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Using Cloud-Based ERP Solutions for Real-Time Supply Chain Visibility and Decision-Making

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ABSTRACT: Today, with the rapid development of business, it is very important for companies to be able to monitor and respond to supply chain events within real time to keep business units in the industry running and competitive. However, one strongly feels that to achieve this level of visibility, cloud-based Enterprise Resource Planning (ERP) solutions are a necessary tool to streamline the supply chain process and improve the capability to make excellent business decisions. The aim of this study is to understand the significance of use of cloud-based ERP solutions to supply chain visibility and how it impacts business performance. Using a literature review and detailed case studies, we examine the benefits, limitations and benefits of best practices for the adoption and use of these solutions. This shows the great practical value of utilizing cloud-based ERP systems in terms of advantages like responsiveness, data quality, and operational agility. It presents important conditions for implementation success that can benefit companies aiming at improving supply chain operations and maintain healthy competitiveness on a market that has become more and more volatile.

KEYWORDS: Cloud-based ERP, Supply Chain Visibility, Decision-making, Real-Time data, Supply Chain Management.

I. INTRODUCTION

In the current era when businesses have become globalized and compete in a highly competitive environment, the efficiency of the supply chain is more important than ever. One of the current realities that we have faced is that we need real-time visibility into the supply chain operations in order to meet customer expectations and stay ahead of our competitors. Fragmented data, an absence of integration, and an inability to respond quickly all point to traditional inefficiencies of supply chain systems. Therefore, businesses are actively searching for creative solutions that will offer end-to-end visibility of their supply chain activities with the required timeliness. Enterprise Resource Planning (ERP) solutions for cloud-based enterprises have proved to be a resource capable of addressing these challenges by allowing businesses to access real-time data and make informed decisions rapidly [1].

Cloud-based ERP systems will include various business processes such as inventory management, purchases, logistics, and sales under a single package available from any location. It is a centralized approach, meaning that all stakeholders in the supply chain, including suppliers and end customers, can operate using the same accurate and up-to-date information. Real-time sharing and communication of data across all levels within the supply chain allow a business to react quickly to disruptions, monitor product movements, and forecast inventory and supply needs [2].

Since the shift from on-premise systems to cloud-based solutions, many benefits have emerged. As the technology is scalable, flexible, and offers lower infrastructure costs, cloud technology is suitable for businesses of any size to implement sophisticated solutions without a substantial capital investment. Additionally, cloud-based ERP systems often include advanced analytics, artificial intelligence (AI), and machine learning (ML) tools that help companies gain actionable insights from real-time data and make better decisions [3] [4].

Nevertheless, cloud-based ERP solutions for real-time supply chain visibility and decision-making have their own advantages but also face challenges. These include data security concerns, integration with existing systems, and the need for proper training and change management [5]. To maximize the potential of cloud-based ERP solutions, organizations must overcome these hurdles [6].

The aim of this study is to examine the aftermath of cloud-based ERP solutions for supply chain visibility and decision-making. We examine through a review of the literature and case studies the benefits, challenges, and best practices of

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adopting these solutions. Our aim is to provide insights that businesses can use to implement cloud-based ERP systems most effectively to enhance process efficiency and secure a competitive position in the market [7-9].

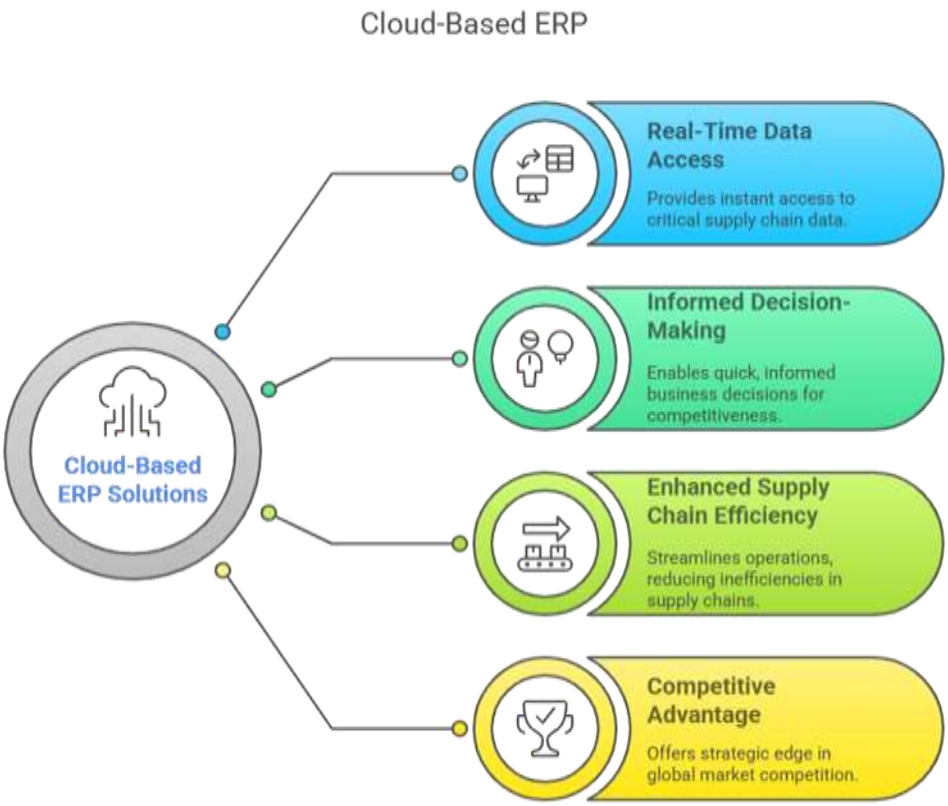

Figure 1: Illustrates Cloud based ERP

In Figure 1 image gives an overview of the main benefits to acquiring cloud-based ERP solutions for supply chain management. These solutions depend on Real Time Data Access which gives businesses immediate access to very important supply chain information, and the ability to respond to events quickly. Another key benefit of cloud-based ERP systems is Informed Decision Making: Using cloud-based ERP systems allows businesses to make faster, data driven decision their decision that helps in business competitiveness. They also support Executive Supply Chain Efficiency through streamlining operations and reducing inefficiencies to boost performance. Fourthly, they provide the Competitive Advantage in that they enable business organizations to possess a strategic advantage in the global market, being able to be adapted and responsive in response to a change business environment.

