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APPLYING BIG DATA AND ARTIFICIAL INTELLIGENCE (AI) FOR DEVELOPING ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM

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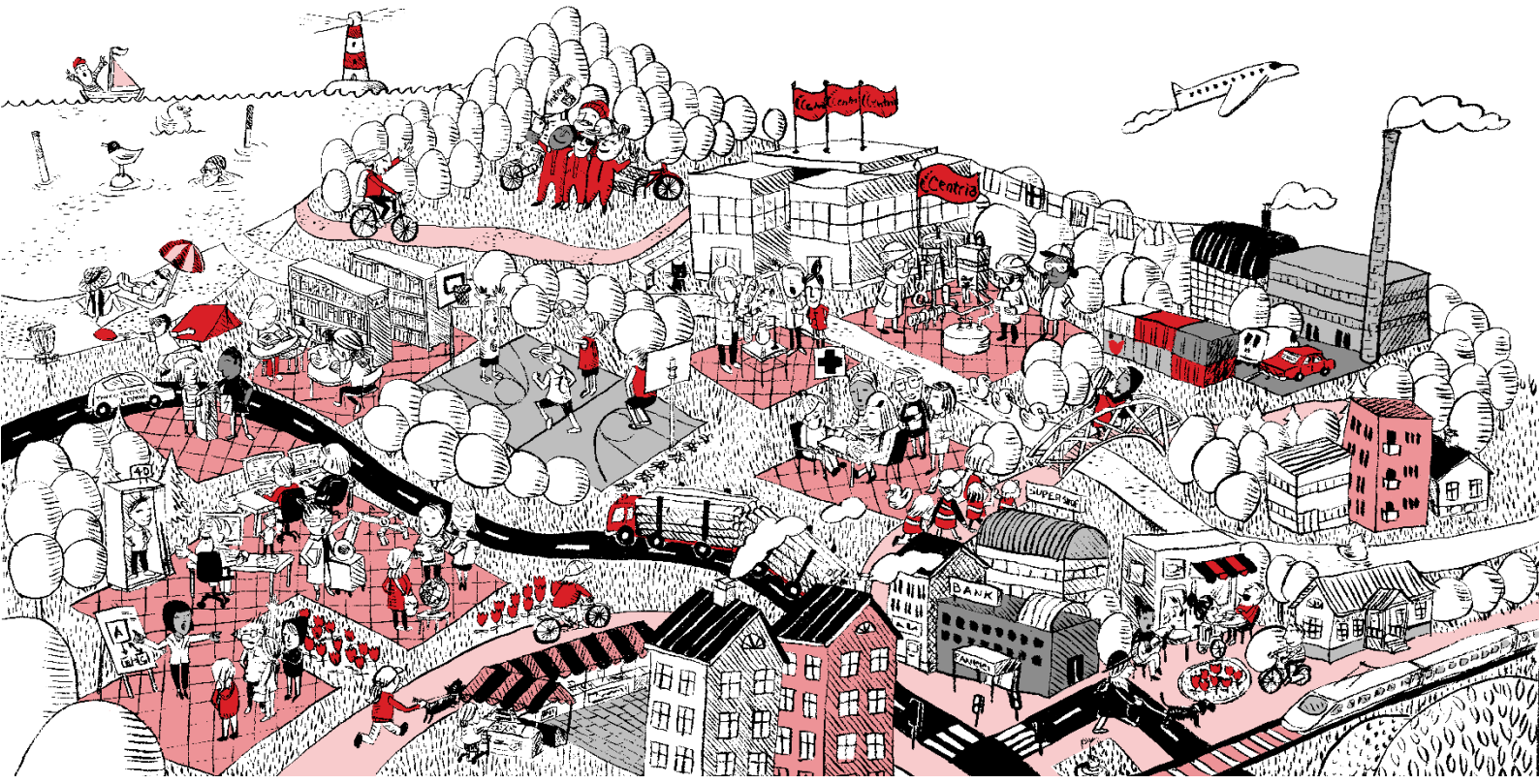

ABSTRACT

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Enterprise resource planning (ERP) systems can help achieve efficiency with business processes. Business processes in today's enterprises achieve efficiency with the help of enterprise resource planning system as well as reduce manual work by ending duplicate data in a company, however when all the data is centralized and available throughout the organization, it is essential to make changes to the Enterprise Resource Planning system such as improve processes, record data or integrate with other software.

The goal of this thesis was to focus on analysing and determining how the data is used in the Enterprise Resource Planning system and the application of AI and big data to the system is still a process that is constantly being upgraded to improve as well as become the most complete system. In this thesis, the theoretical part focus on analysing the applications of ERP software in businesses today, it is not only for IT professionals as before, but increasingly used by business staff. It used to analyse data specific to each department in the business, such as marketing, sales, etc. In addition, development has also increased the need for tools that allow analysis of large and holistic data sets. Therefore, applications can help the decision-making process based on data analysis of the application business to become more oriented. Every business' need for ERP tools depends on how the data is being managed and how you want to analyse it. Therefore, with the application and help of big data and AI, it will make the data analysis process easier, store large amounts of data as well as help businesses operate smoothly.

The main empirical method used in the thesis is qualitative research combined with the content analysis method. Through the results of the interview on the employees who have used ERP software that incorporates big data as well as the benefits and difficulties that it brings. Besides, a case study on SAP, one of the leaders in business planning software as well as Europe's largest software company has shown integrations for data analysis for different business models and their achievements. Those methods have demonstrated the importance of combining AI and big data and the success it brings in the era of globalization help businesses operate easier. However, there is no denying that it still has difficulties and challenges of the combining between AI and big data with ERP brings and needs more time to perfect and develop this integration in the future.

Key words
Artificial intelligence, customer relationship, data warehouse, enterprise resource planning, internet of things, SAP

CONCEPT DEFINITIONS

AI	Artificial Intelligence
CEO	Chief Executive Officer
CRM	Customer Relationship Management
DWH	Data Warehouse
ERP	Enterprise Resource Planning
IoT	Internet of Things
TCO	Total Cost of Ownership

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1 INTRODUCTION

The passage of time with new needs and new technologies have emerged that have forced ERP systems to evolve to match, and one of the biggest challenges facing ERP systems today is performing the smart functions with fast processing speed and high accuracy. This challenge requires ERP vendors to apply new technologies to system development an overall architectural model of the ERP system that applies new technology, big data, and artificial intelligence to perform intelligent functions, automate production to gain maximum competitive advantage for businesses determine the necessary functions, technology, and data when building their ERP system.

In this day and age, the industrial revolution 4.0 has brought profound effects on the thinking and perception of businesses around the world. It has been posing a lot of opportunities, and challenges for businesses, especially when the world is entering the digital age, information technology, and management support devices are growing fast and strong. It is indispensable to use modern management tools for businesses in the new era. ERP – enterprise resource planning system is the preferred choice for businesses today.

ERP integrates all the software used to manage the businesses into a single system. With ERP software, all data on the business activities created are always fully updated, real-time overview, etc. It is the connection and consolidation of software in the same system in order to help businesses store data in one place with one version of use across all departments or branches. When any change occurs, all information is automatically displayed and recalculated to match and help avoid errors. Although today's ERP has synchronous and unified data, it only use structured data. A huge problem that needs to be exploited is the use of significant data sources.

In addition, information technology plays an essential and indispensable role in managing and operating enterprises' production and business activities. Modern technologies like IoT are emerging (Internet of things), Big Data, Artificial Intelligence (AI), etc. have changed the model and way of business operations, traditional transactions gradually shifted to electronic transactions, many manual activities are replaced by automation, all have asked the development and perfection of enterprise management tools, and inevitably, the ERP system also needs to be developed to a new level. This new ERP will fill the gaps the current ERP systems have not yet solved, such as supporting businesses to perform smart busi-

ness functions, automating production, personalizing products, management decisions. For the ERP system to solve the above tasks, it is necessary to apply modern big data, artificial intelligence and other technologies (AI) to collect and distribute data automatically.

