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THE IMPACT OF ERP SYSTEMS ON BUSINESS PROCESSES

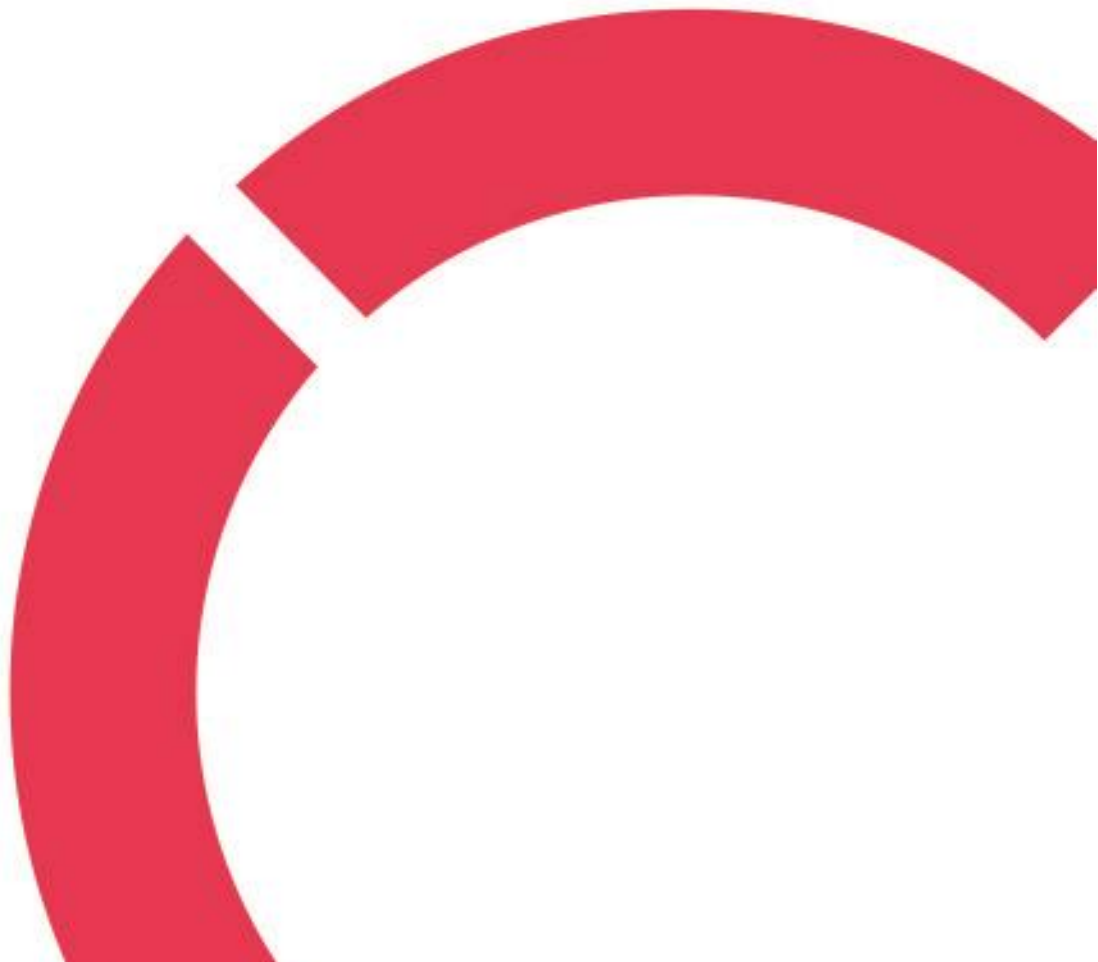**How the implementation of an ERP system automates business processes, improves efficiency, productivity, and profitability**

ABSTRACT

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Over the years, production cost for businesses have been increasing at a rate that pricing cannot be matched with. Also in recent years, competition has drastically increased causing manufacturers and suppliers to seek alternative plans and contingencies for their business processes in order to improve if not maintain their competitive edge. Also, especially as businesses grow in size, key processes such as order and sales management, manufacturing, finance and accounting, inventory management, supply chain management, human resource management, procurement and customer relationship management have become more complex. This calls for a systematic yet flexible method of dealing with such processes. Fortunately, technology has become so advanced giving rise to enterprise resource planning (ERP) system modules that can provide quicker, more accurate, and less complex solutions to this problem.

The purpose of this study was to explore key business processes of companies and examine how the adoption of an ERP system makes them more efficient. The study also seeks to examine potential risks related to the adoption of an ERP system, the harm it may cause and possible solutions. This research also aimed at identifying the ERP modules that should be considered a priority and the deployment method to consider.

Theoretically, this study focused on the introduction of enterprise resource planning systems, some key business processes and how the adoption of an ERP system can influence them.

This research is one of the many studies, which through observation and interviews, have examined the planning and production process of a manufacturing company, as they incorporate the use of ERP systems in a dynamic and competitive environment. The findings from this study provides a contribution to our understanding of how beneficial an effective ERP system can be to a company with many competitors. The findings from this research are particularly useful for companies that are still to adopt an ERP system, especially in choosing the right ERP system for the business and in prioritizing the ERP modules that are most useful to the company. Findings from this research are also useful to ERP vendors by helping them to enhance the functionality, security, and privacy of ERP systems so that they can better serve their purpose.

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1 INTRODUCTION

Continuous increase in the cost of production over the years has been a key challenge to businesses as they seek to maximize profits while satisfying their customers simultaneously. While the world is still struggling to recover from the impacts of Covid-19, war in some economically powerful nations has caused inflation. Businesses are battling with the rapid increase in costs which are partly transferred to their customers. Amidst numerous competitors, just by increasing prices of products would definitely ruin customer relationships and result in a loss of their competitive edge. This struggle has created a steadily increasing gap between rising costs and rising prices. This warrants the need for companies to adopt new methods of managing their production processes that will minimize cost and save time other than just increasing prices of final products.

Enterprise Resource Planning (ERP) tools would be a valuable and reliable investment for companies trying to beat this bottle neck. ERP systems are designed to integrate multiple operations of a company to a centralized platform, making it possible for various departments to access and analyze data simultaneously from their respective workstations. The main business scenarios include order management, sales management, supply chain management, inventory management, human resource management, customer relationship management, project management, finance, and accounting. ERP systems help to unify these scenarios to an easy platform with their data sources accessible by every department. This makes it easier to analyze and follow up the core operations closely, leading to shorter processing times, faster decision making, improved accuracy and thus, overall improved efficiency.

This study is carried out to appraise the effect of ERP systems implementation on key areas of a business. These key areas include order and sales management, manufacturing, finance and accounting, inventory management, supply chain management, human resource management, procurement, and customer relationship management. This study also aims at identifying problems that may come about as a result of ERP implementation, how they can be prevented, and to find possible solutions.

The research is carried out by interviewing the production manager of a manufacturing company and by observing the business processes of the company within two years of working for them. Analysis will be done on the collected data which will be analyzed, and conclusions drawn based on the findings.

2 ENTERPRISE RESOURCE PLANNING

As earlier mentioned, ERP stands for Enterprise Resource Planning, a term initially given by the Gartner Group back in 1990 (Abdullah & Ambedka 2017, 2). The aim of ERP is to merge the various functional units of a business enterprise in a single suite with one interface, accessible by every unit from individual workstations. To better understand what ERP means, think about the core processes that are imminent to run a company. Core business processes here include processes such as supply chain, finance, human resource, manufacturing, procurement, inventory management and customer relationship. ERP helps to efficiently manage these processes by connecting them in an integrated system (SAP Insights 2023).