II. LITERATURE REVIEW

Today's technology advances have had a significant impact on the integration of technology as a large part of supply chain management. The growing expectation from businesses to provide faster and more efficient services is creating an enterprise resource planning (ERP) systems demand through the cloud that helps in not only gaining real-time supply chain visibility but also enhancing decision-making abilities. This literature review is an attempt to study the implementation of cloud-based ERP solutions in supply chain management, analyzing the advantages, uses, and challenges of implementation.

In the figure2 below, the key components and associated challenges for applying cloud-based ERP systems to improve supply chain operations are shown. Because it is centralized, data is available for businesses to access immediately, and the sharing of real-time data enables the business to respond quickly to disruptions, monitor product movements, and

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forecast the needs for supply. They also make use of the latest in advanced analytics and AI to generate actionable information that allows businesses to make more informed and correct decisions. First of all, cloud-based ERP solutions are scalable and flexible, enabling a business to grow and adjust itself to ever-changing demands. However, issues resulting from data security concerns, integration with existing systems, training, and adequate change management must be addressed to make it successful [11-15].

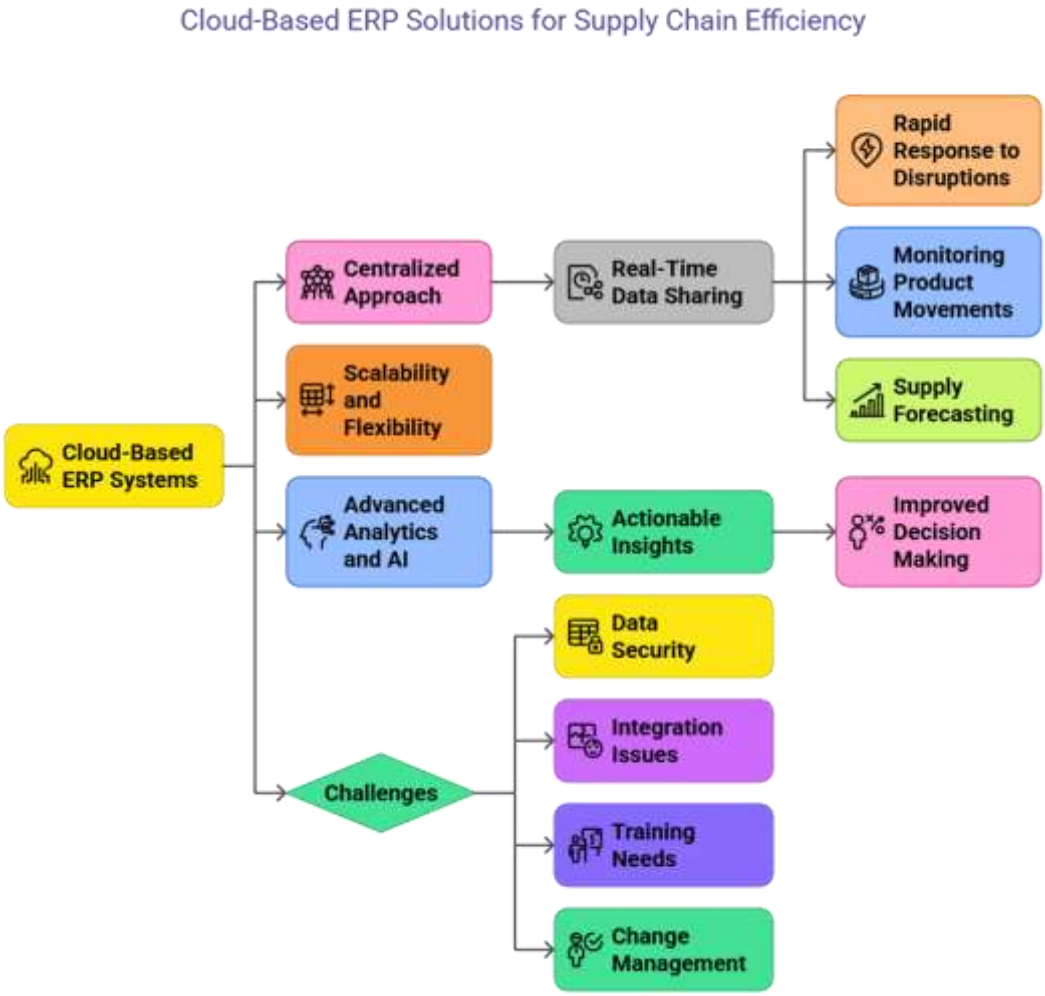

Figure 2: cloud-based ERP systems to enhance supply chain efficiency

Real-Time Visibility in Supply Chains

Supply chains have become too complex and too fast to lose visibility. Since this means visibility to track and monitor supply chain activities such as levels of inventory, product movements, shipments, and suppliers' performance in real-time, it is called visibility. This level of visibility, according to Chopra and Meindl (2016), promotes responsiveness to disruptions and optimization of processes [16]. Typically, traditional supply chain systems were hindered by fragmented data, manual processes, delays in data updates, and so on. On the other hand, cloud-based ERP systems have integrated data from multiple sources and provided a unified platform where we get solutions with updated and accurate information [17]. This enables businesses to make effective decisions, coordinate across functions, and manage risks effectively [18].

The real-time data access that the Cloud ERP solution delivers to stakeholders involved in the supply chain, i.e., suppliers, logistics providers, and distributors, makes it easier for them to have a single source of truth [19]. Zhu (2018)

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noted that as companies serving global supply chains collaborate to deliver products on time and in accordance with customer expectations, they must also share data in real time between themselves, and various other companies involved in the process [20] [21]. Tracking product movements, stock level monitoring, and proactive problem resolution [22] [23], for example, adjusting shipments or production schedule to cope with possible delays of stockouts. Supply chain visibility shown in below Figure 3.