Entering the digital age, information is a crucial asset of an enterprise. The opportunity to get information in the fastest and most accurate way will be the key to the success of every business. Therefore, the emergence of ERP for big data artificial intelligence is inevitable and becomes more critical than ever. With ERP systems, companies are more proactive in exploiting information to build real-time solutions to drive quick strategic decision-making, improve operations, and increase the organization's profitability.

2 ENTERPRISE RESOURCE PLANNING (ERP)

For businesses, effectively mobilizing and managing resources is considered the most important issue to ensure fast and sustainable development in the context of increasing integration and increasingly fierce competition like nowadays. This makes the need to choose a total solution capable of fully integrating the entire management business process of the departments divisions in a single software becomes extremely necessary. Most of the world's leading corporations apply the enterprise resource planning system to manage their business activities and consider this a key factor, the key to the success of the business. Hence, this chapter will discuss the definition of enterprise resource planning (ERP) system, salient features of the system as well as its role in helping businesses grow. However, it is also undeniable that the limitations of the system need to be overcome.

2.1 The definition and overview of ERP

ERP (Enterprise Resource Planning) is a term used concerning a range of corporate activities, aided by computer software, to help a company manage its key activities, including accounting, financial analysis, purchasing management, human resource management, order tracking, sales management, etc., the overall goal of this system is to ensure the appropriate resources of the business such as human resources, materials, machines. ERP allows a company to provide and aggregate data of many different separate activities to achieve goals. (eOctopus ERP System 2018.)

ERP is defined as a multi-layered application system that helps organizations and businesses manage resources and operate operations. ERP solutions allow business managers to collect and use finance - accounting, materials management, production management, business management, product distribution, project management, service management, customer management, human resource management, forecasting and planning tools, reporting, etc. In addition, a very important feature that ERP solutions provide for enterprises is a management system with modern international standards to improve the management and operation of enterprises for leaders and employees. (eOctopus ERP System 2018.)

PICTURE 1. Enterprise Resource Planning Model (eOctopus ERP System 2018)

ERP is a suite of information technology solutions capable of integrating all production and business management applications into a single system to automate management processes with all activities of the company from management of human resources, production and supply chain, internal financial management to sales, product marketing, exchange with partners and customers (Foshee 2017). All orders are made on a single system. ERP is considered one of the most successful business management solutions in the world today. If successfully implementing ERP, businesses will save costs, increase competitiveness, and have more opportunities for strong growth.

In business, resources are resources in general, including finance, human resources, and technology. In the world of information technology, a resource is any software, hardware, or system data that you can access and use. The application of ERP to corporate governance requires businesses to go through a period of changing business culture both inside and outside the company. Specifically, making every department capable of exploiting resources to serve the company and planning as well as building resource exploitation schedule of departments so that there is always smooth coordination between departments.

Establish the most efficient mining processes constantly update accurate and timely information about the status of the company's resources. Enterprises have to pass a time changing business culture both inside and outside the company. (Oracle 2021.)

ERP calculates and forecasts possibilities that may arise during the company's production/business operations. For example, it helps the factory accurately calculate the material supply plan for each order based on the total material demand, progress, productivity, and supply capacity. This approach allows the company always to have enough production materials while still not allowing too large inventories to cause capital accumulation. It is also a support tool in planning necessary work and business contents in the production and business process, such as pricing policy, discounting, purchase forms and support. Calculate the plan to buy raw materials, calculate the optimal production model. This is a measure to help businesses minimize errors in business processing. Moreover, ERP creates a link between departments in the company, so every employee must follow the processing process. (Oracle 2021.)

The common feature of domestic and foreign ERP software is the module structure. Each module has a set of functions. Each module can operate independently, but due to the nature of the ERP system, the modules are connected to share to create a homogeneous system automatically. ERP systems of different companies have different function names and modules. The application layer is the layer that communicates with the user by providing interfaces and functions of the modules and allows the system to exploit data to fulfill user requests through the interface of application layer functions. With today's ERP systems, the data the system is controlling is often the traditional structured data. The technology and service layer is the technologies used to design and build functionality. In addition, there are background technologies installed on server and workstation systems when deploying the system. Each supplier uses different technologies for its products. (Abukari 2020.)

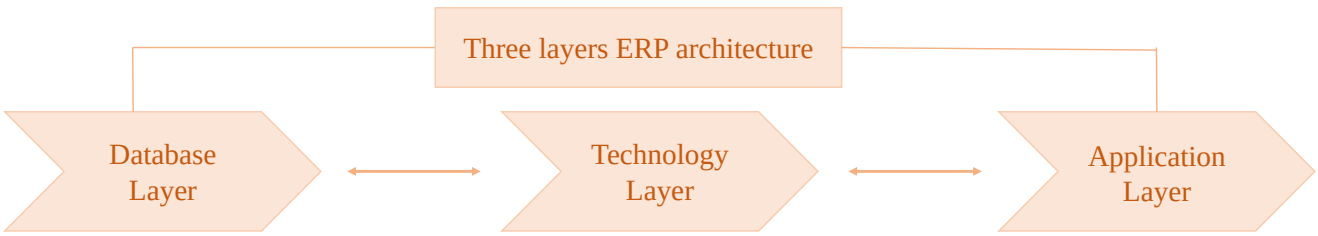

FIGURE 1. ERP three-tier architecture (adapted from Abukari 2020)

2.2 Benefits of application ERP Sofware in the enterprise

The process of integration offers numerous opportunities and enormous challenges, and the competition is getting fiercer. Most of the world's leading corporations apply the enterprise resource planning system to manage their business activities and consider this a key factor, the key to the business's success to improve business in domestically and internationally global market productivity and effectiveness. With ERP, all activities of a company are performed on a single system. ERP is considered one of the most successful business management solutions in the world today. If successfully implementing ERP software, businesses will save costs, increase competitiveness, and have more opportunities for solid development.