2.1 ERP systems

An Enterprise Resource Planning system is a customizable information system that integrates an organization's internal and external information systems into a centralized database (Guavasoft 2017).

An ERP system uses software, hardware and network components essential for operating enterprise resource planning to help streamline business processes such as procurement, finance, supply chain, operations, (Oracle 2023).

ERP systems eliminate the burden of each department in an organization having to ask for heavy information from other departments all the time. With the ERP system in place, each department will have its system customized for their specific tasks but will be able to access other systems through one application.

Figure 1 below presents how ERP systems integrate different functions. It is necessary to dig a little into the history of ERP to better understand the concept.

FIGURE 1. Functionality of ERP systems (Ippolito 2021).

2.2 The history and evolution of ERP

In the mid-20th century, the different departments within organizations operated independently. These companies used unintegrated information systems that could only execute activities of individual departments (Abdullah & Ambedka 2017, 1).

It was such that an organization would have an inventory control information system, a manufacturing information system, a marketing information system, and an accounting information system. These independent information systems were termed silos because each system had its own silo (stack) of information which was not connected to the other stacks. (Monk & Wagner 2013, 20).

Unintegrated information systems leave a lot of room for non-value-added tasks which result in inefficiency. Non-value-added tasks are activities that add no value to a product or service. Imagine printing out information to share with another department because the two systems are not linked in any way. This information will take more than thrice the time to input it into the system by the other department and will increase the chances of input errors.

These independent information systems however worked well within their functional areas but could not stand the test of time as business processes became more complex and the environment became more competitive. Thus, the need for information sharing, speed, and accuracy within organizations. (Abdullah & Ambedka 2017, 2).

The first centralized information system was developed and implemented in the 1960's. This centralized computing system was designed to automate inventory control using inventory control packages (IC). (Abdullah & Ambedka 2017, 2). This inventory automation system is known as the first-generation centralized information system.

Material Requirements Planning (MRP) is known to be the second-generation centralized computing system designed in the 1970's. Material Requirements Planning is a system used by mostly manufacturing businesses to plan production and supply (Jenkins 2022). MRP system basically works by first checking materials at hand (inventory), and secondly determine which ones need to be added, thirdly, the system schedules the purchase of missing materials, and finally schedules production and supply taking into consideration timing, quantity, and cost.

The MRP system helps to balance demand and supply by forecasting customers' needs and understanding inventory trends through data gathered by the system. Previously, this was a near impossible procedure especially for businesses that dealt with many raw materials, many products, and multiple departments that needed to share resources across to enable planning. (Monk & Wagner 2013, 23.)

MRP was quite successful for its purpose back in the 1970's but was not popular due to its high cost of implementation and maintenance. It needed a team of experts to keep it running, and not many people had such skills at that time. Thus, the system was limited to big established companies. (McCue 2020).

Manufacturing Resource Planning (MRP II) is the third generation that came to surface in the 1980's. Just like MRP that helps to plan production and supply, MRP II provides a more precise production plan that eliminates time wasting, minimizes costs and makes maximum use of the materials at hand. The system focuses on making the manufacturing process a lot easier than MRP. Abdullah & Ambedka (2017, 2) explain that the MRP II system includes more features like human resource management, finance, project management and distribution.

Enterprise Resource Planning (ERP) is the fourth generation that came into existence towards the end of the 1980's and the start of 1990's (Abdullah & Ambedka 2017, 2). ERP systems took over with the capability of integrating business functional areas such as project management, inventory management, human resource management and customer relationship management. ERP systems came with more advanced features that identify it as what is currently known today (McCue 2020).

In the mid 1990's, new functions and modules were added to the ERP systems' core modules by developers. As termed by Abdullah & Ambedka (2017), these "add-ons" which include supply chain management (SCM), customer relationship management, advanced planning and scheduling (APS) and e-business solutions, gave rise to "extended ERPs". ERP systems kept on evolving until the establishment of cloud ERP which was first introduced by NetSuite in the late 1990's (McCue 2020). Oracle NetSuite, considered by most companies to be the best cloud-based ERP, was created in 1998 by Evan Goldberg and named NetLedger (Pischke 2022). NetLedger was later launched in 2007. Fisher (2022) defines Cloud ERP as ERP software that operates with the internet instead of an on-premises or local area network. Cloud ERP gives company staff access to their system at any time and location, so long as there is access to internet. In the 2000's, Gartner introduced an even more advanced Cloud ERP system that could collect data from external sources and applications through the internet that makes the ERP system even more useful (McCue 2020).

ERP systems today can unify business processes thereby giving the possibility for them to be controlled through a central server. ERP systems have the power to incorporate enterprise-wide data, automate business processes and generate reports in real time. (Guavasoft 2017).

Figure 2 below shows how ERP systems have evolved since it came to existence in the 1960s till present.
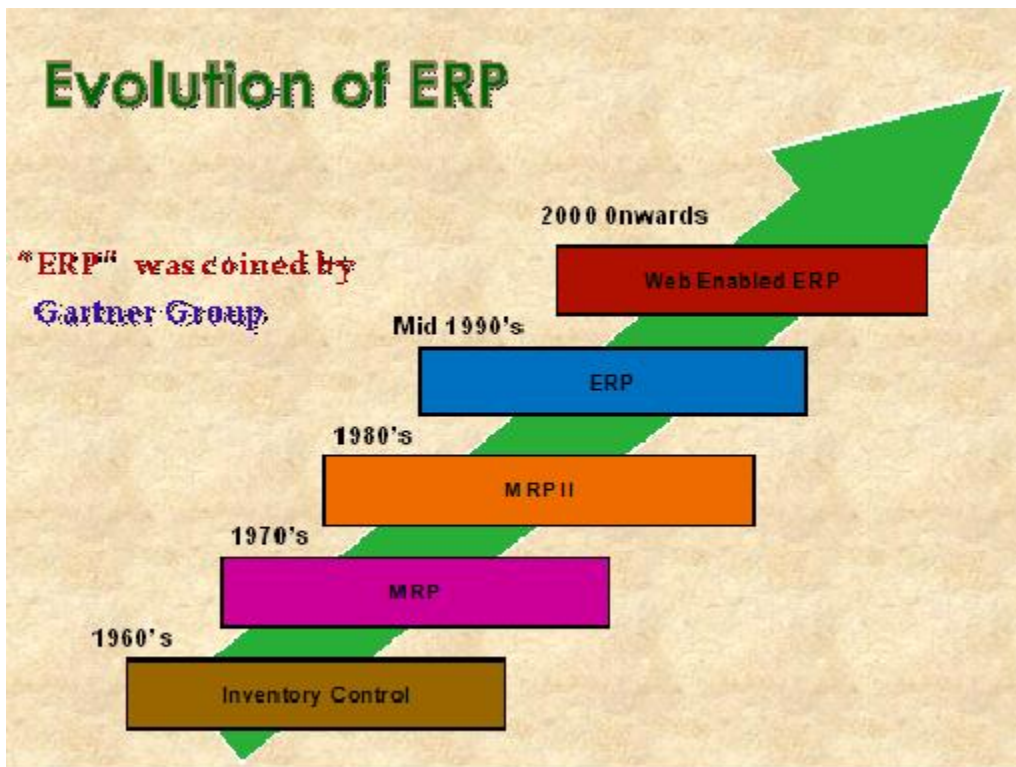
FIGURE 2. The Evolution of ERP (Aves Group 2014).