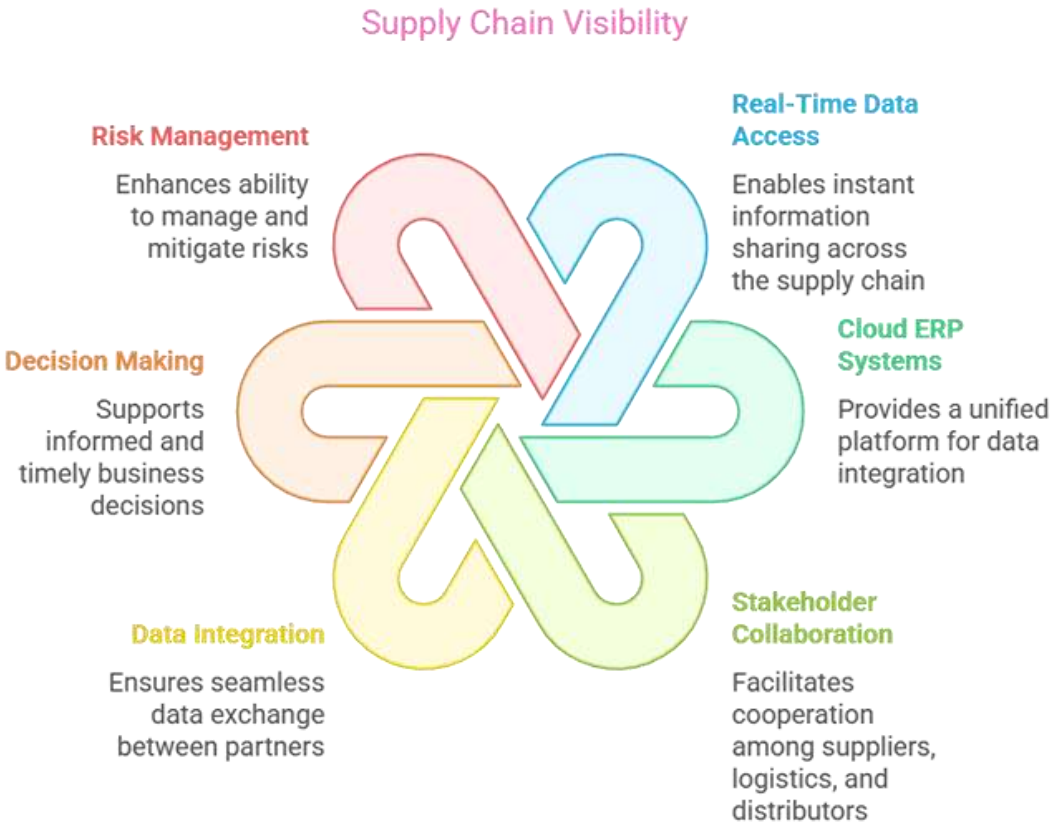

Figure 3: Supply Chain Visibility

Benefits of Cloud-Based ERP Solutions

For an organization willing to make the least cost, the expense of any ERP advancement will typically cover. That is one of the most significant advantages lying at the hands of data management: the centralized technique. Cloud ERP systems integrate key business processes such as procurement, inventory management, sales, and production to reduce data silos and facilitate information flow through departments. This capability allows integrating real-time information on different aspects of supply chain operations to improve better decision-making. Also, since the centralized data management decomposes the complexity of many systems into one, it provides higher transparency for the organization.

Cloud-based ERP solutions also have the added advantage of scalability and flexibility. These systems become important to support businesses growing or fluctuating demand without having to spend on new infrastructure. Since cloud-based systems are naturally scalable, various businesses can increase or lessen the features and resources it needs based on their requirements. The advantage that cloud ERP solutions provide in the way they address upfront costs makes them especially suited for small and medium businesses, which for the most part would not be able to afford an on-premise ERP system due to the high cost involved. Schoenherr et al. (2015) also add to the overview by emphasizing that the ERP systems can be accessed at any time if there is an internet connection, and from anywhere, which leads to enhanced flexibility [23] [24].

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Apart from real-time visibility and data integration, cloud ERP systems also leverage advanced analytics and AI to enhance the depth of supply chain performance analysis. In cloud-based ERP platforms, according to Mishra et al. (2017), AI and machine learning can be integrated to increase the accuracy of predictions, optimize inventory levels, and identify bottlenecks and inefficiencies in the supply chain. These predictive insights give companies the ability to act proactively in adjusting their production schedules or re-distributing inventory before problems arise. As noted by Jain and Tan (2018), AI-driven decision support systems enable businesses to enhance forecasting accuracy and reduce the time and resources needed to run supply chain operations by automating manual decisions and highlighting important issues [25-30].

Challenges in Cloud-Based ERP Implementation

As there are significant advantages in adopting cloud-based ERP for supply chain management, there are many challenges that organizations have to deal with when they try to introduce such systems. The biggest issue when adopting solutions via the cloud is data security. The cloud systems store sensitive information in external servers, and organizations will have to be concerned about the risk of data breaches or unauthorized access. As noted by Martínez-Moyano et al. (2019), protecting the supply chain data's integrity and confidentiality in the cloud is a challenge that requires tight security measures, such as encryption, multi-factor authentication, and regular security audits. Data protection regulations have only added to the complexity of the security landscape for businesses with operations in different countries, for example, regional and international data protection regulations (such as GDPR).

Yet another vital thorn in the side for businesses is integration with existing processes and systems. Most organizations run ERP solutions that are difficult to easily integrate with cloud-based solutions. Often, when migrating from legacy software to a cloud ERP system, you need to integrate or replace legacy software, which can be a complex and time-consuming exercise. In their work, Bendoly et al. (2015) emphasize the significance of careful planning during the integration phase — which includes an in-depth investigation of existing systems and processes, as well as determining possible bottlenecks or resistance in the system [31].

Furthermore, cloud ERP systems should be successful when training needs are addressed, and effective change management measures are carried out. ERP systems deployed on the cloud usually bring changes in workflows, business processes, and technologies, and users need to be sufficiently trained to use the new system. Harrison et al. (2019) pointed out that organizations ought to have training programs to assist employees in adjusting to the new system and provide them with ongoing support to help them grasp the new methods. Other than that, employees may also be hesitant to accept the new technology. Clear communication, involvement in the implementation, as well as leadership support are crucial in managing this resistance to ensure the successful rollout of cloud ERP systems [32-40].

III. TUNING SUPPLY CHAIN WITH ERP

Supply chain is all the processes that are from suppliers to customers. The more efficient your supply, the more profitable business. Keeping your supply chain running at or near top performance should be made possible by ERP. If paying attention to ERP supply chain inputs can help improve the business performance, imagine what can do when you set a tremendous effort in recording, analysing and utilising this data in order to achieve that.[41] That's why most ERP systems offer supply chain modules in a built-in manner. Your system even though has no separate module for the supply chain, it still has imperative information that can help you in efficiently managing supply chain [42].

