development and execution was the programming language. The language of programming is the key to ERP transformation, and its progress has a positive effect on ERP growth and improvement (Jayawickrama et al., 2016). The ERP system has been transformed from an integrated client/application to a client/server model. Due to features such as XML-based web programming, PHP now supports web-based applications and services. Today, the internet affects the lives of manufacturers, companies, and organizations, which need to reform their working patterns so that the global manufacturing sector has a competitive advantage.

Many ERP models have been introduced on the internet. ERP models utilize component technologies and the internet to make faster deployment and adaptation of an object-oriented model. The new-generation ERP is referred to as ERP on the Web. In addition, it has set an ERP for objects based on real-world entities such as organizations, events, or personal roles for object-oriented items. This enables a better and more specific business to be achieved. With increasing user mobility, companies understand the importance of employee inner access and movement of their ERP systems to extend to mobile applications. Mobile ERP apps alter the company's customers, partners, and individual workers by creating and speeding new crucial information exchange applications (Chiu et al., 2017). Their competitive edge is a combination of higher quality, expanded business ties, and a solid consumer base. It is a service that provides on-demand access to the system and a paradigm for offering

internet-based specialized services over the network. This is server, storage, or entering software. Cloud computing models and services are being used to create ERP systems due to this technology's fast revolutions. Cloud ERP consists of cloud ERP systems (Jacksi et al., 2020).

2.7 Artificial Intelligence in ERP Cloud Service

AI in ERP is a recent development that does not require human machines. AI is without question, however, an effective technology to improve the computational capability of the ERP framework (Madakam et al., 2019). In order to profit from the latest technological advances, firms need to revise their current competitive technology and be able to adjust to and alter their evolutions. AI will unquestionably change and affect the future of ERP technologies and will no doubt have a definitive effect on potential industries irrespective of scale or sector.

Digital innovations shape all dimensions of industry and community and fundamentally alter the environment and lifestyle. New digitally-based market models make for better interactions and creativity, unlocking knowledge value (Morris et al., 2016). On their digital change journey, the most successful businesses are ahead of their rivals. The power of global frontier companies represents their capacity to be innovative and to optimally integrate technical, operational, and human resources in manufacturing processes within Global Value Chains (GVCs). However, this path is not straightforward as businesses face an impasse in creativity. Decades-old record-breaking, pre-digital structures utilize obsolete industry assumptions and templates for most companies. These technologies are delicate and can be hard to upgrade in an increasingly competition-oriented modern market world to satisfy the demands of today's companies. They also cannot embrace the criteria to turn the present staff to freshly defined, digital information-centric jobs in view of their obsolete assumptions and architecture. This condition is not sustainable. It is long overdue to substitute today's record systems with new information systems that maintain the central record system's features while relying on advanced autonomous and predictive intelligence assets. The transition takes place quickly on the network across the breadth of core software systems, including marketing automation, operation and support, trading, and sales.

ERP applications have begun to integrate the case of machine learning propelled by the organization's vast data and cloud resources. Data security, however, appears to be a concern. Data protection is at the forefront of a confidential information-trained machine learning model (Gaur, 2020b). Successful corporations and research attempts in a sector cannot advance until they obtain classified knowledge. Using an ML model without completely knowing the hidden layers can be tragic, and the implications can be legitimate. Data security strategies have also continued to develop in recent years. The AI area of privacy is still increasing, and organizations and individuals remain split in awareness, which is an enormous obstacle in terms of privacy and agreement.

AI utilizes intelligent software systems in optimum usage for enhancing the internal management system, building a more intelligent technology platform, and thus maximizing business processes in any single organization (Juma & Shaalan, 2020). It is critical that the business is agile and ready to revise its current IT plan in order to respond to the latest technologies. AI would influence the basic existence of everyday activities as an essential part of the ERP scheme. AI solutions are more likely to carry out repetitive human activities. Therefore, the implementation of modern technologies is also motivated by the need to minimize the business costs of activities by promoting workflows for workers and increasing the quality of the whole company's operations (Marshall & Lambert, 2018). In other words, the advancement of AI is a development that businesses need to undertake to remain successful and competitive.

AI improves the decision-making process for ERP. One of the key features of the ERP framework is to allow organizations to enhance and streamline their workflows and determine all things from output to policy (Zadeh et al., 2020). AI may enhance these functions by processing greater data sets than historically feasible. AI may also be used to read historical data and benefit from earlier examples of behaviour.