2.3 Importance of ERP

ERP systems' ability to integrate various departments into a unified central system to promote coordination and streamline business processes are unique features no organization can resist. Abdullah & Ambedka (2017, 3) use an approach of showing the importance of ERP systems by presenting the problems organizations may face with the absence of ERP systems. Organizations will need to purchase and use more than one software for their different activities which may not only be costly but will not allow interaction between them. This will make data collection and information sharing difficult, thereby slowing down the business process. The presence of an ERP system eliminates most of the non-value-added activities, provides uniform data to every department at once and makes the whole business process standard. Basically, ERP helps to synchronize an organization's data into an easy to manage database which then facilitates operations and promotes transparency, thus efficiency. (WallstreetMojo 2023).

2.4 ERP systems deployment

While different companies may require a specific deployment of their ERP system, some companies may choose to adopt more than one deployment. We will better understand what is meant by deployment in the next paragraph when we explain the types of deployments. It is worth noting that no matter the deployment method, there are main features in all ERP systems that make them ERP systems – customization, data transparency and flexibility, centralized system, data availability in real time, automatic information (from linked applications) (Beaver 2020).

There are three main types of ERP system deployment. Firstly, we will talk about the On-premises ERP. This type of software deployment means the ERP software is installed locally on the company's computer systems and servers. It is then managed and maintained by the company's IT personnel. The main benefit of On-premises ERP is data privacy while its huge initial cost of acquiring is a problem.

The second type of ERP system deployment is Cloud ERP. A company that uses Cloud ERP software gets access to it through the internet by using a web browser on their computer systems. Cloud ERP also known as SaaS (software as a service) is offered to companies as a service by the software vendor who also manages and maintains it. (Schwarz 2016). Cloud ERP has a lower initial implementation cost with better management and maintenance since it is managed by the vendors who know their product better than anyone else. Also, there is a lower risk of losing data in cloud computing than when stored locally (in the case of on premises ERP) (Schwarz 2016). One of the most significant advantages of Cloud ERP is its mobility. Cloud ERP can be accessed from any location so long as one has a portable device and internet connection. The most common setback of Cloud ERP is that there may be less data privacy for the client companies who use Cloud ERP since the service is managed externally by the vendors (Beaver 2020).

So basically what makes the big difference between On-premises ERP and Cloud ERP are mobility, ownership, and initial cost of implementing. On-premises ERP can only be accessed on site and on devices which have the installation while Cloud ERP can be accessed on any device with a browser and internet connection. Since On-premises ERP is completely owned by the company, purchase cost, data security and maintenance are also fully their responsibility which are costly. On the other hand, Cloud ERP is offered to companies as a service which they pay for as subscription. Maintenance and upgrading are the responsibility of the vendor. With Cloud ERP, the initial acquiring cost is lower but the total cost in the long run is high as the company needs to pay for subscription periodically. The cost of

ownership of On-premises ERP (Perpetual License) and Cloud ERP (Subscription) over years after implementation is demonstrated in figure 3 below (Hale & Cox 2020).
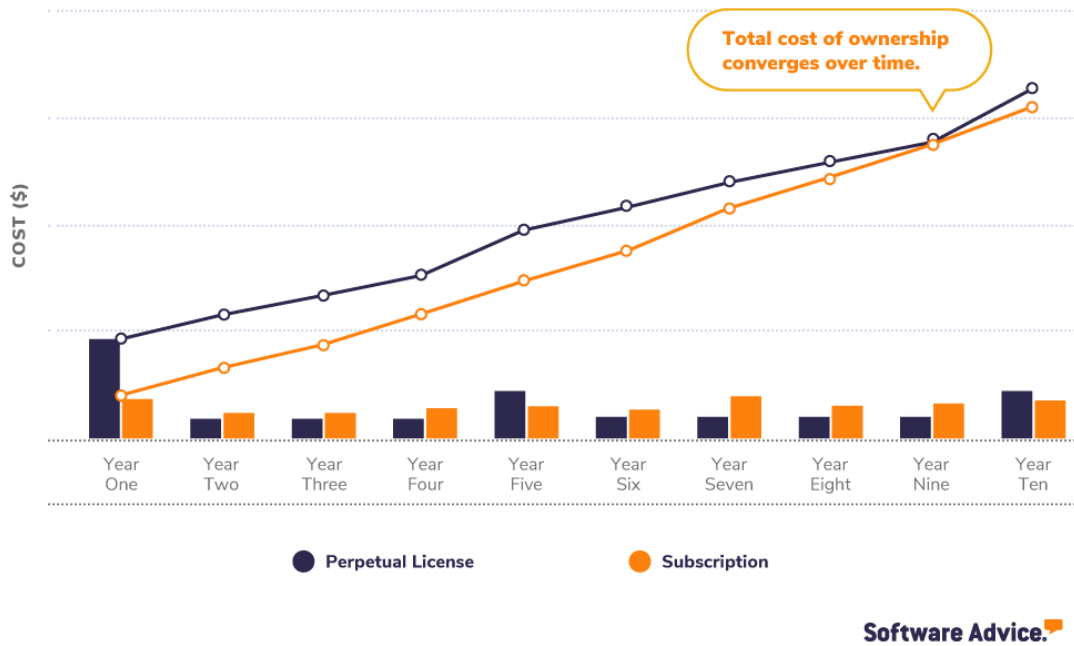
FIGURE 3. Cloud ERP vs. On-Premises ERP (Hale & Cox 2020).

Some companies may choose to implement both On-premises and Cloud ERP systems for other reasons. This leads us to the third type of ERP deployment; Hybrid ERP is a combination of both On-premises ERP and Cloud ERP. Companies after acquiring On-premises ERP may see the need of upgrading in order to meet recent requirements. Most companies in this situation see Cloud ERP as the next option, but due to the challenges that may come with completely discarding the On-premises ERP for a new Cloud ERP, a hybrid ERP is a better solution. There is a possibility of upgrading the ERP system by adding useful cloud applications such as CRM and E-commerce to support the On-premises ERP. Hybrid ERP solution is considered a very useful option as it allows companies to implement necessary cloud applications while maintaining privacy and security of their On-premises investments. (Beaver 2020).

Given the merits and demerits of the different ERP deployment methods, each company's choice depends on their financial capacity and needs (Hale & Cox 2020).

3 BUSINESS PROCESSES AND ERP MODULES

Many companies today know the key areas in their business processes that are essential for success, but all of them adopt the right tools necessary to manage these processes. Amidst fierce competition in the business world with rising technology and high customer expectations, rapidly growing companies are those that have adopted the right tools to manage their business processes and outscore their competitors. Pratt, Mekhala & McLaughlin (2022) define Business Processes as a set of interrelated activities in an organization that collectively help to achieve the organization's goal.

Core business processes in an organization are those processes that create value for the customers and generate income for the company, as well as the processes that ensure accuracy and predictability. Processes such as finance & accounting, human resource management, procurement, manufacturing, inventory, supply chain management, order management, customer relationship management tend to be the most structured processes across companies which we will elaborate on in the subsequent topics (Babb 2023).