The customer is on both sides of the supply chain. The customer buys in the beginning it ends when the customer receives complete satisfaction of the purchase. All those between the two events mentioned would be part of the supply chain. Having your ERP system will give your insight in all the things that occur in terms of the supply chain, you can in effect manage the process better as you know what's going on and when it's going on. It is very important when you are tuning your supply chain in your best results [43].

A company's oversight of the supply chain is more critical when the supply chain is extended to more partners, such as overseas, the more so as the supply chain lengthens. They brought new levels of complexity in the form of everything from container tracking to the clearance of goods through customs by foreign partners, in particular. It is extremely difficult to handle these new complications without accurate information [44]. Moreover, domestic supply chain gives more information granularity to you to be able to make better and a more profitable decision. These days, shippers, mainly trucking companies, are increasingly using GPS based systems to find out every mile of an item's journey, and

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let their customers know where and when it will arrive. Only if you can integrate it into your supply chain management, this information is invaluable. Such an integration and resulting better control over shipments and inventory are available through the offer of your ERP system [45].

A tremendous benefit of the visibility provided by ERP in increased supply chain is the ability to exert tight control of inventory. The reduced markdown of the sales will provide an opportunity to cut inventory levels and WIP by moving more closely with what is required and reducing your inventory slack. This is a big benefit because even a small decrease in inventory and related categories (i.e., WIP) would lead to huge profit improvement [46].

ERP can also speed up the process of inventory and materials flowing through the supply chain by illuminating how long the whole chain really takes. If you carefully look at what those reports are indicating, in some cases you might find you are spending money on shipping and you can save money by cutting inventory costs by switching to express shipping [47]. ERP of the supply chain can also provide leverage in the negotiation with suppliers, shippers and other partners of supply chain. But you may be able to do orders that are smaller or less frequently, controlled tight enough by supply chain. You can further use the info from ERP to also fine tune your shipping schedules so you can get products near when you need them and less inventory lingering in the warehouse.

Generally, the case is that integrating your supply chain information more closely with your ERP system is fairly easy. First, the main consideration is data integration – getting the data from your supply side in one form or the other into a format that your ERP system understands and uses [48]. Well, this will require some reprograming or adding another module in your ERP system, but with a good consultant this shouldn't be that complicated.

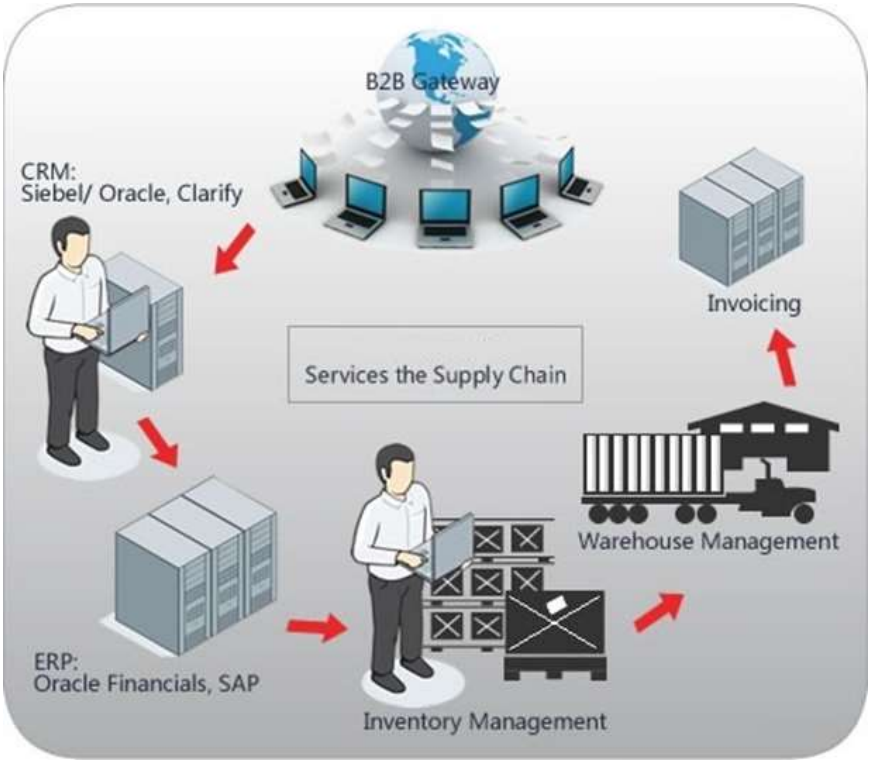

Figure 4: Tuning Supply Chain With ERP

IV. IMPLEMENTATION

Organizations need to overcome multiple implementation obstacles when deploying cloud-based ERP systems to reach the full level of these solutions. Data security stands as the main point of concern [49]. Cloud systems' external server storage of organizational data makes them exposed to threats of cyberattacks and unauthorized access as well as to data breach incidents. Organizations must create robust security protocols which combine data encryption with multi-factor

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authentication and permanent security protocol monitoring. The research team led by Martínez-Moyano et al. (2019) concludes that business organizations consider data protection challenges to be vital when moving their information to cloud platforms [50]. The General Data Protection Regulation (GDPR) alongside Health Insurance Portability and Accountability Act (HIPAA) norms require strict compliance requirements when organizations handle sensitive personal or financial data. The protection of sensitive information stands as a key priority in cloud-based ERP adoption because inadequate protection could bring about reputation damage combined with regulatory penalties and monetary expenses.

The implementation of cloud-based ERP systems faces substantial difficulties when it comes to integrating different systems. Most companies operate with existing ERP systems or other business applications that need integration with new cloud-based ERP solutions when they migrate to such platforms [51]. The integration process tends to be elaborate and simultaneously time intensive and expensive to manage. According to Bendoly et al. (2015) businesses encounter difficulties in uniting data structures and workflow patterns and data communication protocols between their original and upgraded systems in cloud ERP integration efforts. Data transfer and synchronization become restricted due to potential compatibility problems between the systems. Achieving a proper integration demands both extensive planning and testing along with focused teamwork among IT staff along with ERP vendors while including other organizational stakeholders. Bad integration between cloud ERP and legacy systems may cause multiple problems including data errors and operational breakdowns while reducing the ability to improve supply chain efficiency [52].