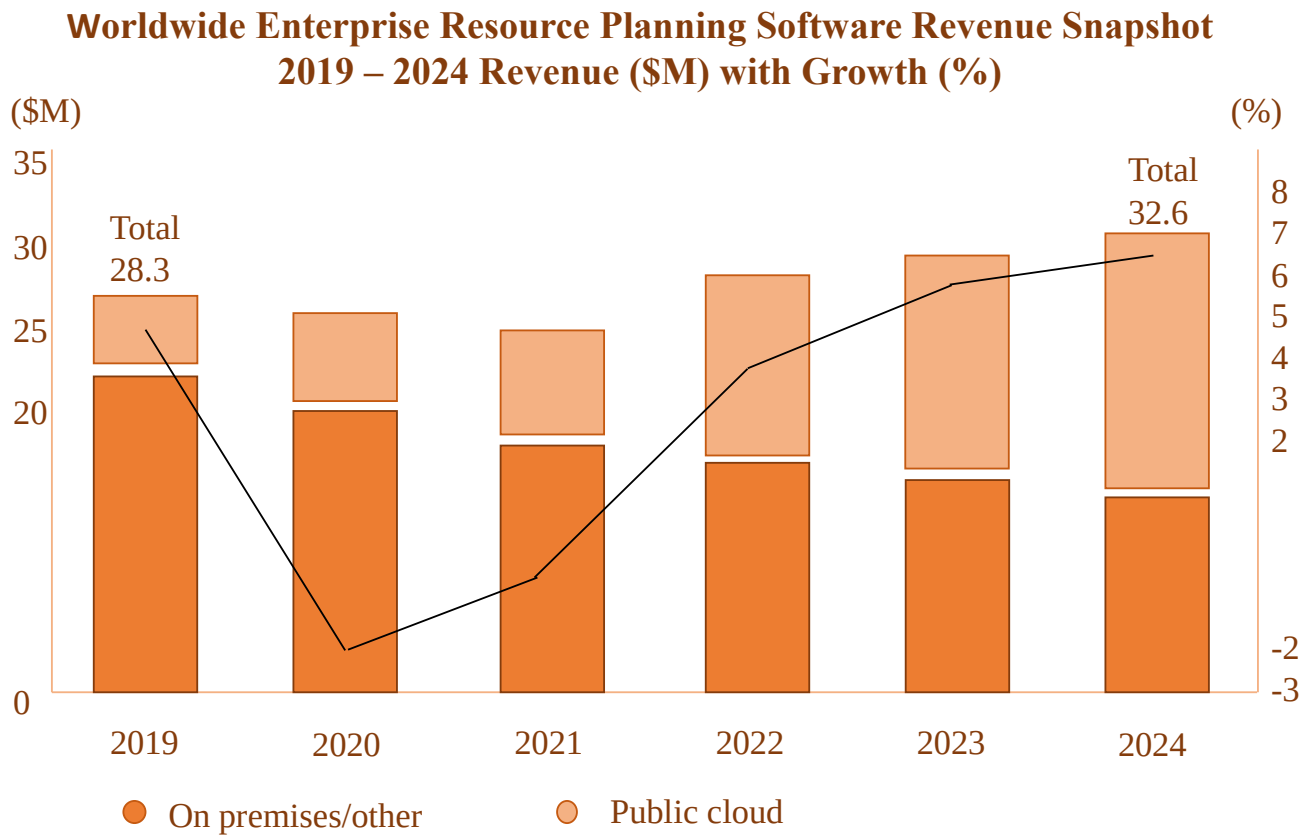

FIGURE 2. Worldwide Enterprise Resource Management Software Revenue Growth, 2019–2024 (adapted from IDC 2020)

2.2.1 Meeting general needs of employees

The core of ERP software is to reduce manual processes by automating work, providing information or access to employees that will be distributed on ERP easily. Employees will receive essential information such as the department they work for, salary and bonus, timesheet, document repository (company regulations, contract templates, training documents, etc.). In addition, the division of access to company data according to the employee's hierarchy helps control important documents or track employees' work:

ERP software has the function of analyzing and evaluating accurate and timely information through a system of information storage, information support, and decision-making solutions, performing operations according to unified and standardized procedures, reducing the amount of paperwork, increasing labor productivity and improving discipline. In addition, creating a habit of working according to procedures and standards at work, strengthening the ability to work in groups, each individual in a workflow as assigned, and the smooth coordination between individuals in work is essential. Besides, the use of the ERP system helps managers enhance their ability to monitor and operate the business and use modern tools, expand information access to help managers do their job quickly, conveniently, and efficiently. (Toolbox.)

2.2.2 Increasing production efficiency and clearly defined business processes

The ERP module system requires a clear business process definition, requires complete work assignment. This will create a seamless and hassle-free workflow. The standardization of business processes in the ERP system will also bring the production plans in line with the process. For example, it is easy to miscalculate and bottleneck the production plan without this process and then not make full use of the capacity of machines and labour. In short, an ERP system helps to clearly define business processes, increase human resource efficiency and reduce production operating costs. The production planning by the manual method is not only inefficient but also inaccurate, prone to errors, and short of actual requirements. The ERP system can help businesses build production plans on a monthly and quarterly basis, thereby helping to regularly monitor the number of products produced along with product quality uniformity, minimizing number of defective manufacturing products. As a result, businesses can plan and allocate human resources appropriately depending on needs and projects. (Oracle 2021.)
ERP software helps speed up the workflow of the entire enterprise. Businesses can easily see that using human resources to transmit information clearly cannot match the speed of electronic documents running

on computer software. The rapid transmission of information between management levels and departments and divisions in the enterprise will help limit delays in solving work, thereby improving productivity and work efficiency. (Oracle 2021.)

2.2.3 Increasing the level of customer satisfaction

All data is centralized on one system so that every employee can log in and view customer data information. Some authorized subjects can change the report, which will be assured because the records will be updated throughout different departments using the same ERP system.

Delays in customer response can increase the likelihood of losing many leads. With the application of the ERP system for businesses, sales staff or customer care staff can immediately access the common database, grasp all customer information, and understand the status of customers. Goods can be provided, helping to respond to customer requests in the shortest time. From there, the system helps to increase productivity and work efficiency for the customer care department, at almost the same time, the level of increasing customer satisfaction with the business. (Nock 2016.)

2.2.4 Reliable accounting profession

Businesses that are still using separate accounting software to meet the necessary needs of companies: inventory management, processing orders (ordering, shipping, etc.), incoming other logistical needs. Today, in order to make business operations less complicated, those functions are grouped in one module of the ERP system. In addition, those accounting applications can be linked with other modules in the same ERP system and have the ability to fine-tune the system's functions to suit business needs. Financial information will have to gather data from many different departments, so there is a specific difference. When using an ERP solution, everything related to finance is consolidated in one place - a single version across all departments and facilities. When a number is changed, all relevant information is automatically calculated and re-displayed for a match, helping to reduce negatives in corporate finances. Thanks to the support of management software, large and complex businesses do not need to wait to aggregate data anymore. Whenever you want an accurate and timely financial report for leadership, look at the numbers of the data line on the ERP. (Oracle 2021.)

2.3 The downsides of ERP

The most serious difficulty for enterprises applying ERP is the human problem. The difficulty of adapting human resources in the company to the new environment and processes, especially for enterprises with an elderly workforce, is increasing. The ERP implementation process requires testing, testing, and then implementation. Tests do not stop at the working-age but also in the number of jobs. Therefore, the workload of employees will increase. If the remuneration policy of the enterprise is not appropriate, it will lead to a strike of the employees. (eOctopus ERP System 2018.)

Another equally important difficulty is the problem of technology. Technology here is the condition for ERP operation. Accordingly, technology will include networks, computers, and equipment to deploy an administration system that can run smoothly. A fundamental principle of an ERP system is that the database is centralized. That is, the database is centralized in one place. Today's advanced ERP software uses web technology. That means that the machines do not need to install any ERP software applications but only use Internet Explorer for internet explorer access program. Therefore, the deployment for member companies will be more complicated if the computer network is not synchronized.

Investing in an ERP system is very different from operating software alone. Estimated investment costs for the ERP system include hardware investment costs, infrastructure, communication (network system, transmission lines, servers, etc.), licensing fees (the purchase of servers), the required ERP software, usually a data management system); expenses paid to the ERP software supplier. In addition, enterprises may have to pay some costs such as initial consulting costs if hiring a separate system consultant, training costs incurred when there is a change in personnel during the implementation process, development costs, etc., generated during operation. Typical ERP costs are pretty significant. This cost is usually in the form of ERP staff salary costs and ERP product project costs. Implementing of small and medium-sized enterprises ERP is challenging to do. This will create cost pressure for companies in the early stages. Total ownership costs (TCO) are one model for analyzing the costs associated with purchasing, implementing, and owning information technology software systems over a specific period. (Twin 2020.)

This cost includes software licensing fees, implementation costs, costs related to upgrading information technology infrastructure, consulting costs, and maintenance and internal administrative costs. (Moadad 2019.)

License costs are the initial costs paid for the right to use the software. This cost is usually calculated based on the number of modules and the number of people using the software simultaneously in the client company.

Implementation cost of the ERP system including the cost to the service provider/distributor and the time that the company's employees must participate in the implementation process. For complex projects, implementation costs may be higher.

Cost of upgrading information technology infrastructure include the amount to be paid for upgrading the enterprise's IT layers, such as licensing fees for database management systems, server application software, network equipment, and new computers or servers.

Consulting costs help preventable factors such as the poor definition of user requirements, misinterpretation of time, choosing incompatible modules, errors in configuration settings. Using an existing systems analysis consultant can help prevent these factors and evaluate the optimal solution or monitor a company's implementation.

Annual maintenance cost to be paid to the software builder or to the company that sells the software is a yearly service fee to fix problems. Typically, maintenance costs range from 8% to 20% of the initial royalty cost.

Internal administrative costs are related to personnel in the company in charge of maintaining the ERP system, supporting users, and solving system-related problems. A general assumption is that one information technology (IT) employee is required for the company, but more IT staff is often necessary for more complex systems. Another element of internal administrative costs that should considered is the time of system users to the extent that they have to spend time implementing or resolving system problems.