Business processes are the foundation on which a company stands and are essential to the company's success. Managing business processes needs a systematic approach to continuously improve them with time by identifying and resolving bottlenecks and loopholes. By managing business processes properly, operations can be automated, time wasting is eliminated, costs reduced, and customer satisfaction improved. Thus, greater efficiency and profitability for the company. (Dickmann 2023).

With the rise of technology over the years, business processes can even be better managed by using software. Thankfully, advanced ERP systems have been designed containing various modules that can manage corresponding business processes in an automated way and even integrate the various processes so that they can interact with each other and ease the flow of information. An ERP solution that serves as a shared database for different business processes extracts data from a number of modules assigned to manage each process (McCue 2022). Furthermore, Abdullah & Ambedka (2017, 4) stated that individual ERP modules have been designed in such a way that they can work alone or are linked to an integrated ERP system.

McCue (2022) explained that each ERP module is designed for a particular business function. Each module provides the functionality and data for their corresponding business functions to assist employees. All the modules are linked to the central ERP system so that they are provided with uniform data even if new modules are introduced to the system. These modules can also communicate between them through the central ERP system. The design of individual ERP modules makes it possible to suit the diverse needs of organizations in the sense that organizations can include just the modules that meet their need or financial capacity when purchasing an ERP system. This also provides the possibility of introducing additional modules or changing modules later as the need arises. Figure 4 below shows various ERP modules and how they are integrated into a central ERP system.

FIGURE 4. Basic ERP Modules (ESDS 2021).

3.1 Finance and accounting

Businesses need to keep track of financial operations so that they can make better decisions. No business will operate properly without sufficient finance, which is of course managed efficiently. Wallstreetmojo (2023) describes the function of finance in a business as actions aimed at acquiring and managing financial resources to generate profit. They further explain that the finance function in a business reveals important financial resources and information that contributes to the productivity of

other business functions, to planning and to decision making. Keeping track of financial operations and profitability mainly has to do with financial management and financial accounting.

Financial management that aims at profitability entails strategic planning organizing, directing, and controlling of financial resources for an organization. Factors that aim at profitability while managing finance include sufficient supply of funds when needed, consistent returns on investments, efficient use of funds and creating reliable investment opportunities. (PFH 2022).

Financial accounting entails a sequence of processes and principles by accountants for bookkeeping of financial transactions which are used for decision making. It involves recording, summarizing, and reporting a company's financial transactions such as purchases, sales, payables, receivables through financial statements. (Wallstreetmojo 2023).

Basically, well-structured financial management makes it possible to create long-term plans and facilitates decision making on where and when to invest, liquidity and profitability. ERP systems make the financial management process even easier to achieve the aforementioned objectives. Furthermore, ERP can provide a financial management platform where it combines various financial tools such as payment processing, accounting, fixed asset management and revenue recognition. The system integrates these important components and provides a clear view of a company's financial state in real time. (Strutner 2022).

McCue (2022) considers the finance and accounting module to be the most important ERP module as it enables companies to have a clearer picture of their present and future financial states. The most intriguing features of the finance and accounting module is that it monitors accounts payable (AP) and accounts receivable (AR) and manages the general ledger. This module also generates and keeps important financial data such as receipts, tax documents and balance sheets.

The finance module manages the entire inflow and outflow of money in an organization and can provide any financial data needed to efficiently operate the organization with almost a single click (ESDS 2021). The financial management ERP module can streamline activities related to payments, billings, cash management, account reconciliation, thereby freeing the accountants from multiple manual operations. This enables timely bookkeeping and reporting, which helps to provide timely data for other departments who need financial information to proceed with their activities (McCue 2022).

Apart from automating activities related to the general ledger, AR, AP, account reconciliation and others, modern ERP systems include advanced financial report writers that accountants and financial managers appreciate. ERP system's finance module can be integrated with other applications that manage processes such as procurement, inventory, order, CRM, and HRM. This feature eliminates the need for repeated data entry since the other applications can get the same data from the central source. (Gestisoft 2021).

Figure 5 shows the various functions of the finance module in ERP.
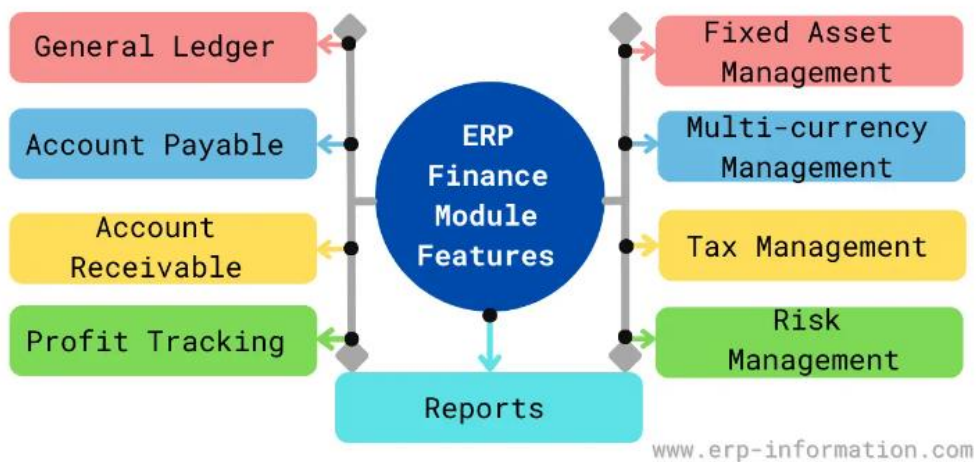
FIGURE 5. ERP Finance and Accounting Module (erp-information.com 2023).

3.2 Procurement

Every business depends on buying goods and services provided by other businesses to keep their operations moving. Procurement involves a set of activities carried out to obtain goods or services. This careful process of selecting and purchasing the goods and services required for a business to operate is as important as any crucial process in a business. Getting the right supplies needed by an organization at the best cost can directly affect profitability. (Reich 2023).

Reich (2023) defines procurement as the process of sourcing, acquiring, and paying for goods and services from vendors or suppliers. She went on to make us understand that many organizations, articles, use the terms "procurement", "purchasing", and "sourcing" interchangeably, but these words represent different activities of the entire procurement process. Sourcing refers to the suppliers or vendors used

for the purchase while Purchasing entails ordering, payment, and delivery. Procurement involves both the former combined and other related activities such as analyses of procurement data and forecasting. Procurement management is very critical to an organization's financial health as it often consumes a greater part of a company's revenue spending. Procurement in most cases requires a cross-departmental effort from supply chain, finance, and some legal bodies. (Reich 2023).

So basically, how the procurement process works as elaborated by Reich (2023) is that it begins first with planning where there is a cross-departmental effort to establish budgets followed by sourcing which involves strategically identifying the best suppliers. Thirdly, orders are placed, payments made, and materials acquired. Lastly, an evaluation is being made using past and current data to establish supplier relationships and prepare for future procurements.

Due to raw material scarcity and fierce competition, companies inevitably need to have more than one supplier. Most companies today deal with dozens of suppliers in a process that involves thousands of invoices and related documentation. To manage multiple vendors and numerous huge data flow, the procurement process needs to be streamlined. This can be done by using procurement software integrated into a central system to automate the entire procurement process and make generated data available in real time to all the teams involved. (Reich 2023).

The ERP procurement module automates the procurement process and helps companies control their spending by efficiently managing supplier relationships and streamlining purchases. This module allows companies to store a list of approved suppliers in the system and link them with specific items which makes supplier relationship management easier. (McCue 2022).