A cloud-based ERP system requires both successful training and change management in addition to solving technical execution issues. Effective use of cloud ERP systems demands proper employee training since these systems come with new workflows, functionalities and tools. The author Harrison et al. (2019) states training stands essential to achieve proper implementation of cloud-based ERP solutions. The organization must customize training platforms to meet the specific requirements of diverse user groups starting from management to front-line employees so they learn to maximize the system for better operational results [53]. Systems that lack proper training generate operational problems alongside errors and user reluctance to use the system. Organizations need to handle resistance to change because employees tend to fear implementing new technologies and transformation of familiar procedural systems. Kotter (1996) explains that leadership needs to communicate effectively while engaging staff in transformation processes as well as providing ongoing assistance to decrease employee resistance. Successful implementation of cloud ERP needs change management strategies which include setting practical goals together with benefits-based adoption programs and continuous technical assistance [54]. A combination of inadequate computer system training and insufficient organizational change management can prevent businesses from achieving the full benefits of cloud-based ERP and result in wasting their investment [55]. Figure 5 gives challenges in cloud ERP implementation and workflow of SCM.

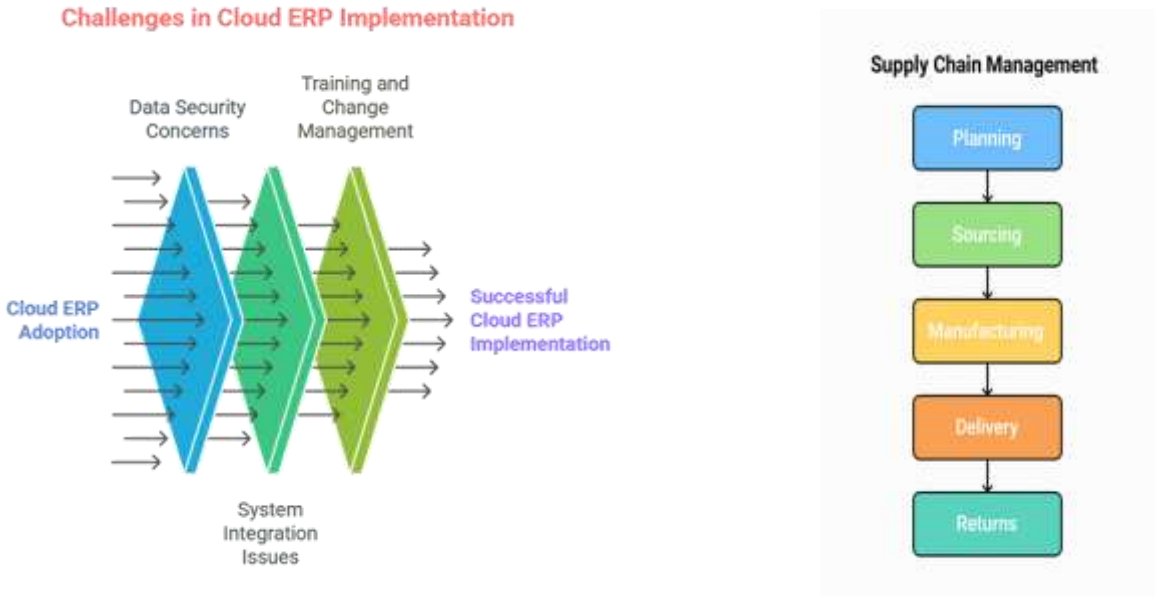

Figure 5: Implementation Challenges and workflow of SCM

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Supply Chain Management (SCM) consists of multiple stages that the flowchart represents in order to guarantee efficient product delivery between suppliers and consumers [56]. The SCM process starts with Planning that includes demand forecasting together with resource allocation and strategic development. Sourcing follows Planning by allowing businesses to find select suppliers and control purchasing operations to acquire production materials. The Manufacturing phase concentrates on product transformation through the development of finished goods through quality checks and production efficiency enhancements [57]. After product completion the Delivery phase starts its operations through logistics management and warehousing while providing transportation services to send products to customers [58]. The Returns stage deals with returns together with repairs and product exchange processes to ensure customer satisfaction while managing post-sale issues. Clear visual boxes in each phase display the sequential nature of supply chain progress from one step to the next to present an all-inclusive overview of the supply chain sequence [59].

Table 1: Comparison table for the Cloud, On-Premise, and Hybrid ERP systems, including key categories like advantages, limitations, insights, applications, and challenges

Category	**Cloud ERP**	On-Premise ERP	Hybrid ERP
Advantages	Real-time data access enhances decision-making (Zhu, 2018)	Full control over data security and customization (Bendoly et al., 2015)	Combines flexibility of cloud-based systems with control over sensitive data (Schoenherr et al., 2015)
Limitations	High dependency on internet connectivity for real-time data access (Schoenherr et al., 2015)	Higher upfront costs due to infrastructure and maintenance (Schoenherr et al., 2015)	Requires integration of both on-premise and cloud systems (Schoenherr et al., 2015)
Insights	Cloud-based ERP provides centralized visibility across global supply chains (Zhu, 2018)	Advanced forecasting tools may require expensive add-ons (Olhager, 2013)	Works well for organizations that need both control and flexibility (Bendoly et al., 2015)
Applications	Improving supply chain visibility, monitoring product movements, and optimizing logistics operations (Zhang et al., 2020)	Offers localized visibility, which may not be ideal for global supply chains (Schoenherr et al., 2015)	Can be used for both local and global supply chain visibility (Olhager, 2013)
Challenges	Data security concerns related to cloud storage and third-party service providers (MartÃnez-Moyano et al., 2019)	Integration with newer technologies is limited (Bendoly et al., 2015)	Integration with both systems can lead to additional technical challenges (Mishra et al., 2017)

A comparison table 1 for the Cloud, On-Premise, and Hybrid ERP systems, including key categories like advantages, limitations, insights, applications, and challenges.

V. CLOUD ERP SYSTEM EVALUATION PROCESS

An organized procedure must be followed to examine an organization's requirements together with cloud-based ERP solution options as well as advantages and obstacles of deploying ERP systems through the cloud [60]. Organizations follow multiple assessment phases to select systems which function with their business targets and improve operational performance while maintaining future growth requirements.