Automation of data input is another feature of AI in ERP. The manual entry of data into the ERP framework is a heavy burden for many businesses and therefore costs a great deal of time (Tavana et al., 2020). Besides a large expense, the manual entry of data in the context of typing errors also produces additional costs. In combination with ERP, the AI may learn from data sources, build workflows, and minimize data charges and the probability of additional errors.

AI improves the business processes in ERP systems. The combination of AI and ERP may also boost business processes. The systems recommend the most efficient internal processes by evaluating historical evidence. For Instance, AI will execute the next step and constantly provide all the details required to complete the task by reading an already defined workflow. This contributes to the effective and error-free execution of the tasks and streamlines the workflow and integrated procedure (Jituri et al., 2018).

AI also improves the data handling process. The evolution of ERP structures has driven businesses to

gradually access vast volumes of data (Zoubeidi et al., 2020). These details can be translated into concrete knowledge and eventually contribute to decisions and activities essential for the organization's business and development. However, the rapid growth in unstructured data, which businesses could collect without clearly providing a consistent path to how this data is utilized properly, has complicated data processing.

Smart objects may be allocated production management roles by digitized and networked technology systems: computers, goods, and pieces (Bendul & Blunck, 2019). This ensures that the production method itself has more versatility and adaptability through the ERP model. This methodology brings forth modern production planning and control paradigms focused on a hybrid transformation model consolidated into a decentralized management concept. On the other hand, the optimization of ERP parameters is performed at the central or dispersed control stage, implying that decision is taken globally or locally as per Kanban or the Holon model, with respect to development plan and control.

Data has become the most critical element for all operations of the Industry 4.0 model along the supply chain (Deloitte, 2020). To establish a successful foundation of decision-making, an organization must handle and appropriately and carefully utilize all data. Innovative data storage on the 4.0 network faces the biggest obstacle, including data saving, sharing, and usage. The creation and execution of such ideas should be stimulated because error-free, up-to-date, available and functional data will help the business thrive, as shown in Table 1.

Table 1: Framework of ERP model

Characteristics	Expected Features	Goals	Approach
Data storage/balance centralized and decentralized approach	Data Model Simplification	Timely Data	Cloud Computing
	Decentralized data management, Distributed data storage.	Bidirectional Data loading	
Data Flow in two directions	Link to the previous system, Data Exchange between different systems	System Integration and flexible planning	Interoperability
	Timely data access without lag	Fast reaction to changes	
Type of data, Visualization of data	Visualization	Effective Visualization of data	Artificial Intelligence
	Intelligent Integration	Effective integration between humans and machines	
	Automation	Automated processes to improve efficiency	

Currently, cloud storage and e-commerce programs are expected to move from ERP systems regularly. In order to successfully innovate and execute the ERP, businesses of all kinds have a crucial part to play (Lee & Wang, 2019). ERP is typically a stable IT backbone and well-organized infrastructure that provides many opportunities while offering real-time help to decision-making and data access. Such a framework integrates numerous functionalities of different or single-storage structures and helps customers or service providers to manage and view the massive data set. However, data from the archive is not easy to access, and ERP faces numerous difficulties, such as source migration and reuse of applications. To prevent these issues, the web's software-based application must consider various considerations such as financial limits, protection difficulties, and a convergence of time and processes (Lee & Wang, 2019). According to Dutt et al. (2018), the SaaS model of software as a service is helpful for providing business applications in an optimal and economical manner. The scalability capacity has been limited, multinational technologies are readily accessible, and market process sophistication has decreased (Venkatachalam et al., 2012). There has been a focus on designing an efficient ERP for web deployment centered on SaaS, which will increase device efficiency.

2.8 Case Study

The hospitality industries increasingly join the popular viewpoint through ERP software through AI. Several upgrades have also occurred in many hotels that would be successful and grow in the industry with the emergence of an intelligent hotel and have experienced multiple device upgrades. The competition factors are

concentrated within four aspects: interactive intelligence, humanization of the scene, personalization of encounters, and computerization of knowledge. The hotel is just the medium and access to the housing. In terms of data transmission and insight, existing processes are being integrated more and more, thereby transforming how data are processed, combined, and accessed. Fusion of knowledge into the cloud ensures the guests have a 360-degree view. In the sharing of knowledge, networks are rising ever more effectively. The hotel would be located in an area accessible to signals, and a smarter device would effectively forecast the staff details and requirements. Various cloud systems cannot accomplish the probability of complete integration and seamless perfect wisdom either by an absence of centralized data or by the integration of data warehousing, and no analytical method can anticipate and thoroughly execute decision making. The future continues to take form, and several hotel brands and corporations have contributed millions of dollars to developing this smart device.