McCue (2022) stated that the procurement module can automate a request for a quote and make it visible in real time to the teams involved. A quote in this case is a document issued by the vendor to the company stating the prices of sale before the company (customer) commits to the purchase. As soon as a company approves a quote, purchase orders can be prepared and sent within the procurement module. The shipments can then be tracked until they arrive and updates the inventory automatically. Figure 6 below shows a summary of the procurement process in ERP.
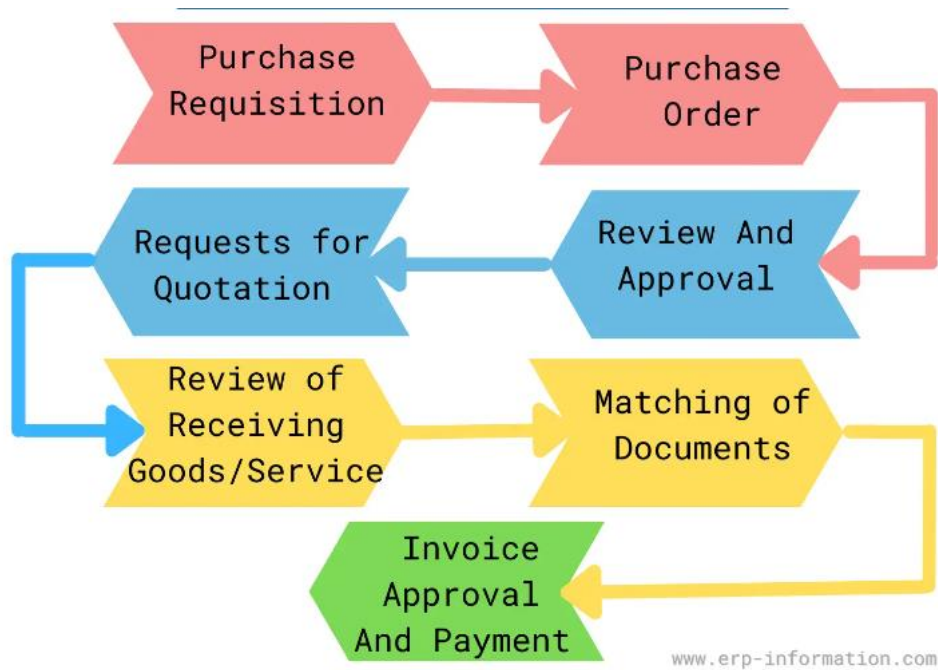
FIGURE 6. ERP Procurement Module (erp-information.com 2023).

3.3 Manufacturing

From food to clothing to electronics to vehicles and heavy machinery, getting the final product involves transforming some raw materials. Manufacturing is the process of transforming raw materials and components into finished and semi-finished products using machinery, labor, and tools (Jenkins 2022). Finished goods are often sold to wholesalers and retailers while semi-finished goods are supplied to other manufacturers who use them as their own raw materials to further manufacture other products.

Jenkins (2022) explained that manufacturing companies typically incorporate a set of resources such as humans, robots, machinery, and computers usually with the help of production lines that enable step by step accomplishments from one workstation to the next until the manufacturing process is complete.

Earlier versions of ERP systems known as Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP II) were primarily designed to help manufacturers plan production and supply. Manufacturing remains a very important aspect of ERP systems with. (McCue 2022).

The ERP manufacturing module that consists of functions such as production planning, machine scheduling, raw material usage, prepares bill of material and track production progress is a great help for manufacturing companies. This module automates the manufacturing process and provides real-time production reports which enables monitoring and production forecast thereby ensuring timely product delivery. The status of goods in progress can be updated during the manufacturing process with this module. Also, it provides data that can help calculate the estimated time to produce items and this helps to compare actual output against expected results. (McCue 2022).

Manufacturing companies typically have a Manufacturing Execution System (MES) software in place to manage and automate manufacturing on the actual production floor. McCue (2022) stated that recent ERP systems include a production management system or MES.

MES acts as a bridge between production and the manufacturing module of an ERP system. The ERP manufacturing module uses information collected by MES from the production floor together with necessary information in the central system generated by other modules to optimize resources and manage demand and supply (Learnware 2023).

3.3.1 Manufacturing execution system (MES)

MES is a versatile software that monitors and controls the manufacturing process and permit data collection from the various machines involved in the entire manufacturing process. MES provides a link between ERP and the manufacturing floor that has the production line, machines, and raw materials, thereby giving those in charge real time visibility of manufacturing operations and data to follow up, evaluate and optimize production.

MES uses multiple sensors installed on machines and tools like barcode scanners to generate real time data on what is happening on the production floor. This includes movement of raw materials and inventory levels of both raw materials and finished products.

Jenkins (2023) stated that, although many other industries use MES, companies that abide to strict regulations such as food and pharmaceutical factories use MES software to enhance quality compliance and traceability by linking the ERP system to the production floor.

One main difference between MES and ERP is that MES systems are integrated directly with the machines on the factory floor for real time monitoring through multiple input devices such as sensors and scanners. On the other hand, ERP systems integrate ERP system modules such as CRM module, HR module, and Manufacturing module. (Jenkins 2023).

MES is considered the linking piece between ERP and production. MES may have different features depending on the software vendor or the design, but the main features of typical MES are real time data collection and visibility, production analysis and ability to track work quality and productivity of machines and employees. (Jenkins 2023).

Figure 7 shows how MES connects the production floor to ERP and the interaction between them.

FIGURE 7. MES integration with ERP (ResearchGate 2023).

3.4 Human resource management (HRM)

The employees in an organization are the human resources. All companies irrespective of the industry need people and their skills to make their other capitals do the required work. The University of Minnesota defines Human resources management as a process of hiring people, training them for the intended work, paying them, developing policies to regulate them, and devising strategies to retain them. In previous years, HRM was known to be more of an administrative role that a strategic role. (M. Libraries 2016).

HRM personnel have the responsibility to develop policies and procedures to ensure employee safety and wellbeing. Human resource managers ensure company and employee compliance to federal and state laws. Human resource managers also monitor employees' engagement and productivity and take necessary actions to maintain efficiency. Most organizations (big and small) consider human resource management a key aspect to make the organisation run smoothly and efficiently. (Coursera 2023).

Recent ERP systems have the capacity to manage human resources of an organisation. The increased number of functions within employee management in modern HRM such as employee personal data, employment type, job description, attendance, pay roll information, skill levels, work history, leaves, has introduced the need for a Human Resource Management system. A system that can merge the data across HRM activities for HRM manages to better do their jobs, and also make the data readily available in the data base for other uses. (Open HRMS 2022).

The HRM ERP module can carry detailed records of all previous and current employees. It can collect employees' attendance through an external hardware used by employees to sign in and sign out each day they go to work which helps to record attendance, overtime, and sick leaves. This module helps to automatically generate and distribute pay checks to each employee. This massively reduce inaccuracies and saves a lot of time. (McCue 2022).

Data from the HR module can assist in determining which areas are over staffed and areas that need more employees. It can also help to better plan and schedule training and development of employees by analysing performance. (Davies 2021).

