

How Business can use ERP and AI to become Intelligent Enterprise

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Abstract:- Today every Business generates an enormous amount of data from daily operations from Production, Sales, Purchase, and Maintenance. With the rise of Machine Learning, and improved Processing power on the cloud, Businesses can use this data to improve Sales, provide a better customer experience, reduce downtime by performing predictive maintenance and improve inventory management. In Sales, Businesses can provide Product suggestions based on customer buying patterns. To reduce downtime, Companies can look at the sensor data and quality of products to predict possible maintenance of the machines. To improve Customer experience, Companies can integrate intelligent chat bots. This Opinion article will share Business scenarios where Machine learning can help improve processes.

Keywords:- Intelligent Enterprise, ERP, Artificial Intelligence, Machine Learning.

I. INTRODUCTION TO ERP AND AI

Enterprise Resource Planning (ERP) [1] is a software system that integrates and automates various business processes such as inventory and order management, accounting, human resources, and customer relationship management. ERP systems help businesses to streamline their operations, improve efficiency, and make more informed decisions.

Artificial Intelligence (AI) [2] refers to the use of computer algorithms to mimic human intelligence and decision-making. AI can analyze large amounts of data, identify patterns and make predictions, and automate tasks that would otherwise require human intervention.

The integration of ERP and AI [3] has become increasingly important in recent years as businesses seek to become more agile and responsive to customer needs. By using AI to analyze data generated by ERP systems, businesses can gain insights into customer behavior, forecast demand, optimize supply chains, and automate routine tasks.

The convergence of ERP and AI has the potential to transform businesses into intelligent enterprises that can adapt to changing market conditions and stay ahead of the competition.

II. BENEFITS OF ERP AND AI

ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) are two powerful technologies that can provide businesses with significant benefits [4]. Some of the benefits of ERP and AI include:

A. Benefits of ERP:

Improved efficiency: ERP systems can help businesses streamline their processes and reduce manual work, leading to improved efficiency and productivity.

Better data management [5]: ERP systems provide a centralized platform for managing data across different departments and functions, improving data accuracy and reducing data duplication.

Increased visibility [6]: ERP systems provide real-time visibility into business operations, allowing managers to make informed decisions based on accurate and up-to-date information.

Enhanced collaboration [7]: ERP systems enable collaboration across different departments and functions, facilitating better communication and teamwork.

Cost savings [8]: ERP systems can help businesses reduce costs by optimizing processes, reducing inventory levels, and minimizing waste.

B. Benefits of AI

Improved decision-making [9]: AI can analyze large amounts of data quickly and accurately, providing businesses with insights and recommendations that can inform decision-making.

Increased efficiency: AI can automate repetitive tasks, freeing up employees to focus on higher-value activities.

Enhanced customer experience [10]: AI can help businesses personalize their interactions with customers, improving customer satisfaction and loyalty.

Predictive analytics [11]: AI can analyze historical data and make predictions about future outcomes, helping businesses identify opportunities and avoid risks.

Competitive advantage: AI can help businesses gain a competitive advantage by enabling them to innovate and respond quickly to changing market conditions.

III. USE CASES OF ERP AND AI

There are many use cases where ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) can be applied together to provide businesses with significant benefits. Here are some examples:

Supply Chain Management [12]: ERP systems can provide businesses with visibility into their supply chain, while AI can be used to analyze data from the ERP system and identify areas for improvement. For example, AI can help to predict demand, optimize inventory levels, and identify potential bottlenecks in the supply chain.



Figure 1: Product recommendations

Customer Relationship Management [13]: By integrating AI algorithms into their ERP system, businesses can gain insights into customer behavior, preferences, and needs. This can enable businesses to create personalized experiences for their customers and improve customer satisfaction. As shown in Figure 1 Apriori algorithm can be used to generate product associations from historic Sales data.