3 PROPOSING THE APPLICATION OF BIG DATA AND ARTIFICIAL INTELLIGENCE TO THE ERP SYSTEM

Big data and artificial intelligence have been a hot topic in recent years. The application of artificial intelligence in all human life activities is increasing and bringing remarkable results. Reality shows that organizations that accept artificial intelligence and big data will make substantial strides, while the one's who refuse to use modern technologies lag. ERP application of big data and artificial intelligence will be a solution, a comprehensive business management tool to meet the needs of the times. This ERP system architecture is built on: trends in additional functions, new technologies (cloud computing; big data; artificial intelligence; connected things), data collection, and storage. (Diceus 2020.)

In essence, ERP application of big data and artificial intelligence is not based on a specific technology but on the ability of the ERP system to use multiple technologies to support intelligent functions. In enterprises, smart functions often start from the automation of processes, primarily performed frequently. Over time, other parts are developed, such as manufacturing defect detection and predictive analytics for demand planning and forecasting, requiring machine learning, deep learning, language processing, and other technologies. Natural language for voice control systems in production or the warehouse this part of the situation has also confirmed the need for change. Therefore, this new ERP system architecture is built on applying technologies to expand functions and integrate with innovative applications over time to meet the changing needs of businesses. (Diceus 2020.)

3.1 The difference between ERP and individual management sofware

Characteristics of separate management software discrete often serve the operation of a specific department or department (sales, accounting, human resources, etc.). The transfer of information from one department to another is done manually (transferring documents, copying files) with low productivity and no control. The discrete management software will now be isolated from the software in other departments. In addition, specialized software will be developed more intensively with distinct features. The features are designed optimally to meet the requirements of the business. Because it is separate and independent software, it is easier to customize the features according to the scalability of the business because it is not as binding as the management modules in the general ERP system. Customization in ERP will be more complicated and time-consuming. Especially when deploying technology, the cost

factor is always the top consideration for businesses. There are software costs and other costs such as staff training fees, upgrade fees and monthly and annual maintenance fees. The investment cost will be cheaper with specialized software than an ERP overall management software because it is independent software, so the risk is distributed. Enterprises can completely proactively change the choice if there are unsatisfactory points, not suitable for your business. (Diceus 2020.)

Characteristics of Enterprise Resources Planning (ERP) software are the modules on the ERP software also serve the departments. Information flows automatically between the steps of the process and is strictly controlled. Reports on ERP software can pull data from many steps in the process and even from many different techniques. This approach creates very high labor productivity and information management efficiency for businesses. Still, more than that, it also solves the relationship between the departments when simulating the operations of the staff according to the process. The exchange of information between departments is also so that it is automatically rotated between the process steps and is strictly controlled. (Diceus 2020.)

Most small and medium enterprises use separate software, such as the sales department using its customer relationship management software and sales software, the accounting department using its accounting software, the human resources department. It also has separate HR management software. However, the limitation here is that in terms of data link, the transfer of data information between departments is done manually, time-consuming, and time-consuming, information security is not high, data is difficult to control. With an ERP management solution, businesses only need to use a standard system that integrates modules to perform functions equivalent to discrete management software. These modules solve the unification of data transmission between departments by automation in ERP software. The overall management software was born to replace all single systems while still meeting the criteria such as data synchronization, avoiding information errors when entering data, a single reporting system comprehensive and specific. (Diceus 2020.)

3.2 AI and ERP: Perfect combination

As a relatively new field of study, artificial intelligence (AI) technology, it has shown the technology industry was abuzz with its potential implications. According to Gartner, by 2021, up to 80% of emerging technologies will have artificial intelligence as a critical component. (Panorama Consulting 2019.)

It's a given that ERP is the core of the business, but it isn't the only one artificial intelligence (AI) takes it to a whole new level of success. For this, it analyses big amounts of information and makes predictions and suggestions based on those predictions the next steps. The core of the 4.0 technology revolution is intelligent production and services based on the breakthrough of digital technology with the help of artificial intelligence (AI). Artificial intelligence can be defined as a branch of computer science that deals with the automation of intelligent behaviors. Artificial intelligence can process data more extensively, systematically, scientifically, and faster than humans. (Panorama Consulting 2019.)

A new digitalization is currently in progress with AI, ERP is becoming more imaginative and innovative. Some intelligent ERP systems can be combined with AI to support production and operations departments effectively. Production departments can save labor in performing manual operations, and operators can understand Capture production in real-time. ERP combined with artificial intelligence can automate, increasing user productivity even more. Whether creating employee schedules, issuing invoices, or performing data entry, ERP can take care of many administrative obligations, freeing users from repetitive tasks. (Panorama Consulting 2019.)

3.2.1 AI and the ability to promote enterprise quality

Artificial intelligence is a joint development trend worldwide because of its ability to process millions of information automatically in a short time. Intelligent machines produced by man are called artificial intelligence (AI). This intelligence can think, think, learn, etc., like human intelligence, but process data at a broader, more scale, systematic, scientific, and faster level than humans. Artificial intelligence is a combination of technology: machine learning, natural language processing, and computer vision.

Artificial intelligence was born to transfer intelligence to machines because humans always have limited memory and speed when humans perform specific tasks. The success of applying artificial intelligence often does not come immediately. It is a process of formulating strategy, collecting and normalizing data, training machine learning, and using data to make decisions. Therefore, when combining ERP software with artificial intelligence, it will create benefits as well as businesses will be extremely surprised by the working efficiency that it brings. (Panorama Consulting 2019.)

Inventory management helps every part of a product be tracked from raw until manufactured, assembled, and delivered to the final customer when using an AI system. AI and machine learning can test hundreds

of models and improve their ability to accurately forecast demand while automatically adjusting for other unusual conditions such as new product launches, supply chain disruptions, or changes. (Quirk 2018.)

Financial management helps automatically categorize invoice information, optimize repetitious financial activities in different accounts, and even distinguish different invoices types. AI can automate monthly, quarterly, and year-end processes, even compare account balances between independent systems and verify reports. Using machine learning, it is even possible to learn from different inputs to make better judgments and adapt to the behavioral patterns of various accounting professionals. (Quirk 2018.)

The production process of artificial intelligence (AI) in conjunction with an ERP system can help identify inefficient processes recommend a solution that cuts costs. AI can also identify strategies that use too much energy and it enables diagnostics and predictions to reduce the wastage of recources. (Panorama Consulting 2019.)

Sales automation systems are now in charge of tracking, reporting, and team productivity. The future trend is to make personal interactions smarter by using data to determine which content, which answers are likely to lead to better results. AI can emerge early in the sales process by aggregating data from outside the organization to allow to create a detailed profile of your target customers. In addition, the system also supports automating several other sales processes such as information collection, classification, and response processing in real-time. (Quirk 2018.)

Advanced analytics is the ability of AI to work with massive amounts of data enables accurate, real-time data insights. For example, AI can analyze the shopping behavior of different customers, allowing you to tailor your product or service to the needs of a particular audience. Besides, AI-based solutions can process historical data and make predictions for the future. These tools identify seasonal patterns in your business, making recommendations on whether you should reduce or increase production. (Panorama Consulting 2019.)

3.2.2 AI helps improve customer experiences of business

With the ability to serve customers in real-time and provide customer insights, artificial intelligence has been applied and used in ERP systems to enhance customer experience. With the ability to serve

customers in real-time and provide customer insights, artificial intelligence has been applied and used in ERP systems to improve customer experience. Customer experience will surpass price and product quality in the quest to develop new customers and retain loyal customers for your business. Understanding and focusing on customer experience is the first and most crucial essential step for improving customer experience. (Vij 2019.)

Through the help of AI technology, each company can serve customers in the fastest way in addition to providing customers with a high level of service. Emotion when buying is one of the most critical factors that help attract new customers and increase the loyalty of old customers. Most individual and corporate customers say that personalized experiences influence their commitment. This shows the critical role of customer experience personalization. Realizing this need, businesses have also been applying personalization in their business. Today, consumers are gradually not looking for the right product, but retailers will suggest directly according to customers' search and purchase habits. (Vij 2019.)