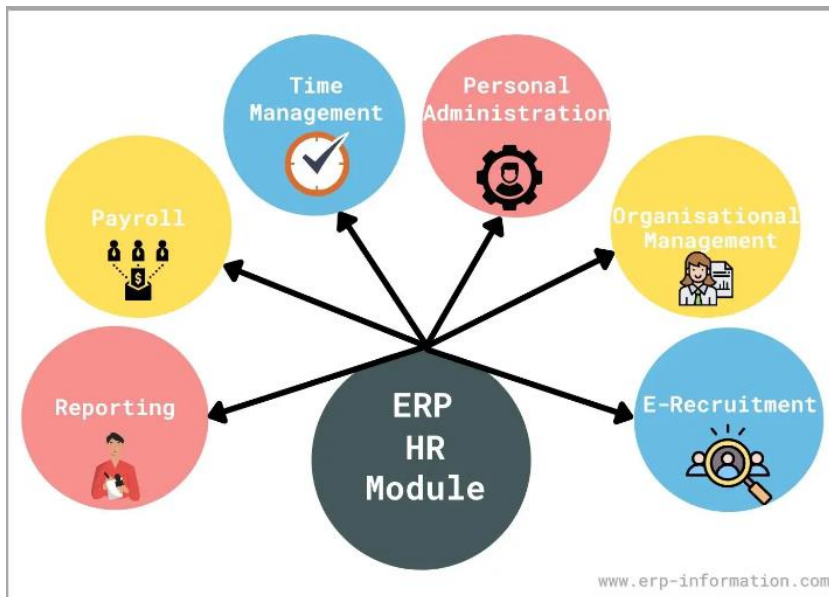Figure 8 shows the various functions of the HR ERP module.

FIGURE 8. ERP HR Module. (erp-information.com 2023).

3.5 Inventory management

Inventory covers a major portion of every manufacturing or trading business' assets. Inventory does not only mean goods in the warehouse or storage, but includes raw materials, finished goods, maintenance repair and operating supplies, and transit inventory in most cases. (Tanoy 2020).

Inventory can be defined as finished products being held for sale, as well as unfinished products in the process of production, and all raw materials that are used to produce goods. Jenkins (2020) describes inventory as all raw materials and components used to produce goods, as well as unfinished goods in process, and finished goods a company can sell. A company's inventory is recorded as current asset on the balance sheet.

Inventory management helps companies determine their stock levels and make it possible to respond to trends to make sure there is always enough stock available to fulfil production and customer demands. The inventory management process tracks inventory from purchase of materials to storage, to manufacturing, to transporting to sale of goods. (McCue 2022)

Jenkins (2020) stated that one key measurement of a good inventory management is inventory turnover. Inventory turns into revenue once it is sold. High inventory levels costs money and reduces cash flow since inventory is recorded as asset on the balance sheet and ties up cash when unsold. The goal

of inventory is to make sure there is just enough stock at hand always. Too much stock or too little stock is harmful for the business. A well-managed inventory ensures a company can fulfil all orders and maximise profits. Good management of inventory will also help a company save money, improve cash flow, and leave their customers satisfied.

Challenges that may come with managing inventory includes, high inventory level with no orders, low inventory levels to fulfil orders, not being able to identify what materials or products you have in stock and their locations, not being able to identify which materials to use first (for instance by the best before date). This occurs especially when a company must deal with several types of materials, products, and customers. (Jenkins 2022).

Inventory management which is known to be a critical element of the supply chain is the tracking of stocks from raw material suppliers to the manufacturing site, and from manufacturing to warehouses, and to the point of sale with the primary objective of having the right products in their right quantities at the right place and time. For this entire process to be effective, it requires some level of visibility which is provided by inventory management systems. Knowing when to order, how much to order, where to store, and which to use first are the basics you can think of within an inventory management system. (IBM 2023).

Inventory management system is a simplified process of sourcing, storing, and consuming inventory with the aim of finding a balance between over stocking and understocking. This is done by analysing customer's demand trends. (Chakraborty 2023).

The ERP inventory module permits inventory management by tracking item quantities, location, and individual information such as expiration date. The module helps visualise current, incoming and outgoing inventory by integrating with the procurement and Sales/Order module. The software basically streamlines inventory management and help companies to fulfil orders and improve inventory turnover which enhances customer service. A version of the inventory software that can manage inventory in multiple locations that are apart is recommended for larger companies. (McCue 2022).

McCue (2022) also stated that companies that do not have the supply chain management module could use the inventory management software to manage purchases and sales. Inventory management software helps streamline the inventory process which improves efficiency, customer satisfaction and profitability. Figure 9 depicts different functions of the inventory management module in ERP.

FIGURE 9. ERP Inventory Management Software Module (erp-information.com 2023).

3.6 Supply chain management (SCM)

In business, there are several stages involved in fulfilling a customer's request. The activities carried out at every stage involves mainly movement of resources by multiple entities, link up to form a supply chain. All efforts of a supply chain are to add value to a final product desired by a customer. This collective effort involves a network of companies such as raw material suppliers, manufacturers, distributors or logistics companies, wholesalers, retailers, and the customers. (Oracle 2023).

Supply chain management (SCM) is the management of flow of goods, information, and money regarding a product, from the procurement of raw materials stage, through transformation, storage and transportation stages, until delivery of the product at its final destination (Oracle 2023).

Most companies' supply chain today involves more than one raw material supplier and also multiple customers, but they all aim at lowering production cost, maximizing efficiency in order to be at the top in the midst of fierce competition.

Since we now live in a time of continuous rising technology and innovation that has given businesses the possibility to operate globally, customers' demands change rapidly and with high expectations. The

best supply chain management strategies should be able to integrate the various functions related to supply chain and streamline the supply chain process so as to meet these rising demands (Khanderia 2018).

The SCM module in ERP manages flow (product, information, and money) from the supplier to the consumer and consumer to supplier. This involves critically managing demand and supply, sales returns and replacement of defective products, and logistics. (Abdullah & Ambedka 2017, 5).

The SCM module tracks the movement of goods at every stage of the supply chain. So basically, SCM is considered the most fundamental and strategic function of a business as it integrates with a number of other business functions such as procurement, inventory, manufacturing and sales. This means the SCM module can cut across a wide range of modules such as procurement, inventory, manufacturing, and order management, as well as it may function beyond that. (McCue 2022).

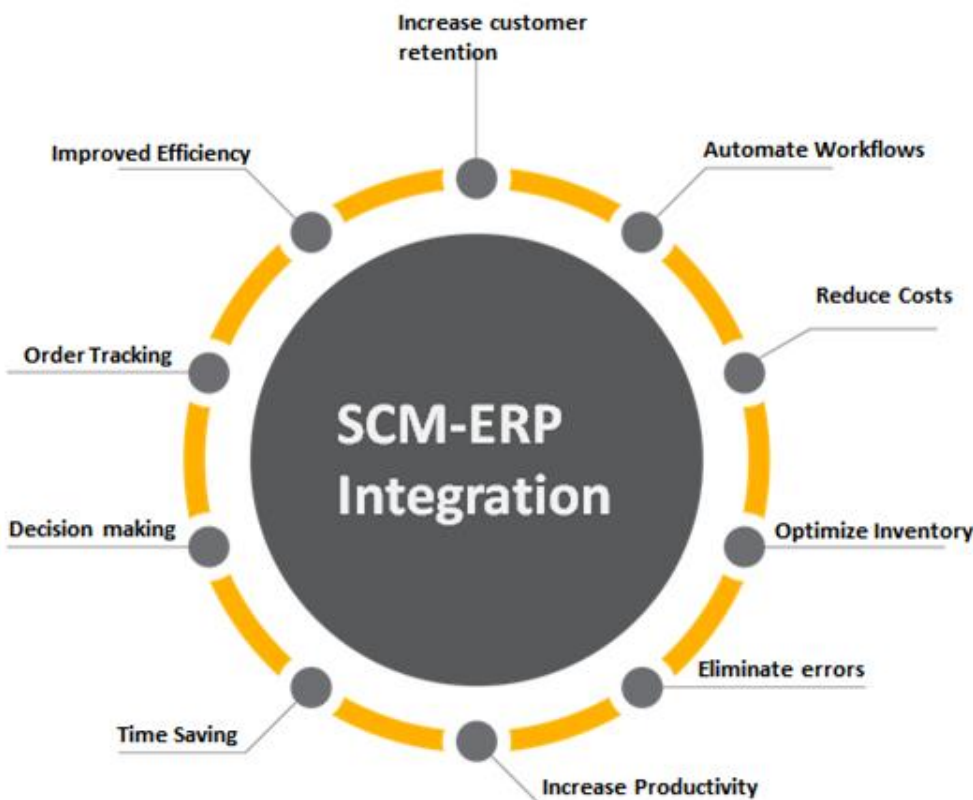Figure 10 shows the benefits of SCM when integrated to ERP.