Define Business Objectives and Requirements

The first step in the evaluation process is to clearly define the business objectives that the ERP system is intended to address [61]. These could include streamlining operations, improving financial visibility, enhancing customer service, or reducing operational costs. Specific requirements such as inventory management, production planning, or supply chain visibility must be identified based on business needs [62].

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Key Considerations:
- Understand the specific functions and processes that need improvement.
- Define short-term and long-term business goals.
- Prioritize features (e.g., real-time reporting, mobile access, integration with other software).

Assess Current IT Infrastructure
Evaluate the existing IT infrastructure to understand how it integrates with the cloud ERP system. This includes assessing current ERP systems (if any), network capabilities, data storage, and cybersecurity frameworks [63]. This step helps determine whether the existing setup can support the cloud ERP system and if any upgrades are needed.

Key Considerations:
- Assess the scalability of the current IT infrastructure.
- Identify potential issues with internet bandwidth, data transfer, and network reliability.
- Ensure alignment between cloud ERP's requirements and existing infrastructure.

Evaluate Cloud ERP Vendors
The next step is to evaluate different cloud ERP vendors. This evaluation should be based on the vendor's ability to meet business needs, the quality of support provided, the flexibility of the system, and the costs associated with implementation and maintenance [64]. Some key areas of focus include:
- Vendor Reputation: Research the vendor's history, customer reviews, and case studies.
- Security: Ensure that the vendor complies with industry standards and regulations (e.g., GDPR, HIPAA).
- Scalability & Flexibility: Evaluate the ability to scale the system as the business grows or pivots.
- Customization Options: Assess how much customization is possible and whether the vendor offers configurable templates.
- Integration with Existing Systems: Ensure that the cloud ERP system can integrate smoothly with existing software applications (e.g., CRM, HRM).

Key Considerations:
- Review the features and functionality of cloud ERP solutions offered by each vendor.
- Compare the cost of implementation, licensing, and ongoing support.
- Assess vendor's data protection and disaster recovery protocols.

Conduct a Pilot or Proof of Concept
A proof of concept alongside a pilot project should be performed prior to a complete deployment. The organization can evaluate the ERP system performance in authentic operational conditions through this testing method to validate its business compatibility [65]. The system effectiveness should be evaluated through key performance indicators during the pilot operation period.

Key Considerations:
- Test core functionalities such as reporting, user interface, and mobile access.
- Evaluate system performance during high-demand periods (e.g., system load tests).
- Involve end-users in testing to ensure the system is user-friendly.

Consider Cloud ERP Deployment Models
Cloud-based ERP systems can be deployed in different models based on the organization's needs. These include:
- **Public Cloud:** The system is hosted by a third-party vendor and shared with other customers. This option is cost-effective and scalable but may raise concerns over data privacy and control.
- **Private Cloud:** The system is hosted on private servers, providing greater control and security but potentially higher costs.
- **Hybrid Cloud:** Combines both public and private clouds, allowing businesses to keep sensitive data on private servers while using public cloud services for other tasks.

Key Considerations:
- The choice between public, private, or hybrid cloud depends on security needs, data privacy concerns, and regulatory compliance requirements.

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Table 2: Cloud ERP Deployment Models with Examples and Values

Deployment Model	Description	Benefits	Drawbacks	Best for	Examples	Estimated Cost (per month)
Public Cloud	Hosted by a third-party vendor and shared with other customers. It is cost-effective and scalable but may raise concerns over data privacy and control.	Cost-effective, scalable, and easy to set up with minimal management required.	Concerns over data privacy, control, and reliance on third-party vendors.	Small to medium businesses, startups, or organizations with lower security and regulatory requirements.	Dropbox, Google Drive, AWS EC2, Microsoft Azure	$20 - $500 (depending on usage)
Private Cloud	Hosted on private servers providing greater control and security but potentially higher costs.	Greater control over data and security, ideal for highly regulated industries or businesses with specific compliance needs.	Higher costs for infrastructure, maintenance, and security. Requires more IT management.	Large enterprises or businesses in highly regulated industries (e.g., healthcare, finance) with stringent security and compliance needs.	IBM Cloud Private, Oracle Cloud Infrastructure, VMware Cloud on AWS	$500 - $5000 (depending on scale)
Hybrid Cloud	Combines both public and private clouds, allowing businesses to keep sensitive data on private servers while using public cloud services for other tasks.	Combines the benefits of both public and private clouds, offering flexibility and scalability while maintaining control over sensitive data.	Complex integration and management of both cloud environments, with potential higher costs.	Businesses needing both scalability and control over sensitive data, typically large organizations with diverse needs.	Microsoft Azure Stack, AWS Outposts, Google Anthos	$1000 - $10000 (depending on combination)

In order to show the table 2 which illustrates Cloud ERP deployment model, their benefits, drawbacks and describe best fit businesses, examples, authors and estimated cost. To enable a centralized approach to decision making about computing thin layer combined deployment models (Public Cloud, Private Cloud and Hybrid Cloud), this table compares all the three deployment models.

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Evaluate the Total Cost of Ownership (TCO)

A cloud ERP system requires organizations to pay multiple types of costs which start with software purchase fees alongside installation expenses while continuing with recurring expenses such as licensing fees and maintenance services and upgrade investments and support fees [66]. Organizations need to account for direct costs together with indirect costs to fully understand their financial obligation when implementing cloud ERP systems [67]. Figure 6 Cost Breakdown of cloud ERP.

Key Considerations:

- Initial costs of software and hardware (if applicable).
- Ongoing subscription or licensing costs.
- Costs for training, implementation, and change management.
- Long-term costs for system upgrades, customization, and vendor support.