This is possible because the AI has analyzed the entire history of customer interactions and transactions across all channels and proactively asking questions and receiving feedback to predict habits and preferences of customers and make suggestions for them. It is easy to see examples such as favorite videos suggested on Youtube and favorite music recommended on Spotify. The customer's product has just been searched for is immediately displayed on Facebook or websites that customers view later. (Dixon 2021.)

Customers can also receive emails about precisely the products they need, based on the data they leave during their interactions on social networks and search sites. Thus, personalizing marketing emails through AI saves businesses time and resources and brings more value to customers. Increasing customer demand, constantly changing tastes, and increasingly rich supplier options require businesses to continually get new and different experiences. To meet these constant changes, the application of software combined with artificial intelligence (AI) to exploit and utilize the data generated by customers will help businesses bring the best ways to serve and experience their customers. (Dixon 2021.)

3.2.3 Challenges of ERP software when combined with AI

Incorporating AI into ERP software is becoming increasingly popular today as businesses are increasingly trying to incorporate AI technology into their business processes to improve productivity,

profitability, and efficiency profits and their business results. However, besides the benefits of that combination, there are also disadvantages and challenges affecting the operation of enterprises that need to be noted. First, a significant barrier to the adoption of AI in ERP software is the skill-shortage of the engineering team, which requires the technical team to increase the experience and training needed to deploy and operate AI solutions effectively. Experienced data researchers are in short supply, as well as experts with machine learning skills. This affects your data, which challenges businesses to have a clear strategy to source quality data to create valuable AI-integrated ERP software on a large scale. A challenge that has always been a concern of companies when they want to combine business planning software with artificial intelligence is cost. It's among the most important factors to consider when shopping for AI technologies. As mentioned above, the lack of skills and knowledge about AI has been a significant barrier. Therefore, to operate a business with a smooth AI system, it is necessary to hire human resources from outside as well as incur additional maintenance costs. Combining ERP with AI has never been easy due to its complex nature; it requires businesses the act of paying a substantial amount of money intelligent technology software and may incur additional maintenance and repair costs. In addition, due to the extremely rapid development of technology, the software needs to be upgraded regularly to be able to adapt to the change in the business environment to help businesses not be backward; in some cases, the software is not elevated and maintained, there is a risk of losing essential data, recovering these data will be time-consuming and expensive. There is no denying that AI combined with ERP software brings convenience to users, quick work solving, and the ability to analyze and predict data but with rapid development. Therefore, the potential of technology will be the cause of increasing the risk of job loss because machines will gradually replace humans or require experienced professionals instead of cost to deploy and re-train employees. However, if businesses have well-designed systems and understand the requirements of AI, they will reduce risks, help businesses operate better, have great potential and opportunities. (MacAraig 2019.)

3.3 Intergrating big data with ERP

In the current context, the emergence of big data is expected by businesses as a considerable resource, forcing firms to face a series of limitations in information processing, leading to the ability to the business decisions to be delayed. This will undoubtedly affect business performance in the long run. Big data refers to data sets that grow rapidly and widely in various forms, making them processing power of relational database management systems. Big data is called a new resource of the economy because it contains a lot of valuable information that, if successfully extracted, will help businesses predict trends,

seize opportunities and save costs. How can the business analyze its significant data source? This is the question of most business managers because they all want to be more flexible and agile than their competitors to dominate the market.

Therefore, big data in the 4.0 revolution becomes a handy tool for the business activities of enterprises. It is finding solutions to approach and change and improve to serve target customers effectively. The combination of big data with Enterprise Resources Planning (ERP) is no longer a new concept to run businesses effectively, ERP continues to be an essential aspect of companies to drive business productivity, and the integration of big data with ERP can trigger unprecedented growth in the business, will analyze the effects it brings as well as the reasons why big data is always there is the choice of many entrepreneurs around the world.

3.3.1 The denifition of big data and its application to ERP

The definition of big data: big data has many concepts that have been explained differently, but in the most basic way, it is a term that can only handle large and complex data sets that traditional systems can handle. The system is challenging to handle. Big data can include analyzing, collecting, monitoring, managing, searching, sharing, querying, and securing the system's data. In addition, big data is often referred to as the analysis of forecasts, market movements, and user behavior with a valuable input system. Big Data can aggregate data from a few tens of terabytes to many petabytes (1 petabyte = 1024 terabytes). Big Data is often characterized as considered as an information asset, with such a large volume of data that it is necessary to have new technologies such as cloud storage to be able to process it effectively to provide the best optimizations for users' use them (SAP Insights 2019). Big Data has five features or can be called V's: (Gutta 2020.)

Volume indicates growth in terms of vast volumes of data created and stored. Masses of big data are measured from terabytes to petabytes. With big data, Cloud Computing technology is capable of meeting storage needs.

Velocity shows an increase in the speed of data processing and analysis operations. The rate can be understood in two aspects: the volume of data increases quickly and fast data processing in real-time, which means data is processed immediately, as soon as they arise.

Variety is an increase in the diversity of data for traditional data – structured data. Still, today more than 80% of the data generated is unstructured (documents, blogs, images, videos, songs, data from physical sensors, healthcare devices). An organization's big data is a collection of many data sources, the diversity of which is also increasing, making the data more complex. (Bayrak 2015.)

Veracity of big data authenticity reflects the level of confidence corresponding to each data type in different data sources. Several data sources are inherently unknown and constantly changing, such as customer opinions about a brand, product or service, the level of interest in a new campaign or product line, market trends, and economic factors. The reliability of big data depends on the origin of the data. Its value is influenced by the time factor and the impact of mining techniques on the analytic information to make actionable decisions.

Value is the most important property. It is necessary to plan the proper information values of big data for the problem or business model to be solved. Big data is seen as a technology that gives organizations added values to maintain and protect competitive advantages. Instead of storing and managing customer data in a generalized approach, big data helps organizations specialize in each object and store independent data for behavioral analysis in increase experience.

The application of Big Data to ERP has become a critical component of large businesses. Not all data, however, passes through the ERP system. Managing the ERP system's massive data and information collection becomes a challenging undertaking. It adds a lot of complications to data manipulation. As a result, big data tools are built to discern between data sources and alter them. After the data has been manipulated, it will be converted into a usable format. ERP serves as a large data bank in and of itself. Both big data and ERP can work in tandem. As a result, extensive data integration can dramatically increase the value of an ERP system. Big data can improve an ERP system's performance and lead to business transformation. Companies have been able to increase productivity in significant manner procedures and increase their revenue as a result of it. Internal processes have been streamlined, resulting in a highly efficient working paradigm. The combined use of extensive data and ERP shows increasing applications in several industries. Businesses generate data quickly, with the last two years accounting for 90% of it. This data contains significant insights which can give these companies or
break their prospects. Some areas that can benefit significantly by using ERP solutions to implement Big Data are medical centers, hospitals, social media platforms, retailers, and fashion companies. These industries rely heavily on ERP systems, and large-scale data can benefit their efficiency and daily operation. It is no mistake to say that big data will be included in ERP's future. Combining extensive

data with ERP allows companies to gain a broader understanding of their businesses. Companies should, however, ensure that significant data risk is addressed to optimize technology utilization. As a further step, companies must converge with significant responsibilities in many advanced technologies if they desire to stay ahead of the competition.

3.3.2 The impact of Big Data on ERP

In this day and age, combining ERP with big data is necessary to make the most of ERP productivity. It helps companies to analyze valuable insights that enable companies to operate efficiently and financially. By using big data integrated into a reasonable ERP system, data can be collected, processed, and analyzed, the operation of the ERP software can be supported, and companies can gain many benefits: (Joshi 2019.)

Planning process simple is one of the critical benefits of using big data with the ERP system. A great deal of information can be processed in a short period, making project management and planning easy. As operations can be run efficiently, this can significantly improve business performance. Businesses can conveniently access real-time information by including large-scale data in ERP, which helps them to plan better and save time. Furthermore, human resources can be efficiently allocated, and productivity improvement results.