2.9 Privacy Preservation

The digital transformation is omnipresent and drives ERP businesses to introduce more machine learning algorithms to accelerate informed decision-making in real-time. ERP programs have also begun combining case studies with companies' massive information, cloud, and computational resources. Data security, however, is also a concern. Data protection is at the forefront of a confidential information-trained machine learning model. Data privacy is essential to a confidential information-trained machine learning model. Neither successful firms nor scholarly attempts in the medical sector can advance if they cannot access confidential medical data in a maintained data security format. Ramifications of the implementation of an ML model without completely knowing the occurrence of the hidden layers may be catastrophic, and the subsequent risks can have legal implications. The data anonymization in the training set, which eliminates all personal details, is a starting point to safeguard privacy. Online streaming services host millions of videos that are watched simultaneously. However, the robust Deanonymization technology has been demonstrated by Narayanan and Shmatikov (2019), who utilized public data from streaming service data from the identified users and other possible sensitive data. According to Dwork and Pappas (2017), differential privacy research has indicated that the principle of privacy adapted to the study of privacy, under which the object is to learn about the whole population while preserving the privacy of each citizen, meaning that the scheme is ultimately as robust in its enforcement regardless of whether a particular person opts for or interacts with it. This intuitively captures the notion that the performance distribution of the mechanism is influenced significantly by no individual data. Organizations in possession or custody of personal data, such as patient health data, are cautious regarding their capacity to participate in machine learning (ML), partly because of their confusion about regulation on the application of those details, and partly because they worry that the privacy of individuals might be inadvertently abused during extraction of this information (Carlini et al., 2018).

Gaur (2020b) has focused on the key challenges for ERP companies with respect to training machine learning models on their enterprise data. The methods of overcoming these challenges have also been studied by proposing data anonymization and differential privacy techniques. Data privacy is at the forefront of a confidential information-trained machine learning model. Companies with income and even academic initiatives in the medical sector cannot advance if the accurate knowledge is not available in a confidential format. The consequence of implementing a machine learning model without a complete comprehension of what occurs within the secret layers can be catastrophic, and the resultant risks may be legal. Data security strategies have also continued to develop in recent years. The area of AI privacy continues to grow, and organizations and individuals face an awareness void that compromises or undermines privacy.

It is necessary to transform a machine learning-based model into a privacy-preserving model without challenges. However, some challenges must be dealt with to preserve privacy. These challenges are reverse engineering of training data, pilferage of model weights, and backdoor memorization. The most significant is the reverse engineering of training data, while others are not an issue. It is necessary to address this challenge as ERP systems are the pillars of any organization, and sensitive data is stored here (Gaur & Mathar, 2020).Any customer data which contains sensitive information that can uniquely identify a customer requires privacy-preserving. For the purposes of combating computer training problems, numerous techniques of data retention are categorized into anonymization methods and differential methods of data privacy.

2.9.1 Anonymization

Usually, data is anonymized by deleting or swapping private information with random values. This is, however, deeply inadequate and deteriorates the anonymity when opponents receive additional details on the persons seen on the dataset. It has confidentiality databases in its key system in current ERP systems for

anonymization processes (SAP, 2020). Anonymity of data takes effect at the stage of the view, and the data is unchanged at the table level. ERP schemes have two distinct types of anonymizations: k-anonymity and data masking. In addition, the customized concept of anonymization views, access reporting views, and incorporation into the authorization framework may also be added (Wang & Chang, 2002). Anonymisation approaches also provide the following:

1. Enterprises with invaluable benefits consumers may utilize anonymized data without inferring the privacy of individuals.
2. Assistance with anonymous personally identified data processing and machine learning scenarios.
3. Boost consumer ROI by exploiting the importance of organizational data
4. Efficient data mining on confidential data allows extracting lessons from information that cannot be used in advance.

Data masking is another tool to anonymize further data, which aids in shielding confidential DBAs and broader access for power users. Critical details are displayed or hidden for certain people through this approach.

2.9.2 Differential Privacy

Differential data privacy is a statistical ML model that maintains privacy and applies noise and randomness to a dataset while preserving possible denial without impacting the sample distribution. Individuals cannot be picked in the dataset individually, and the outcomes do not rely on a single data point (Wang & Chang, 2002). For instance, the Laplace mechanism is used by SAP HANA. The sound from a Laplace propagation is so accumulating that a promise occurs, and the concept of susceptibility needs that the maximal effect of an individual on the data set in terms of query results be determined (Gaur, 2020a). To maintain differential privacy, selecting the correct sensitivity should be mandatory; if the sensitivity is larger than necessary, the quality is decreased.