FIGURE 10. Integration of SCM to ERP (Khanderia 2018).

3.7 Sales and order management

Sales and order management are business functions that involve direct interaction between company and customers. Selling the final products to raise revenue and maximize profits is the goal of every business organization. When customers place orders, vendors do not want to get it mixed up as it may lead to major direct losses for the company. They may also end up losing loyal and potential customers due to mistakes in order management. It is ultimately important for a company to get everything right when dealing directly with their customers, especially with customers' orders. (McCue 2022).

Order management is the process of collecting, tracking and delivering customer orders. This process starts when a customer places an order and ends when the customer receives the order. (Oracle 2023).

Nowadays, companies interact with multiple customers with different needs and still need to get all of their orders fulfilled with pinpoint accuracy. A successful sales order means delivering as promised according to customers' requirements. For businesses to meet up with these high customer expectations in a competitive environment, they need to get rid of manual processes that could lead to costly errors and automate the order management process by embracing modern software solutions designed for such. (Schwarz 2016).

Also known as order management system (OMS), the order management module in ERP is a piece of software that helps to streamline the entire order fulfilment process from receipt to delivery. This module allows you to manage customer information, inventory, warehouses, and order status in real time. This ensures accurate and timely delivery and prevents orders from getting lost. Data gathered by this software overtime can be used to determine the most efficient method of order fulfilment. Good order fulfilment makes customers happy. Figure 11 shows the functions of an order management system in ERP.

FIGURE 11. Order Management System (blink 2022).

3.8 Customer relationship management (CRM)

Decades ago, entities like Gartner (2005) saw customer relationship management as a process that addresses all aspects of identifying customers, creating customer knowledge, building customer relationships, and shaping their perceptions of the organization and its products.

Today, CRM is mostly tied to technology. Salesforce (2023) explained that CRM basically refers to a CRM system platform or software. They further describe CRM as a software for managing company-customer interactions as well as potential customers.

CRM software helps strengthens a company's relationships with individuals and organizations such as customers and suppliers throughout the business life cycle. It helps in finding new customers and provides support services in the business relationship. A CRM system can track each customer's activities with a company from day one to present and the data can be used to enhance customer experience. (Salesforce 2023).

A CRM system gathers customer data such as contact information, various interactions with company representatives, purchase history, then analyses the data and develop a customer profile through which a strong relationship is built. This improves customer service as company representatives have access to all customer information in one place when interacting with the customer. (Oracle 2023).

The CRM module can be integrated with a sales module to provide better visibility of customer trends which enhance sales opportunities and delivery success rate. Most companies use CRM to manage sales opportunities and marketing as it can track interactions with prospective customers and suggest those that should be targeted for certain promotions. (McCue 2022). Figure 12 shows various functions of the CRM module in ERP.

FIGURE 12. Customer Relationship Management (ERP Sirius).

4 RESEARCH METHODOLOGY AND DATA COLLECTION

This study comprises theoretical and practical research. This research was developed by several scientific research, journals, articles, related books, and e-books to develop the theoretical framework. All materials used for the theoretical part of this research are strongly reliable due to many positive reviews. The practical data used in this research is gathered from a two-year direct employer.

4.1 Research methodology

A qualitative research approach was used to carry out this research. Related books, journals and scientific research were closely examined and analysed to extract reliable and relevant information for this research.

Close observations were carried out during two years of working experience in three different positions in a manufacturing company, enough to examine their operations and gather reliable first-hand information.

Also, an in-depth interview was carried out with the production manager of the same company who has acquired plenty of skills and experience in his five years of working progressively in five different positions for the company.

4.2 Data collection

Data for this research was collected through interviewing the production manager of a manufacturing company. Although they did not want the company name and names of their software disclosed, enough detailed information about their business processes and software solutions that are relevant to this research were revealed. The interview questions primarily comprised 13 main questions that prompted 3 additional significant questions during the interview, making a total of 16 questions. Table 1 shows the questions asked during the interview session with the production manager.

TABLE 1. Interview Questions.

Prepared Questions
1. For how long have you been working for the company?
2. What positions have you occupied until now?
3. I understand you have an ERP system in place. How long has it been in use?
4. What basically is (*ERP system name) used for?
5. Which software solution was used previously?
6. What are the functions of MES in the company?
7. Is MES integrated with the ERP system or other software?
8. Do you need an internet connection to access them (MES, ERP system, other software solutions in use)?
9. Can you access them remotely using a mobile device outside the company?
10. What other software or applications do you use? Are they integrated in any way?
11. Briefly, how does the ERP system, MES and other software solutions help departmental workflow and general efficiency?
12. With numbers, can you please tell how these software solutions have affected productivity in terms of output and fulfilment of customers' orders.
13. What amendments would you want to be made to any of the software to enhance their functionality so as to improve work efficiency?
Prompted Questions
14. According to you, in what category (small, medium, big) is the company in terms of size?
15. Are your main software tools installed as an application on local devices or are they provided as a service by the software vendors?
16. You have agreed with me that integrating the various software tools used by the company into a central ERP system will significantly promote efficiency. What could be the reason the company haven't adopted that idea?

5 PRESENTATION OF FINDINGS

The purpose of this study was to explore key business processes of companies and examine how the adoption of an ERP system makes them more efficient. The study also seeks to examine potential risks related to the adoption of an ERP system, the harm it may cause and possible solutions. This research also aims at identifying the ERP modules that should be considered a priority and the deployment method to consider. These findings are also useful to ERP vendors by helping them to enhance the functionality, security, and privacy of ERP systems. The findings have been divided into three parts – Benefits, Challenges, and Possible amendments.

5.1 Benefits of ERP

The production manager of this manufacturing company who was interviewed affirmed that ERP systems have been in use since he joined the company in 2017, with the current ERP system adopted in 2022. He further stated that the main ERP system is used mainly for procurement, planning and sales management.

Manufacturing Execution System (MES) is the busiest software used by the company as it cuts across the whole manufacturing process until delivery to the customers. MES tracks the processing of raw materials from when it is received from the raw material suppliers. It tracks the inventory, machine efficiency and employee efficiency at each stage of production with the help of sensors implanted on the machines and input devices like bar code scanners. At each stage of production where material is transformed, MES generates a material number for the specific type of material and prints a label with information such as material number, material name, date processed, best before date, and a unique bar code for that chunk of material. With this information, everything about that material can be easily traced. The MES is integrated with the main ERP system in the company and provides real time data needed for procurement, planning and sales management.