Detail provides by companies collect semi-structured information using sensor nets. Big data can be collected in a structured way in business processes and gives companies with an efficient insight into their inventory, production, and supply chain management processes. These insights allow companies to make better and more accurate decisions that the organization can benefit from. With big data from ERP, the companies can develop new strategies for business growth.

Standard research methods help the recruitment of suitable candidates for companies is a primary focus. Many companies use extensive data to improve their recruitment processes. Practical analysis and data use can contribute to improving relations with applicants. Recruiters can have a thorough overview of jobseekers and this can contribute to the candidate's evaluation. In addition, recruiters can find the most qualified replacement. In many cases, it can help to fill potential talent gaps. The cooperation can thus verify very beneficial over traditional recruitment procedures. The employee can achieve a highly positive working environment, perfectly aligned with the skills needed and morality at work.

3.3.3 Helping businesses identify and research business opportunities

Attracting and retaining customers are considered the most important and valuable of any business. No business can claim its success without the customer element. However, in the current competitive era, it isn't straightforward to attract and retain customers. If companies do not quickly absorb what customers need and look for, they will very quickly come up with products of poor quality that do not match customer needs. Big Data integrated with ERP software allows businesses to observe new development trends associated with customers. In today's modernized technology world, businesses can easily collect customer data if there is a need. Understanding customer needs will help your business go further and grow further in the future. For example, a clear example of brand protection and the use of big data is Disney. Disney executives are now using big data in innovative ways to improve the experience of Disney Land park gate walks. Disney World has launched the My MagicPlus program. Through the use of My MagicPlus, every visitor entering the park receives a wristband equipped with RFID technology that will track their movements. This device is connected to many other sensors throughout the park and turns accurate data into an extensive data system. The data collected is designed to help Disney employees find and anticipate their desires to provide a more personalized. (ICMD 2019.)

Using Big Data to integrate with ERP to manage risk of the collaborative between big data and ERP systems in predicting and sales improvement can be beneficial for a retail store. The vendors can give knowledge into sales figures with essential data in the ERP system, such as stock and supply management. Retailers can better manage supply and demand requirements for various products with precise sales predictions. This can considerably decrease instances where materials and products are under or overloaded and maximize income. The larger the business, the more careful and thorough the risk management process is. Essentially, a risk management plan is an essential investment for any business or sector. Being able to foresee potential risk and mitigate it before it happens is crucial if a company remains profitable. Big Data analysis has contributed significantly to the development of risk management solutions. The tools available allow businesses to quantify and model the risks they have to deal with daily. As the availability and diversity of statistics has increased, big data analytics have become increasingly important great potential to improve the quality of risk management models. As a result, a business can achieve more innovative risk mitigation strategies and make strategic decisions more successfully. (ICMD 2019.)

Managing supply chain demonstrates to be a big challenge for businesses to document all processes associated with supply chain management. Without knowledge of supply chain management, the

production process from supplier to retailer is complicated. By integrating Big Data with ERP, the awareness of the supply chain is greatly enhanced. Companies can also get a detailed overview with big data for ERP solutions of all their information assets. Companies can optimize all routes associated with product inflow and their motion in the supply chain cycle through good data monitoring. At the various stages of production, businesses can effectively identify product details to help businesses present their supply network with more accuracy, clarity, and detail. Any product must go through a journey of cycle – also known as the supply chain, which requires the coordination of many stages: from the supplier of raw materials to the supplier in order to reach the consumer's hands. Product processing factories, then to shipping units, means of transport, then to distribution centers, wholesale and retail stores. Each step through the process comes with risks. The modern supply chain system based on Big Data allows businesses to have more choices, with a broader network of suppliers, distributors, and products retailers. As a result, supply chain management becomes more accessible and more convenient than ever. (Parmar 2021.)

4 DATA COLLECTION AND SORTAGE

As businesses apply artificial intelligence and big data technologies to improve business management efficiency, data collection, storage, and management become more crucial than ever. Incomplete, inaccurate data is one of the significant challenges in analysis and decision-making. Rich, accurate data sources help streamline decision-making and promote output quality. Big data and artificial intelligence ERP applications supplement data more important data sources than traditional ERP systems. Traditionally collected data sources are brought into the data warehouse. In contrast, data collected from websites, IoT, etc., will be stored in the data lake and then, thanks to data normalization technology, fed into the mining system.

4.1 Data warehouse

A data warehouse (DWH) is also a data store for businesses whose primary purpose is to provide reporting and analysis. Stored data sometimes has to go through an extraction, transformation, and processing through the ETL (Extract - Transform - Load) process before being imported into the archive. A data warehouse transforms and classifies data from different sources of businesses. This data will be ready to serve other purposes, especially reports and analysis. (Bui 2017.)

ERP software with artificial intelligence and big data will always need a place to store data and use them most effectively. One of the methods to handle data is a data warehouse, which includes data taken from the trading system and data to support business performance processes and business status. A data warehouse is a system used to store information for analysis and reporting. This type of data warehouse is also known as a "data mart" used to keep the information needed for a department or even a single user. Most users need to access a specific data subset, like sales, production, logistics, or marketing. The vital data marts on both sides are data security and avoid confusion because of too much data, and working with related data. Therefore, data warehouse needs a data model with an explicit data structure to help determine the data to be stored and remove unnecessary information. The data warehouse uses a Schema diagram, which means that the model is designed for the primary purpose of providing reports. This requires a significant time investment to analyze data sources, understand business processes, categorize data, and form a defined system for storing data. (Harrington 2021.)

4.2 Data lake

When comparing a data lake to a data warehouse, that just a large data warehouse in its natural, unstructured form. The data lake stores raw data, and users can transform, categorize or analyze different pieces of data based on their needs, and these data need to be further processed as required. In a data lake, all types of data from system sources are stored that includes data sources that may be rejected for storage in a data warehouse, such as sensor data, social media activity, text, and images, which may even store data that is currently not but may be required in the future. Data lake keeps data in its original state; when data is required to solve business problems, the only relevant information is selected and analyzed to provide answers. On the other hand, it takes advantage of the flexibility of data because the raw form of the data is always stored easily accessible, allowing for unhindered refactoring and better suited to users doing in-depth analysis like data scientists. With so many diverse data types in the data lake, they have the ability to combine many different kinds of data and raise entirely new questions that need to be answered. (Harrington 2021.)

The vigorous development of big data and artificial intelligence technologies that integrate with ERP will create more and more intelligent ERP, supporting better business management. Proposals to add additional functions to meet the needs of businesses have been. They are changing and applying procedures, technology software, data sources into current ERP software. The existing ERP software is still being perfected to serve the needs of businesses, and each company will have its ERP software to suit and support to develop in the best way. After analyzing the requirements of the functions, it is necessary to identify the data sources that need to be collected so that the new parts can be implemented quickly, accurately, and efficiently in real-time. Finally, it is the determination of the technologies needed to manage, process, store data, and perform functions and maintain a safe, efficient, and appropriate system for the business with the times. (SAP Press 2019.)

5 CASE STUDY – SAP ERP

In this section, a case study from software company SAP will demonstrate that applying big data and artificial intelligence to business planning software has been a technological leap forward and has become invaluable common to many global businesses. This case study builds on the achievements that SAP has created and makes it successful to prove that applying big data and artificial intelligence to ERP is the right thing to do in the industrial age. Industry 4.0, the people who experience this software will collaborate and it as a tool to help businesses operate more smoothly. In this section, besides taking SAP as a case study of applying big data and artificial intelligence with business planning software, qualitative research methods and content analysis method are used to demonstrate this research through the content of two interviews as data for analysis for the research. The qualitative data analysis method used to identify and analyze the characteristics of the combination of big data, artificial intelligence and AI has brought benefits and limitations as well as challenges, specifically two interviews with the CEO of an enterprise that has been using S/4 HANA software for its business operation and the other interviewee is an IT specialist of the ERP software working for one of the telecommunications companies in Vietnam.