In regard to differential privacy, both individuals enjoy the same protection, as the details from the survey are eliminated. The demonization functionality allows for the restoration of original data. There are several essential properties of differential privacy that render it rich and promising.The privacy deficit quantification is denoted by epsilon ε and is inversely commensurate with privacy security. It is a measure for contrasts between numerous techniques. Loss of privacy means increased security of information. The lack of privacy can be regulated to guarantee a balance between a loss of privacy and precision.

Composition refers to damage quantification that provides interpretation and monitoring of many estimates of total privacy loss. Understanding the action of differentially private mechanisms in the composition helps create and study dynamic, differentially private building blocks. Regarding community secrecy, differentiated confidentiality enables the review and reporting of data breaches generated by individuals such as communities.

Finally, closure under post-processing refers to differential secrecy toward post-processing (i.e., an attacker) that, without more details on the private record, cannot determine a differential algorithm performance feature and less privately. If anyone monitors and disciplines the role of the noise introduced over a long period of time, however, differential privacy may be abused.

2.10 AI Integration

Katuu (2020) has analysed the business studies and scholarly papers, considering ERPs substantially distinct from predecessor schemes such as content resource planning (MRP) and ICP. The researcher has also proposed that the introduction of cloud-based applications, robot process automation, and AI could increase the efficiency of ERPs.

Ijaz et al. (2014) described a concept utilizing a post and pre-implementation functional integration model developed by ERP. Therefore, the enhanced ERP module may provide a different industry sense that includes successful decision-making, improving data protection, business process quality, and improving organizational agility. HOWEVER, the ERP paradigm is more nuanced and demanding and must take into account various abilities and characteristics. Therefore, an appropriate model is needed to estimate and align supplies and demand with integration tools. The strategy, estimation, and preparation process should be established to bring clients and suppliers together for management and decision-making (Chofreh et al., 2020).

The assessment of ERP and e-commerce was addressed by Lee and Wang (2019). The program has also been addressed as an elastic model e-ERP viewing controller for service distribution. The suggested model findings demonstrated that a stable cloud ERP could be efficiently used. The trouble with this paradigm is that the architecture is verified by a lack of creative technique or maturity. There is also a need for an efficient model for comprehensive review and evaluation cloud-based model level of maturity of the system.

Orosz and Orosz (2017) implemented an ERP model of the Microsoft Dynamics AX lifecycle maintenance delivery project for change management methodologies. The proposed model is more fitting to support the long-term survival of the software product. Furthermore, it is suggested that future work could take a cloud-based SaaS problem of privacy and protection guarantee data safety levels.

Gupta and Misra (2016b) indicated a link between a key success driver and a cloud provider categorized as human beings, technology, and organizational variables. They have also implemented an SEM modelling structural equation to assess the network impact, protection, and enforcement results. Two hundred and eight SME respondents were collected, and the relationship between successfully implementing Cloud ERP and organizational factors was found. It was found that the substantial influence of technical factors and people factors is not accomplished by moderating network, enforcement, and protection. In the future, a case analysis with consumers and cloud service providers is expected to test the model.

2.11 Talent Acquisition

HR managers play a key role in talent acquisition, and companies aspire to obtain the best talents (Allen et al., 2007). Talent acquisition is the primary measure of operational performance in this intensely dynamic and global sector (Phillips-Wren et al., 2016). The talent acquisition role requires a significant investment in the growth of the newly working candidates. The appointment of suitable applicants by managers in human resources in the organization thus requires a great deal of commitment to ensure that the organization works efficiently (Das & Kodwani, 2018). The market has intensified due to the advent of the internet, and innovations allow quick access to prospective HR management career applicants.

Many major multinational corporations have introduced their talent acquisition technologies. Studies have concentrated on TA-recruiting technologies (Kapoor et al., 2018), applicant recruiting AIT (Van Esch et al., 2019), e-recruitment (Melanthiou et al., 2015), work automation, recruiting Blockchain (Onik et al., 2018), and the effects of technology (Martinez-Gil et al., 2019). Organizations aim to find trained candidates who can fulfil the technological, functional, and operational criteria. Organizations compete with one another to locate suitable individuals (Dries, 2013). AI is transforming the talent acquisition roles of organizations. The selection process for talent acquisition has improved the employer brand, diversity, applied to recruited ratio, and greater applicant experience, and helps recognize and promote creativity in an organization (Albert, 2019). AI lets HR administrators enhance talent acquisition functions, but it still comes with inconveniences. For example, due to algorithmic programming that chooses men to function on app creation, the procurement tool used by Amazon was orientated towards female applicants (Dastin, 2018).Research on technological adoption has focused on a number of models of technology acceptance that address the personal adoption of IS (Shih et al., 2010).