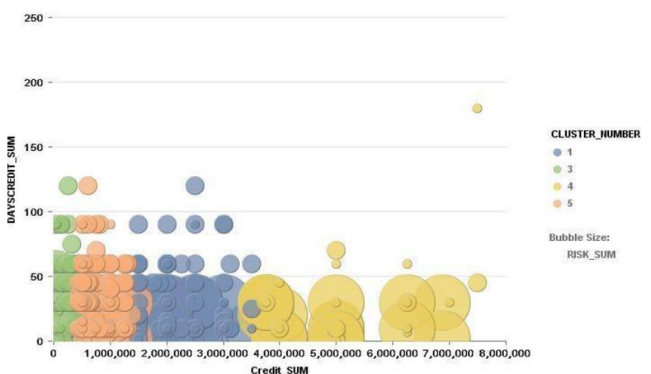


Figure 2: Customer Credit and Risk assessment

Financial Management [14]: ERP systems can provide businesses with a centralized platform for managing their financial data, while AI can be used to analyze the data and provide insights into financial performance. For example, AI can be used to predict cash flow, identify potential fraud, and optimize financial reporting. As shown in Figure 2, K-means algorithm can be used on Customer Credit limit, Risk category and Terms of payment to create cluster and offer discounts or Identify anomalies.

Human Resources Management [15]: ERP systems can help businesses manage their human resources data, while AI can be used to analyze the data and provide insights into employee performance, engagement, and retention. For

example, AI can be used to identify employees who are at risk of leaving and provide recommendations for how to retain them.

Manufacturing Optimization [16]: By integrating AI algorithms into their ERP system, businesses can optimize their manufacturing processes. For example, AI can be used to predict equipment failures, optimize production schedules, and reduce waste.

IV. IMPLEMENTATION OF ERP AND AI

Implementing ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) together can be a complex process, but the benefits can be significant. Here are some key considerations for implementing ERP and AI:

Define your business needs [17]: Before implementing ERP and AI, it's important to define your business needs and objectives. This can help you choose the right ERP and AI solutions and ensure that they are aligned with your business goals.

Choose the right ERP [18] and AI solutions [19]: There are many ERP and AI solutions available, so it's important to choose the ones that are best suited to your business needs. Consider factors such as functionality, scalability, and compatibility with your existing systems.

Plan your implementation: Implementing ERP and AI requires careful planning and coordination. Develop a detailed implementation plan that includes timelines, milestones, and responsibilities.

Ensure data accuracy and quality: ERP and AI rely on accurate and high-quality data. Before implementing these technologies, ensure that your data is clean, accurate, and complete. This can involve data cleansing, data normalization, and data validation.

Provide training and support: ERP and AI can be complex technologies, so it's important to provide training and support to your employees. This can help them to use the new systems effectively and maximize the benefits.

Monitor and evaluate your results: After implementing ERP and AI, monitor your results and evaluate your performance against your objectives. This can help you to identify areas for improvement and optimize your systems over time.

V. FUTURE OF ERP AND AI

The future of ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) is exciting, with many new developments and innovations on the horizon. Here are some trends and predictions for the future of ERP and AI:

Increased use of AI in ERP [20]: As AI technology continues to evolve, we can expect to see more integration of AI into ERP systems. This could include more advanced predictive analytics, natural language processing, and machine learning algorithms.

Greater focus on data security [21]: With the increasing amount of data that ERP and AI systems generate, data security will become even more important. We can expect to see more robust security features and more emphasis on data privacy and compliance.

More personalized experiences: As AI technology improves, we can expect to see more personalized experiences for customers, employees, and partners. This could include personalized recommendations, tailored communications, and customized workflows.

Greater automation [22]: With the integration of AI into ERP systems, we can expect to see greater automation of routine tasks and processes. This could include automated data entry, invoice processing, and inventory management.

Adoption of cloud-based ERP: Cloud-based ERP systems are becoming increasingly popular, and we can expect to see even more widespread adoption in the future. This could include more advanced cloud-based AI solutions, which can provide even greater scalability and flexibility.

VI. CHALLENGES OF ERP AND AI

While the benefits of integrating ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) are numerous, there are also several challenges that organizations may face. Here are some common challenges of ERP and AI:

Integration complexity: Integrating ERP and AI can be complex and challenging. The two technologies often require different skill sets and expertise, and integrating them requires careful planning and coordination.

Data quality: ERP and AI both rely on high-quality data, but ensuring data quality can be a challenge. Data must be accurate, complete, and consistent across all systems to ensure that the AI algorithms generate reliable insights.