5.1 SAP business technology platform

SAP stands for the English phrase “Systems Applications and Products in Data Processing”. It is the name of a leading software supplier company in Germany in particular and the world in general. SAP is also in the list of the largest software companies in the world. This enterprise is the "father" of SAP ERP software that is used by many companies around the world. It is a business planning software created by the German company SAP. SAP's head office is located in Walldorf in Germany. Thanks to the development and sales of this product, SAP has earned huge profits. (SAP History.)

In addition, SAP software is also known by a more complete name, which is SAP ERP software and it was first hit the market. SAP offers a wide range of enterprise resource planning applications including customer relationship management, financial management, human resource management, and product flow management products, and supply chain management. In addition, SAP also provides integrated and customized software with partners such as SAP Business One, SAP Net Weaver, SAP Analytics Clould, SAP S/4 HANA help businesses manage key business activities well. SAP’s business is helping

customers optimize their business processes and run as an intelligent enterprise. SAP's purpose is to help the world run better and improve people's lives. (SAP Business Technology Platform.)

With each module of SAP software, there will be different features to bring efficiency and benefits to businesses: (Boeder & Groene, 2014.)

Sales management helps the business' sales process be closely monitored by the SAP ERP system to conduct revenue analysis, forecast profits, and find potential capabilities through indicators and reports. SAP will help businesses manage customer relationships and grasp the psychology of customers, thereby selling successfully.

Purchasing Management of SAP software can help you build, manage, and maintain relationships with suppliers. Items such as orders, quantity of goods, profit level, outstanding debt, etc., will all be strictly managed.

Warehouse management is a complex job, but just taking advantage of the help of SAP, businesses can "lighten up" a lot. This system will help you manage inventory, pricing policy thoughtfully and effectively.

Financial management is an essential task of every business, no matter how large or small their size. SAP ERP will help you manage accounting and finance related activities such as general accounting, journal entry, budgeting. It will also provide you with full reports on the above activities.

5.2 Innovation of SAP

The continuous development of the technology industry and with a mission to be the largest business management software company in the world, SAP has been developing software with different applications to meet the needs of customers. For the different needs of customers around the world in the current era, if the businesses don't adapt to the materials in the technology industry such as IoT, AI, big data, etc.,. Therefore, seeing that great potential, SAP deserves to become a successful business planning software and deserves to be one of the software with a huge global customer base. Compared to the past technology landscape, AI and big data are really big things, however, it is an interesting material for technology researchers because of the unexpected benefits that it brings. For that extremely

reasonable reason, scientists have spent all their time, effort and brainpower to research and research for big data and artificial intelligence. The technology platform will continue to thrive with countless products on the market to connect society with the economy to help businesses work easier, smarter, and significantly more productive. (SAP Business Technology Platform.)

5.2.1 Build an SAP ERP intelligent system

In the improvement process of SAP ERP software, it is impossible not to integrate with artificial intelligence, and SAP S/4 HANA is a typical application of that combination. SAP S/4 HANA is software for large-scale enterprises, and SAP S/4HANA supports planning to use the enterprise's resources most optimally, including AI, machine learning, and advanced data analysis tools SAP S/4HANA will transform the overall business process thanks to intelligent automation technology running on the market-leading SAP HANA database. The facility features fast real-time processing and an optimized data model.

With intelligent technology to reduce the burden on businesses, instead of having to deal with countless important problems or even small errors, when businesses use SAP S/ 4 HANA, they will experience the features it brings. SAP S/4 HANA delivers rapid data integration, real-time intelligence-driven reporting and analytics, flexible deployment, and the best user experience. (Johannes 2020.)

SAP S/4 HANA Cloud also ensures compliance with laws and regulations with tax support, as well as properly presented audit reports with accounting rules and data commitment compliance. But perhaps, the most exciting benefit that S/4 HANA brings lies in its innovative business intelligence services. Streamlined automated processes are great productivity boosters, but using intelligent apps delivers insights and recommendations based on computer algorithms. The decision-making and the use of resources can change completely. Finally, it is impossible not to mention the incentive to increase profits. With SAP S/4 HANA, users will experience simplified and personalized utilities. The design is focused on boosting productivity, such as faster access to critical information or a timely notification system. Everything is centralized to help users perform operations quickly, ensuring complete information and personalization. (SAP S/4 HANA Cloud.)

5.2.2 Values of Big Data contribute for SAP platform

In business planning software, it is impossible not to mention the application with big data, and SAP HANA is one of the typical technology platforms provided by SAP when combined with big data. Combining SAP with big data is a solution for data analysis, computation as well as SAP HANA technology that allows data transformation to increase system data processing capabilities, optimize performance data analysis. Besides the usual data analysis features, this software also provides analytical predictive tools, allowing simple integration with big data, so SAP HANA is becoming popular and well-suited as well as a potential application to become the next generation for real-time, analytical applications with extremely large amounts of data. (ZaranTech 2019). Besides, this combination also creates a breakthrough in speeding up, retrieving data sources from administrative applications, serving computation, analysis, reporting and decision-making tasks in real-time at the fastest speed. A evident change can be seen from applying big data to business planning software that saves time and data analytics to help companies make informed decisions. Strategies are a huge plus of this combination. It allows organizations of all sizes to build data lakes and run data science and analysis using their favorite tools using the SAP Cloud Platform. Big Data cloud solution is a fully managed service that can handle terabytes to petabytes of structured data (structural or unstructured) from import to refinement and storage in the cloud. (SAP Insights.)

Clients can augment their data warehouse with a SAP Cloud Platform Big Data Service using external integration into SAP HANA. It acts as a processing plant for new big data sources like IoT, cleaning and transforming information before it is sent to SAP HANA via the SAP Cloud Platform Big Data Service. Data product lifecycle regulations have been used to outsource jobs and store older and less commonly used data, such as past orders, on the SAP Cloud Platform. (Jain 2018.)

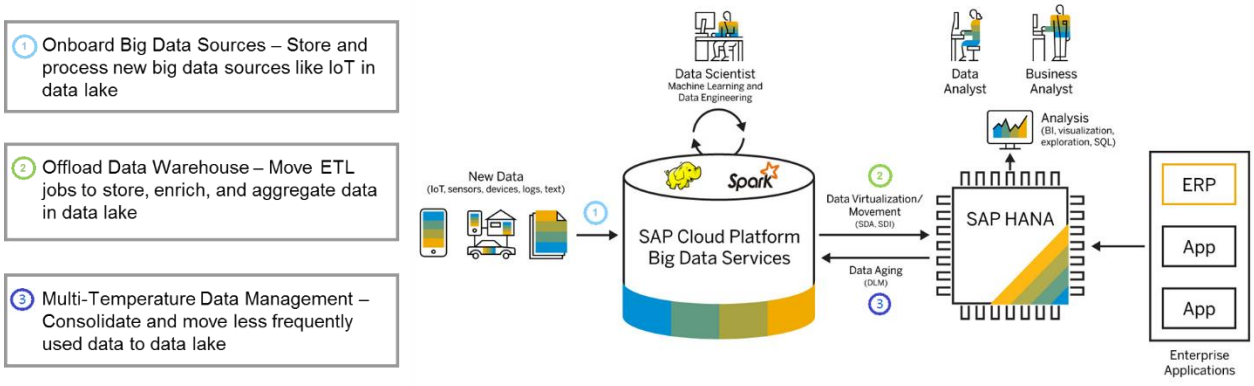

FIGURE 4. Integrated data warehouse on SAP HANA and data lake on SAP Cloud Platform Big Data service (Jain 2018.)

5.3 Research methodology

FIGFURE 5. Research Method

Based on the case study, in this thesis, the qualitative data analysis method used to identify and analyze the characteristics of the combination of big data and artificial intelligence has brought benefits and limitations as well as challenges needs to face and solve in the future. Besides, the application helping entrepreneurs have a clear direction, analyze the content as well as see the results and experiences of the enterprises that have been and are in the process of applying the ERP software that integrates artificial intelligence and big data through interviews. Qualitative research method combined with interview is a method to carry out empirical research. Using the data through two interviews with people who have direct daily contact with this software, especially the experiences they have accumulated, will be a condition to prove the theories mentioned in this article dissertation.