2.12 Network Security

The presence of online cloud storage for ERP raises many security problems with the transition to this computing paradigm, including intrusions detection. The intrusions and attacks appear to defeat conventional intrusion prevention mechanisms, thereby lacking network security (Iqbal et al., 2016). However, the data analysing, processing, and detecting intrusions in the cloud through the conventional approach becomes costly with respect to time, budget, and computation (Idhammad et al., 2018). Therefore, there is a need for flexible and dispersed cloud intrusion detection system techniques. Self-learning capabilities combined with machine learning in order to improve device efficiency have been suggested by (Lin et al., 2019). The data is analysed and combined with features and adaptive security-related data collection to introduce virtual threat detection. The machine learning method can identify and segment patterns from various data from multiple sources. It can learn from experience and can adapt to new ideas and knowledge. This method can address and optimize the protection and decision-making problems in a cloud storage setting. Hence, the machine learning method provides stronger outcomes than the conventional approach.

The IDS is a tool to track and warn about suspicious network traffic behaviours(Delamore & Ko, 2015). It often identifies suspicious traffic or malicious transactions, while the principal function identifies and monitors irregularities. IDS occasionally offers false warnings about malicious behaviour. In order to detect daily traffic and malicious acts, IDS must also be optimized and trained annually. Types of IDS differ from a small network to a huge network of computers. IDS are generally classified into active and passive. If the passive IDS is detected, it warns against the malware and the indicated logs but not action. In addition to logging and alertness, the system (Zhang & Meddahi, 2017), the active IDS, takes appropriate action. The operation consists of shutting down the entries, resource restriction, and IP address blocking. Based on the implementation, an IDS is split into either a Network-based IDS (NIDS) or a Host-Based IDS (HIDS). NIDS is used for traffic and network state monitoring where local device logs are the object of the HIDS.

The NIDS is a framework that analyses and tracks all of its inbound and outbound network traffic network equipment (Condomines et al., 2019), following many hosts concurrently. It correlates multiple attacks without affecting the functionality of the host. It may detect invisible attacks from one host (Saxena et al., 2017). The attack behaviours spread and are observed across the public network. IDS must manage various formats of audit documents. IDS is also a critical method for detecting infrastructure and data network threats. HIDS tracks critical data (Gautam & Om, 2016) and may detect malicious traffic and irregular NIDS-free network packets. Both the internet device and business network are fully available for HIDS. The host may even detect harmful traffic if the host is corrupted with viruses and is attempting to propagate to other devices. It is more widely used on the host goal even though some functions can be consolidated and host data obtained (Hou et al., 2019).

Blockchain is a set of specialized knowledge exchanged and synchronized throughout multiple locations and areas. Moreover, the organization has no central management or a centralized server, which is one of the motivating factors behind creating non-represented digital money (Miglani et al., 2020). In terms of encryption of money forms, such as bitcoin, these promises are not plentiful with electronic funds. Blockchain nodes concurrently monitor all to keep everybody honest (Caliskan, 2020). The general flow of a process for Blockchain is shown in Figure 5.