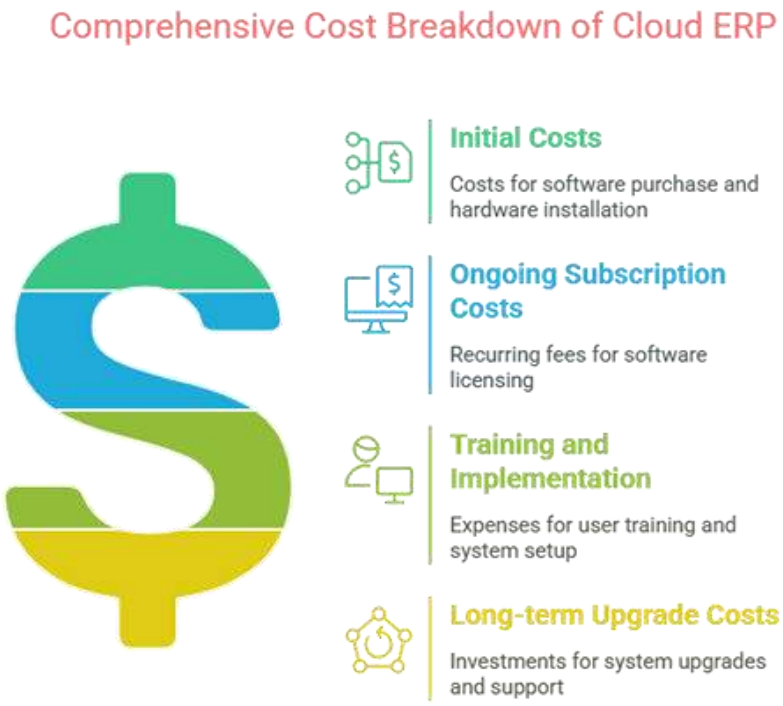

Figure 6: Cost Breakdown of cloud ERP

Consider Change Management and Training

A cloud-based ERP system implementation requires change management for achieving successful adoption and deployment [68]. A detailed strategy must exist for staff transition to the new system together with training protocols [69]. The transition requires end-user training while documentation helps people use the system effectively along with proper support throughout the change process [70].

Key Considerations:

- Develop a comprehensive training program for all users.
- Create support resources such as guides and FAQs.
- Prepare for potential resistance to change and manage it through communication and leadership involvement.

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Monitor System Performance and Continuous Improvement

Organizations need to monitor their implemented ERP system continually in order to verify its value delivery. The collection of KPI data must happen frequently and end-user input must be obtained to make changes and optimizations [71]. Figure 7 gives ERP system performance monitoring and improvement.

Key Considerations:

- Set up real-time monitoring for performance and data accuracy.
- Conduct regular system reviews and updates.
- Continuously refine processes based on feedback and evolving business needs.

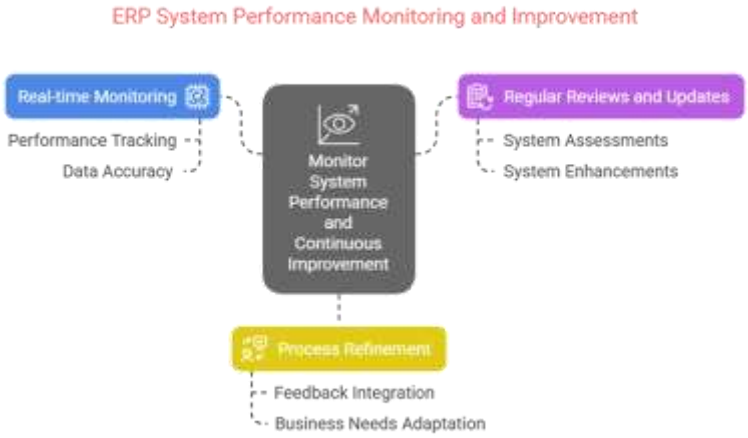

Figure 7: ERP system performance monitoring and improvement

Implementing cloud-based ERP systems requires thorough evaluation of multiple elements starting with requirement mapping followed by vendor selection and infrastructure inspection coupled with system scalability evaluation [72]. The key to successful implementation requires formal methods for establishing business targets and system testing before system deployment and change administration and ongoing system optimization to adapt with organizational development needs [73]. Organizations can achieve complete cloud-based ERP solution potential through this system implementation process. Figure 8 shows evaluation process of cloud-based ERP systems [74].

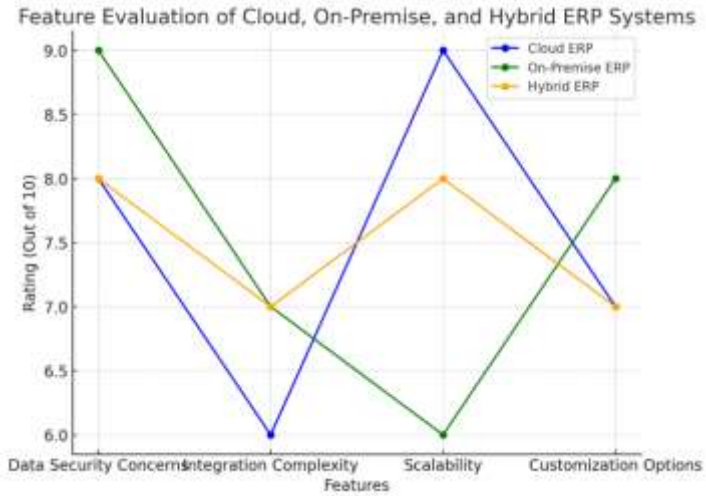

Figure 8: Evaluation process of cloud-based ERP systems

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VI. REAL-TIME APPLICATION OF CLOUD-BASED ERP SOLUTIONS FOR SUPPLY CHAIN VISIBILITY AND DECISION-MAKING

Cloud-based ERP solutions produce their most significant immediate effects when used by retail manufacturing and logistic companies who require comprehensive supply chain monitoring [75-85]. Real-time applications of cloud-based ERP solutions appear in retail industries such as manufacturing and logistics as they demonstrate the following functionality:

Example: Global Retailer (e.g., Walmart)
Industry: Retail
Cloud ERP Solution: SAP S/4HANA Cloud, Microsoft Dynamics 365, Oracle ERP Cloud
Walmart as a worldwide retailer implements cloud-based ERP systems to handle its elaborate multi-tier supply chain management activities throughout various business sectors and geographic regions [86-90]. The retailer operates a supply chain network which needs real-time coordination of thousands of supplier's manufacturers and distribution centres for maintaining stock levels and managing logistics while fulfilling customer demand [91].