For more details about the interviews, these two interviews were conducted via Skype during the current epidemic situation and the time to interview each person lasted about 45 minutes, I greatly appreciate them for taking their time for me to share and give me advice. They are people who have experience with ERP and work in the Vietnamese market - specifically Ho Chi Minh City - a young city with great potential as well as on the fast-growing momentum in a land. developing countries like Vietnam. One person is currently the CEO of a business and the other is an IT specialist of SAP S/4 HANA ERP software. Concluding two interviews has yielded positive results. The information they provide will be aggregated and analyzed below. The questions in the interview process are mainly close to the experiences of the interviewees because they have difficulties and how they successfully solve each problem will be arguments to supplement the theoretical part of the thesis.

Through interviews, business owners who decided to use ERP software shared their experiences during the application of this software. ERP software in general is one of the most effective business management software and is widely applied in almost all small and medium enterprises around the world, as a CEO of a large enterprise in Vietnam and with lessons learned from practical applications, Mr. Hong shared the practical difficulties and advantages during the process of implementing this software as well as how businesses can radically overcome this problem.

Mr. Hong said that the most difficult thing for enterprises in the process of implementing ERP is the communication between enterprises and suppliers. He also said the concept of SAP ERP is quite new in Vietnam and most business owners and managers are still vague about this system. Therefore, the initial exchange process between the ERP software supplier and the enterprise may face many difficulties and barriers because the two sides do not really understand each other. Therefore, to overcome this situation, enterprises had to spend a relatively long time learning about ERP software before discussing with partner units. Enterprises had to discuss with suppliers that together they would find the most clear and intuitive ways of expressing themselves, as well as using images and case studies to have a clearer picture. And of course, the problems that arise, the two sides have tried very hard to promptly notify each other so as not to miss important information leading to unnecessary misunderstandings. Besides, he also shared that he has received a lot of positive feedback from his customers since applying this software to his business. He compared the difference before and after the ERP application changed the customer experience with the business and he emphasized that it is really important and gives the business long-term growth. Whether a business is really sustainable or not largely depends on the number of their customers, how they communicate with customers in addition to developing the quality of the product. From the use of ERP software, the business has solved countless problems with customers quickly and effectively instead of needing to spend a lot of time as before. Customers have expressed satisfaction with the business and ERP software has really changed the whole working system of the company with positive changes. One very special thing that he shared when asked about the application of ERP will be for the core value of business in the enterprise. Today, for a business to develop sustainably, it is necessary to have applications that are consistent with the core values of the business, specifically the three core values that are "Professionalism - Quality - Efficiency". These key factors have been, are and will become strategic weapons of enterprises in the journey towards big goals of enterprises in the coming time and when applying ERP software, it is really suitable in line with the company's operation and moreover, it will bring many benefits as well as go further with the company in the future.

Besides, through an interview with one of the IT specialists of ERP software, it really gave a specific view as well as a better understanding of how this software works for each business. In order for the ERP system to be effective and bring real benefits to the business, it is indispensable for the role of the ERP implementation staff who accompany the enterprise throughout the ERP implementation process. Mr. Hai said that as a profession in the IT industry, ERP implementation staff have a lot of time with customers, understand the operation process of the business thoroughly to each department. In an ERP project, after signing the contract, the implementing staff is the one who directly survey the business processes of the departments, understand the customer's requirements and document, then standardize the process. and transfer requirements for analysis and design to the technical department. They also work directly with the technical department in software testing. After completing the project, the ERP implementation staff is the one to assist the customer in preparing training documents and user manuals. Therefore, it is necessary to require staff to deploy besides understanding the system, it also requires dedication. Mr. Hai also shared more about the surprises when he first started the implementation profession, “When entered the profession, the concept of ERP was still very new, only read through ERP documents and visualized the model process of the system in theory, trained in software, and taught himself to understand the software. When implementing an ERP project, see how many difficulties, at first due to lack of experience. However, implementation experience will increase with exposed to multiple projects. Besides, not everyone is ready to accept the customers or they do not fully understand the ERP system. This forces the focus on communication skills and dealing with customers as well as the IT specialist of the ERP software who is responsible for guiding customers to use the software to solve their problems and clearly define the problem’s scope. Deployment is a difficult job, but it also brings many benefits for personal development and relationship development. This research has shown the importance of ERP software for businesses globally today, and SAP is one of the most commonly used typical large companies. The two interviewees are both users and have direct experience and they understand the potential that this software offers and its continuous improvement in the future. The products of business planning software always promise to be products with great strides not only to make business operations more efficient, but also to bring those who experience it as employees, IT professionals and even customers new experiences.

However, those experiences are accompanied by difficulties and challenges for every business when it comes to racing against the ever-evolving and rapidly changing technology. Therefore, instead of businesses always having to update the latest features of the software, each business should have an overview and analysis to find a product that really matches the core values of the business. Because the process of applying and changing an operating system in the company is not an easy thing when it will

have an impact on many problems in the business. The results show that business planning software when combined with big data and artificial intelligence brings a lot of benefits and potential in the future, not to mention the difficulties and challenges, but there is an undeniable fact that it is being received positively. Hopefully in the future this software will develop more and more and make great strides.

6 CONCLUSION

The business environment is constantly changing, the pace of change is accelerating, businesses are always looking for ways to meet customer needs and access higher market opportunities. Today's successful companies have recognized the need for ERP systems to improve quality, customer satisfaction, performance, and profitability. Developing an ERP system applying big data and artificial intelligence is an inevitable thing in the coming time. This system provides organizations and businesses with an overview of their core business in real-time and supports enterprises to automate and combine business processes by allowing sharing of data and information to perform intelligent functions that help the organization achieve the best business results. Thanks to the model of an ERP system that applies big data and artificial intelligence, organizations can recognize the development trend of business management technology in the future. Although technology is a factor that dramatically increases business benefits, businesses also need to pay attention to other factors such as marketing, finance and human resources, it will help the business survive and develop in the market. Therefore, you should also review your strategy and goals after preparing the people and processes and then determine which technology options are necessary to achieve the set goals. In addition, the model also helps businesses visualize the functions required in business management in the future. So, does the company need to define its operations in advance and build processes, especially, routines to make it more innovative and move towards automation. In addition, the model is also a reference channel for organizations when they need to determine whether to expand, upgrade, or replace a completely new system for their organization after having established their goals. Analyzing the current state of the business in terms of people, processes, and technology. In addition, the model helps companies to determine what functions are needed, what data is necessary and from what sources, the legality and data quality of the data collection. Finally, note that big data and artificial intelligence ERP applications are necessarily cloud-based, so businesses face challenges from safe and secure business information.

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APPENDIX 1

Interviewer: Yen Hoang

Interviewee: Hong Nguyen – Chief Executive Officer of Eurowindow – Total solution provider for building materials in Vietnam

Interview questions:

1. In today's market ERP has become increasingly popular and is spread across the globe. In your opinion, what factors have made ERP such a place?

2. What made you decide to apply SAP ERP to your business system?

3. Currently business planning software is actively developing in the market, specifically the market in Vietnam, will there be any difficulties before it goes into operation as smoothly as now?

4. When using a system that integrates with big data and AI, besides difficulties, what benefits does it bring to your business?

5. In the process of implementing ERP, do you think the importance of customer experience to the business will be developed?

6. Finally, how do you evaluate the potential of ERP application in understanding the core value of business in the enterprise?

APPENDIX 2

Interviewer: Yen Hoang

Interviewee: Hai Nguyen – Former IT Technician for ERP System – FPT Group (telecommunications companies in Vietnam)

Interview questions:

1. As a person directly involved in the implementation of ERP software, can you share your experiences?

2. Now that the explosion of digital big data is huge, are there any difficulties that stand in the way of entering the data?

3. When applying S/4 HANA, what role do you play when training older employees to access new technology?

4. With years of work experience, how do you compare today's ERP software with individual software in the past?

5. Do you think ERP software specialists play an important role and what are their duties when the software is applied with AI and Big Data?

6. In summary, ERP is a very necessary software for a business today, do you have any new suggestions for this application to go further in the future?