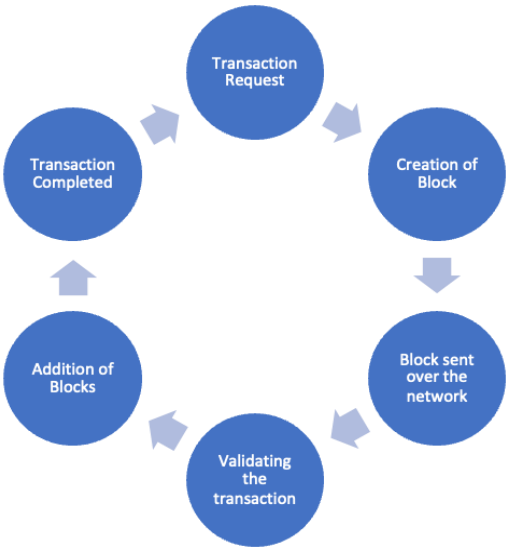

Fig.4: Blockchain Process

ERP programming manages and streamlines these huge market forms. It is a sort of database core that helps a collaboration to work easily and continuously with integrated applications (Papathanasiou et al., 2020) in the same way the Blockchain uses a continuously varied archive, which facilitates checking of concepts, measures, and implementations, as the ERP structure utilizes the executive framework. If cryptocurrencies are being utilized, it allows easier accounting for vendors, customers, and corporate associates. Cryptocurrency is very beneficial for businesses. Digitally cashed items can be bought and sold quickly. The ledgers and journals can be held across the Blockchain, and even the balance can be conveniently preserved. Cryptocurrency is a valuable instrument for ERP and blockchain management and is necessary to update and maintain the online financial records for the particular ERP blockchain module, as shown in Figure 5 (Albayati et al., 2020).

IBM's Oracle Business software division has tried to merge the Oracle ERP cloud blockchain arrangements to leverage the transparent framework it offers. There are three attributes of the ERP blockchain (Pandian et al., 2020). The first is a system of suppliers who are willing to demonstrate interest at all times, including customers, dealers, bankers, logistics suppliers, and other business associates. Second is the digitalization of modes of industry relevant to the exchange of commodities, administrations, and other services. Last is the sharing directory where all business participants in the device or network may be safely reached. The trouble with current ERPs is that they routinely conduct inefficient, expensive, and defenceless trades.

In comparison, the exchanges are exorbitant to track and monitor. Recently, this was a challenge without a solution before Blockchain-enabled strides on the scene. Blockchain transactions are supposed to be stable, trustworthy, and unchanging for all participants worldwide. These attributes enable individuals to streamline inefficient and unnecessary practices throughout their ERP with a different approach, which saves time in regard to meetings, minimizes expenses, and essentially reduces risks in the company. Moreover, the Blockchain allows for confidence-building among co-workers to streamline potential trading (Banerjee, 2018).

2.13 Research Gap

From the above review of literature, it can be observed that there is a need for an effective ERP model by integrating software as a service. For instance, Katuu (2020) uncovered a need to enhance the performance of ERPs with the integration of cloud-based services that include robotic process automation and AI. Similarly, Ijaz et al. (2014) presented an ERP integration model developed with post and pre-implementation dynamics. However, the presented ERP model is more challenging

and complex, and thus different competencies and features must be considered.

Lee and Wang (2019) explored the evaluation of ERP and e-commerce and also discussed the software as a service delivery and elastic model view controller e-ERP. However, the problem with this model is absence of an innovative methodology or maturity model toward verification of the architecture. Thus, an effective model needs to analyse and validate the model in-depth with cloud-based service-oriented architecture maturity levels (Kress, 2018; Pulparambil & Baghdadi, 2019; Raines, 2018).

Orosz and Orosz (2017) introduced an ERP model with a change management methodology. The researchers also recommended the adoption of privacy and security questions of cloud-based SaaS, which can ensure the security level of data. Hence, the present research focused on investigating how integrating AI and S- machine learning into an effective ERP model with integration software as a service for both users and service providers would enhance the privacy and security of data in a cloud database system.

2.14 Summary

Existing ERP systems are not supporting the digital business needs due to a lack of ability to scale up and integrate with the Application Programming Interface (API). The purpose of the study was to investigate how integrating AI and S- machine learning into cloud service platforms can enhance the cloud ERP system. Some cloud ERP software includes SAP Business One, Oracle ERP Cloud, and SAP S/4 HANA. A qualitative research method was used to investigate the use of a cloud-based ERP modelamong a sample size of 20 participants. In this literature review, the researcher studied the possibilities of using AI in ERP systems to simplify tasks. Detailed past literature was analysed, and a strong gap was identified to frame the methodology. The integration of AI to the cloud service platforms can improve the Cloud ERP systems. It is suggested that a qualitative methodology can be implemented by collecting appropriate data. In Chapter three, the methodology used for the current study is explained in detail.

III. LIMITATIONS OF THE STUDY

Within this study, some limitations were present. As stated by Theofanidis and Fountouki (2018), limitations are factors within a study that may potentially weaken the credibility of the findings. The first limitation of this study was the poor generalizability. The study included a sample of 15 IT professionals, with the findings of each case being a single piece of data relative to that participant. Therefore, the findings from each participant are not generalizable to anyone specific population. Because of this, it is difficult to generalize the findings across the entire population of IT specialists or organizations who may adopt the IT processes analyzed. This study does, however, provide a framework for studies that could improve the generalizability of results in the future. By increasing the sample size and including individuals who work with ERP systems and AI, even if they are not considered IT professionals, future studies may generate results that are representative of a greater population's view. Due to the nature of this study, however, which focused on unique pieces of data gathered from each individual, there were going to be limitations with respect to generalizability.