Figure 9: Cloud ERP Impact on Retail

Key Features in Real-Time:

- Walmart tracks its worldwide inventory across all locations through real-time dashboard capabilities which encompass warehouses distribution centres as well as retail stores [92]. Through this system the retailer maintains automatic inventory updates which decreases stock-running out and stockpiling risks and enhances forecasting accuracy.
- The cloud ERP system tracks and supervises the complete order sequences starting from customer purchases through online or physical stores. Walmart optimizes delivery routes after product availability verification while also directing orders to right warehouses through this system [93]. The system activates automatic supplier reorder processes when product shortages or supply chain breakdowns occur to maintain inventory restocking.
- Supplier Integration and Collaboration enables Walmart to use a platform which allows real-time supply data entry from suppliers regarding inventory readiness and delivery planning schedules [94]. Walmart together with its suppliers benefit from information sharing which allows them to make operational adjustments that improve delivery efficiency and reduce delivery delays for product shipments.
- The ERP system enables Walmart to execute real-time data analytics which helps the company make decisions through performance assessments of its supply chain activities. With AI and machine learning functionality built into the system it becomes possible to forecast market demand changes together with supply chain interference risks and

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vital information points [95]. The system demonstrates the capability to identify unexpected product demand spikes by suggesting supply chain route changes together with necessary restock procedures.

- The cloud-based ERP system through its optimization features improves both logistics operations and distribution processes. Real-time inventory and demand data allows the system to find optimized shipping routes and enhance delivery times and minimize operational expenses through shipment consolidation. Multiple local orders can be combined by the system into a single shipment that leads to lower transportation expenses [96].
- The returns process and reverse supply chain function more efficiently with cloud-based ERP systems. The system tracks actual-time returned products while it updates inventory levels as well as manages customer refunds and exchanges. The retailer achieves quick returns handling together with product redistribution at different locations to minimize waste and enhance customer satisfaction [97].

Impact:

- The implementation of real-time data enables Walmart to enhance its supply chain management through efficient operations and shorter lead times and less manual involvement which results in better operational outcomes.
- Geared toward customer satisfaction is the real-time inventory tracking system that delivers exact delivery predictions and full order visibility producing smooth operations.
- Cloud ERP provides businesses with cost-saving features which minimize supply chain stockholding expenses and lower inventory depletion frequencies and enhance delivery logistics efficiency.
- The cloud solution allows Walmart to extend operations by making it simple to handle expansion across new territories and supply base growth with simultaneous adaptation of changing customer demands.

Time-based deployment of cloud-based ERP solutions for supply chain management makes it possible to achieve superior visibility together with better decision-making abilities along with enhanced operational efficiency. The systems that Walmart uses as a global retailer deliver complete and real-time information to help the organization handle changing demand patterns while avoiding operational disruptions while enhancing their supply chain functions [98]. The combined approach delivers both business superiority and quick and affordable service delivery to customers with outstanding quality results.

The table 3 presenting Cloud-Based ERP solution parameters and applications for real-time supply chain management now appears in this document. The framework contains definitions together with advantages and technological elements that handle moments from inventory status following to order process administration to supplier coordination and beyond [99-105].

This table presents comprehensive information about essential features which cloud-based ERP systems use for real-time supply chain management [106]. The system includes essential features which enable real-time inventory tracking for optimal stock management and it contains dynamic order management to ensure precise order delivery. Supplier Integration helps in collaboration and product availability whereas Real Time Data Analytics uses AI and machine learning to make the demand forecast and advanced the operations [107-109]. The delivery efficiency and efficiency of handling returns and exchanges through refunds benefit from Logistics Optimization improvements as well as Returns Management simplification. The advanced technologies consisting of cloud ERP, RFID, GPS and predictive analytics support each parameter which boosts operational efficiency as well as improves decision-making capabilities.

Table 3: Cloud ERP Parameters for SCM

Parameter	Description	Benefits	Key Technology Used
Real-Time Inventory Tracking	Tracks inventory in real-time across global locations to optimize stock levels and prevent overstocking or stockouts.	Reduces stockouts, minimizes overstocking, improves demand forecasting.	Cloud-based ERP, RFID, Real-time data integration
Dynamic Order Management	Manages the entire order lifecycle, from order creation to delivery, ensuring accurate and timely fulfilment.	Ensures timely order fulfilment, reduces errors, and enhances customer experience.	Cloud ERP, API integration with e-commerce platforms
Supplier	Integrates supplier data into the	Fosters collaboration with	Supplier portals,

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Integration and Collaboration	system to enable collaborative adjustments for demand and supply needs.	suppliers, improves replenishment cycles, ensures product availability.	Cloud ERP, Real-time data exchange
Real-Time Data Analytics for Decision-Making	Uses AI and machine learning for predictive analytics, helping to forecast demand and optimize supply chain processes.	Improves decision-making, helps anticipate disruptions, and reduces waste.	AI, Machine Learning, Cloud ERP, Predictive analytics
Logistics and Distribution Optimization	Optimizes shipping routes and consolidates shipments in real-time, reducing logistics costs and improving delivery timelines.	Lowers transportation costs, ensures timely deliveries, improves operational efficiency.	Cloud ERP, GPS, Route optimization algorithms
Returns Management	Streamlines the returns process, updates inventory levels, and processes exchanges or refunds efficiently.	Enhances customer satisfaction, reduces waste, and speeds up the return process.	Cloud ERP, Return management systems, Integration with logistics

VII. CONCLUSION

A new trend of cloud ERP solutions has greatly helped organizations to visualize the supply chain with similar experiences like on ground, as well as making better decision on supply chain management. They provide a number of advantages, including better operational efficiency, improved resource use, better supplier and partner collaboration. Cloud ERP systems are able to achieve this because they integrate key supply chain processes like inventory management, order fulfilment and logistics, and generate fast, data driven business decisions which are needed in today's move fast market. In particular, companies can respond proactively to disruptions, minimize the impact of such disruptions to supply chain performance, and reduce costs by being able to track and analyze the real time data. While cloud ERP adoption also includes challenges like data security concerns, integration complexities and need for comprehensive training and change management, yet it opens up opportunities for wider adoption, enhanced flexibility, increased transparency, minimal infrastructure, better collaboration and timely responses to the demand and supply of products and services. While many of companies face these challenges, the benefits of cloud –based ERP such as scalability, flexibility and cost effectiveness have made them a valuable resource for companies wishing to stay ahead among their competitors. After all, cloud ERP systems will fulfil an important part in the supply chain innovation and sustained success for various businesses as they all continue to reorganize to their changing market dynamics.

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