A separate software is used to track "give away" during production. "Give away" as described by the production manager is that extra unit of product saved during the production process that could go to the customer without causing any harm to the company, measured in euros (€). Due to the tracking of "give away" by this piece of software, the company has experienced a major improvement in savings

from "give away". Average "give away" in 2022 was recorded at 15,000€ per week. 2023 is just half-way gone and the company has already recorded 33,000€ per week, which is over 50% increase in savings from "give away".

The company uses another separate software to monitor production efficiency. This piece of software is able to track the speed and productivity of machines and employees on the production floor as well as stoppages, and breakdowns. This software provides data that is used to make improvements in necessary areas of production. This piece of software is particularly used to control "down time". Down time is the number of stoppages or breaks experienced during the production process which may be caused by a machine break down, change over time, and accidents. By monitoring efficiency with this software, average "down time" has been reduced to average 0.6 in 2023 as against 1.3 in 2022.

The Human resource (HR) department uses a separate software to track employee attendance and individual efficiency on each workstation. There are sign in devices for employees at specific stations that are linked to this software so that it registers working hours for each employee directly as well as the visibility of hours worked on a particular machine by an employee. This data is very useful to track production efficiency and to generate payrolls.

The HR also uses a separate software for tracking of personal information of each employee. The software basically builds a profile for each employee that has worked or is working for the company. This software stores information such as names, address, salary grade, contracts, holidays, leaves, and medical information. It enables the visibility of work history of any employee with just one click.

It is of great advantage that the above-mentioned modules implemented by the company are all cloud-based. This means that the software can be accessed remotely through a mobile device out of the company premises. This allows continuous follow up at any time and place.

Monitoring and controlling with the collective help of these software tools have significantly improved productivity for the company from 245 units per person per hour produced in 2022 to 375 units per person per hour produced in 2023.

5.2 Challenges of ERP

The company find it difficult to fully monitor the efficiency of a few machines on the manufacturing floor that do not yet have sensors implanted on them that are linked to MES. The company also faces some challenges related to the modules they have implemented. The first thing worth noting is that, although most of the modules implemented by the company are cloud-based, not all of them are integrated into a central ERP system for a couple of reasons.

When asked the reason for not having the various modules integrated yet, despite being aware of the benefits, the production manager presented two main reasons. Firstly, he expressed the concern of data privacy and security breach. This particularly concerns the module used by the HR for tracking employees' personal information which is highly confidential. Integrating this particular module with other modules in a centralized system will risk leakage of highly confidential information.

Secondly there is lack of resources to invest on a more sophisticated ERP system at this point since they consider other priorities – lack of enough funds to purchase, unavailability of enough IT (information technology) staff in the company to monitor and maintain the software, and lack of sufficient IT skills by the employees meant to use the software. This means the company will need to hire more skilled IT staff and organize expensive IT training programs for current and future employees.

5.3 Possible solutions and amendments

Making sure all machines have the necessary mechanisms to enable monitoring and control is important. That has proven to significantly improve efficiency. Companies that are small and fast growing should consider making available resources for future implementation of a centralized ERP system. This is because as the business grow, the number of customers will increase, demand will rise, they will need to have multiple raw material suppliers to satisfy demand. This will make their processes more complex to manage without a centralized ERP system. Acquiring a centralized ERP system will streamline their operations leading faster deliveries and satisfied customers. This keeps the company competitive in the market.

Companies with high concern for data privacy and cyber security should consider implementing a hybrid ERP system. As earlier defined, a hybrid centralized ERP system is one that integrates all modules

both cloud and on premises modules, but without the software vendors having any access to the integrated on-premises modules. This way, modules with privacy concern can be operated locally and still have the possibility to communicate with the other modules.

ERP vendors should consider developing the system to have a more user-friendly interface such that employees will spend less training time on how to use it. It is important as well for ERP SaaS providers to keep working on ways in which companies can have full control of their confidential data in the cloud system.

Also, as technology keeps on advancing, ERP vendors should consider exploring how to develop a more compact software for ERP that will not require a lot of resources and may cost less and make it affordable for businesses.

6 SUMMARY AND CONCLUSION

This research was motivated by a consistent increase of the price of resources that causes a continuous increase in the cost of production over the years. This has pushed companies to raise the prices of their products in the market, but sadly, prices can never be raised to the same proportion as the increase in cost of production. For this reason, businesses need to come up with a systematic way of carrying out their various processes in order to optimize their operations, thereby cutting some production costs in the process.

The purpose of this study was to explore key business processes of companies and examine how the adoption of an ERP system makes them more efficient. Understanding that adopting new methods of doing things may come with their own problems, this study also seeks to examine potential risks related to the adoption of an ERP system, the harm it may cause and possible solutions.

This paper presents a deep introduction of ERP, its history and evolution over the years, the importance, and the different ways in which ERP systems can be deployed in an organization. This research further examines the various ERP modules of key business processes such as order and sales management, manufacturing, finance and accounting, inventory management, supply chain management, human resource management, procurement, and customer relationship management.

Findings of this research are based on personal observations and working experience, as well as an in-depth interview. The implementation of ERP systems has proven to be significantly beneficial to a business in automating operations, monitoring efficiency, saving time, reduces material wastage, provides real-time visibility of reports, ensures data accuracy and easy accessibility, and ultimately enhances customer relationship management especially in terms of timely delivery and better communication. This reduces costs and ensures more revenue and profitability for a business.

ERP systems implementation has inevitably presented some challenges. Most common challenges encountered are high cost of investment, and the concern for data privacy and cyber security in the cloud ERP system.

These challenges can however be handled. With ERP systems, there is the possibility of adopting and implementing individual modules according to the needs of the organization. This allows companies to examine their priorities and determine which modules to adopt according to their resources.

Cloud ERP system implementation is found to cost less than on-premises ERP system in terms of initial investment. Companies with privacy and cyber security concerns who still wish to implement a centralized ERP system can choose to implement a Hybrid ERP solution. Hybrid ERP solution is considered a very useful option as it allows companies to implement necessary cloud applications while maintaining privacy and security of their On-premises investments (Beaver, 2020). However, each company's choice depends on their financial capacity and needs.

Mohammad (2002) stated that it is generally a misleading perception that implementing an ERP system will improve an organization's operations overnight. Expecting to have high efficiency very much depends on how well the chosen ERP system fits the organization's functions and how well the tailoring and configuration process of the system matches with the business culture and strategy. (Abdullah & Ambedka 2017, 3). Overall ERP systems have proven to improve efficiency, productivity, and profitability.

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APPENDIX 1

Interview Questions

Prepared Questions
17. For how long have you been working for the company?
18. What positions have you occupied until now?
19. I understand you have an ERP system in place. How long has it been in use?
20. What basically is (*ERP system name) used for?
21. Which software solution was used previously?
22. What are the functions of MES in the company?
23. Is MES integrated with the ERP system or other software?
24. Do you need an internet connection to access them (MES, ERP system, other software solutions in use)?
25. Can you access them remotely using a mobile device outside the company?
26. What other software or applications do you use? Are they integrated in any way?
27. Briefly, how does the ERP system, MES and other software solutions help departmental workflow and general efficiency?
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