Prior to the study being conducted, the time required to complete the process of collecting and analyzing data was discussed as a potential limitation. An email within an open-ended questionnaire was sent to all participants in this study, with no time limit for responses being given. Not placing a time limit on responses opened up the study to possible research bias and errors. Conducting member checking, however, strengthened the accuracy of the data by recruiting the help of the participants to validate the data, such as the transcripts or the preliminary codes. Conducting member checking, therefore, helped to mitigate the potential limitations arising from the time taken to gather questionnaire results from the participants.

This study relied on several assumptions included with the data collection and data analysis process. The two main assumptions were that IT professionals who participated in the study would be truthful when providing answers to the questions and the second assumption was that these IT professionals had the knowledge and experience necessary to be involved in this study. These assumptions comprised another limitation of this study, as there was no definitive way to determine whether the participants' responses were truthful or to definitively state whether participants had the necessary adequate knowledge. Although steps were taken to ensure that participants were professionals in either AI, Machine Learning, Cybersecurity, or Cloud Services, it is important to recognize that each individual's perceived skills in these areas do provide a limitation to this study's results. Even though assumptions are self-evident truths within a study (Theofanidis & Fountouki, 2018), it is important to recognize that these assumptions can also result in limitations within the study.

While qualitative research was the right choice for this study, qualitative research cannot be used to determine statistical relationships between variables. Qualitative studies can provide indications that

relationships may exist, but only quantitative studies can determine whether those relationships truly exist. This current study provided a variety of insights into IT professionals' perceptions regarding AI integration into a cloud-based ERP or SaaS. This is useful in that it helped to provide a broad overview of experts' perceptions regarding AI integration into these systems. One of the limitations of this study, however, was that it did not provide complex data with respect to how AI can help to improve the efficiency of cloud-based ERP systems or how it can improve the security of these systems. This leaves room for future research that can be conducted when a larger number of organizations have integrated AI into their cloud-based ERP and SaaS systems. A quantitative study could then be conducted to analyze whether there is any correlation between increased efficiency or improved security due to AI integration.

IV. IMPLICATIONS FOR FUTURE STUDY

This qualitative study demonstrated that IT professionals believe integrating an AI model into cloud-based ERP and SaaS can help to improve work efficiency. This has positive implications for all businesses and organizations moving forward that may look to implement AI into their cloud-based ERP or SaaS. This theme highlighted various aspects of increased efficiency, including optimized solutions, simpler and more accurate processes, reduced business risks, and fewer updates required by the model. This finding provides a strong basis for future studies which could focus on analyzing businesses that have integrated AI into their cloud-based ERP and SaaS. Specifically, these attributes of efficiency could be the variables analyzed in a quantitative study analyzing whether there is a correlation between increased efficiency in these variables and the integration of AI.

The fifth finding determined that IT professionals perceived that the security of an ERP Cloud-based system was optimized by integrating AI. This finding has positive implications at both the individual and organizational levels. Individuals may benefit because AI will help prevent unauthorized access to their data, while the utilization of intelligent IP tracking will also help prevent hackers who could harm individuals. Organizations and businesses will also benefit as a result of the security issues believed to be addressed by AI. This finding regarding the security issues which are addressed by AI integration also provides a basis for significant future research. Specifically, future quantitative studies may be conducted utilizing a sample of both organizations that have integrated AI into their cloud-based ERP system and organizations that have not. The aim of these studies would be to determine whether the integration of AI has had a statistically significant impact on reducing security issues, including persistent storage redundancy, identity management, and multi-layer security.

Although this study highlighted the benefits of implementing AI into cloud-based ERP and SaaS systems, it also emphasized several challenges which will arise because of this integration on top of both the human resources and infrastructure, which will be critical for effective AI integration. Within finding two, several challenges of integrating AI into cloud-service ERP and SaaS were identified. Ensuring user adoption, high costs required at scale, restrictions to the movement of data, need for large training data, and AI's limited flexibility were all identified as challenges that could arise when integrating AI. This array of challenges highlighted that it might not be in the best interest of all businesses to integrate AI into their cloud-based ERP or SaaS. Rather, it is critical for businesses to review both the costs and benefits of AI integration prior to implementing AI. This provides the basis for an interesting phenomenological qualitative study analyzing the reasons why specific organizations may or may not have decided to implement AI. Regardless of the efficiency and security improvements associated with AI integration, these challenges highlight how those decisions regarding AI integration must still be made at the individual organizational level.

Finding three indicated that infrastructure and human resources are necessary to fully implement an AI into a cloud service ERP or SaaS. One of the main implications of this finding is that the benefits of AI integration also perceived by the IT professionals cannot be received without a level of resource input. Businesses looking to integrate AI should be made aware of these findings, as it is important for them to recognize the costs and resources associated with AI integration. This recognition of the resources needed for AI integration forms a strong basis for future studies which could be conducted to determine whether the efficiency and security benefits associated with AI integration will outweigh the time and expense requirements of the initial integration. This research could be conducted over several years with the sample, including businesses and organizations that have implemented AI into their cloud service ERP or SaaS.

The two research questions addressed in this qualitative study produced five main themes discussing the positive benefits of AI integration into cloud-based ERP or SaaS, the challenges that could arise, and the best practices and resources needed for AI integration. As a result of these insights shared by IT professionals, a variety of positive implications for individuals and organizations

have been highlighted in this research. At the same time, these findings have also demonstrated that, due to the potential challenges arising from AI integration, AI implementation may not be the best decision for every organization. Because of these challenges, there is a gap in the literature that can be addressed by future studies that may analyze whether the predicted efficiency and security improvements have occurred because of AI integration. Additionally, research should be conducted into the processes followed during AI implementation to determine how companies have maximized improvements following the integration of AI into their cloud-based ERP or SaaS.

V. CONCLUSION

ERP systems offer widespread benefits and services to the entire enterprise. ERP systems aid the enterprise by sharing and transmitting information and data across all functions units inside and outside the enterprise (Mayeh et al., 2016). AI is a relatively new technological innovation that further provides leaders the opportunity to improve management performance (Borges et al., 2020; Brock & Von Wangenheim, 2019). The problem addressed by the current study was it was not known how IT professionals perceive the integration of AI and S- machine learning into cloud service platforms in the enhancement of the cloud ERP system. The purpose of this study was to explore the perception of IT professionals regarding the integration of AI and S- machine learning into cloud service platforms in the enhancement of the Cloud ERP system. Based on the problem identified, two research questions were posited to gather IT professionals' perceptions. The first research question was,what are the perceptions of IT professionals regarding the use of an AI model to integrate SaaS and ERP? The second research question was, what are the perceptions of IT professionals regarding how AI can be integrated in order to enhance the security of using an ERP cloud-based system?A phenomenological qualitative study was conducted to gather the perceptions of IT professionals with respect to the two research questions. The theoretical framework of the study was informed by the philosophical tenets of hermeneutics as a lens for interpreting phenomena (Gadamer, 2008). Thematic analysis of the perceptions of 15 IT professionals included in this study resulted in five key themes determined from the data.

Within the existing literature, there was an array of evidence to suggest that AI integration could improve working efficiency, while there was also significant discussion regarding how AI could influence data privacy and security of cloud-based ERP and SaaS. The five key themes which arose from this study built off the existing literature and provided answers to the two research questions posited at the beginning of the study. The first, and one of the most important themes, found that IT professionals perceived that the use of an AI model to integrate SaaS and ERP helped them to perform their work efficiently. Additionally, the fifth finding indicated that IT professionals perceived that the security of an ERP cloud-based system was optimized by integrating AI. The second finding indicated an array of challenges that could be faced during the AI integration process. Finding three highlighted the resources necessary to integrate an AI model, and finding four highlighted the best practices for developing and implementing an AI model. Overall, these five findings show that AI integration into a cloud-based ERP or SaaS may improve work efficiency and increase security. The remaining three findings delved into the challenge regarding AI integration and the various elements necessary to overcome these challenges.

This study provides a strong foundation for future research into organizations that have begun the process of integrating AI into their cloud-based ERP and SaaS systems. There is a gap in the literature that can be addressed by future studies that may analyze whether the predicted efficiency and security improvements have occurred because of AI integration. Additionally, research should be conducted into the processes followed during AI implementation to determine how companies have maximized improvements following the integration of AI into their cloud-based ERP or SaaS. The use of AI, specifically in cloud-based ERP or SaaS, is an emerging field and an area of scholarship which should be further analyzed in the future.

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