Resistance to change: Implementing new technology can be disruptive, and employees may resist changes to their familiar workflows and processes. This can make it challenging to gain buy-in and adoption for new ERP and AI systems.

Security and privacy: ERP and AI systems generate and process large amounts of sensitive data, which can create security and privacy concerns. Organizations must implement robust security measures to protect against cyber threats and ensure compliance with data protection regulations.

Cost: Integrating ERP and AI can be costly, both in terms of software and hardware investments and in terms of personnel and training costs.

Talent scarcity: Finding skilled personnel who are knowledgeable in both ERP and AI can be challenging, as these are specialized skill sets.

VII. CONCLUSION

In conclusion, the integration of ERP (Enterprise Resource Planning) and AI (Artificial Intelligence) can provide significant benefits to organizations, including increased efficiency, better decision-making, and improved competitiveness. However, implementing these technologies together requires careful planning, coordination, and attention to detail.

Organizations must define their business needs, choose the right ERP and AI solutions, plan their implementation, ensure data accuracy and quality, provide training and support to employees, and monitor and evaluate their results. The future of ERP and AI is bright, with trends such as increased AI integration, greater focus on data security, more personalized experiences, greater automation, and greater adoption of cloud-based ERP.

However, integrating ERP and AI can also present several challenges, including integration complexity, data quality, resistance to change, security and privacy concerns, cost, and talent scarcity. By addressing these challenges, organizations can successfully integrate ERP and AI and reap the rewards of these powerful technologies.

REFERENCES

- [1] Klaus, Helmut, Michael Rosemann, and Guy G. Gable. "What is ERP?." *Information systems frontiers* 2 (2000):141-162.
- [2] Schank, Roger C. "What is AI, anyway?." *AI magazine* 8,no.4(1987):59-59.
- [3] Goundar, Sam, Anand Nayyar, Moniker Maharaj, Karunesh Ratnam, and Shalvin Prasad. "How artificial intelligence is transforming the ERP systems." *Enterprise systems and technological convergence: Research and practice* 85 (2021).
- [4] Anguelov, Kiril. "Applications of artificial intelligence for optimization of business processes in enterprise resource planning systems." In *2021 12th national conference with international participation (ELECTRONICA)*, pp. 1-4. IEEE, 2021.
- [5] Maedche, Alexander. "An ERP-centric master data management approach." (2010).
- [6] Holcomb, Phillip J., Lindsay Reder, Maya Misra, and Jonathan Grainger. "The effects of prime visibility on ERP measures of masked priming." *Cognitive Brain Research* 24, no. 1 (2005): 155-172.
- [7] Shafiei, Farzad, and David Sundaram. "Multi-enterprise collaborative enterprise resource planning and decision support systems." In *37th Annual Hawaii International Conference on System Sciences*, 2004. *Proceedings of the*, pp. 10-pp. IEEE, 2004.
- [8] Kim, Jipyo. "Activity-based framework for cost savings through the implementation of an ERP system." *International journal of production research* 47, no. 7 (2009): 1913-1929.
- [9] Pomerol, Jean-Charles. "Artificial intelligence and human decision making." *European Journal of Operational Research* 99, no. 1 (1997): 3-25.
- [10] Ameen, Nisreen, Ali Tarhini, Alexander Reppel, and Amitabh Anand. "Customer experiences in the age of

- artificial intelligence." *Computers in Human Behavior* 114 (2021): 106548.
- [11] Larose, Daniel T. *Data mining and predictive analytics*. John Wiley & Sons, 2015.
 - [12] Dash, Rupa, Mark McMurtrey, Carl Rebman, and Upendra K. Kar. "Application of artificial intelligence in automation of supply chain management." *Journal of Strategic Innovation and Sustainability* 14, no. 3 (2019): 43-53.
 - [13] Chatterjee, Sheshadri, Soumya Kanti Ghosh, Ranjan Chaudhuri, and Sumana Chaudhuri. "Adoption of AI-integrated CRM system by Indian industry: from security and privacy perspective." *Information & Computer Security* 29, no. 1 (2021): 1-24.
 - [14] Al-Blooshi, Laila, and Haitham Nobanee. "Applications of artificial intelligence in financial management decisions: A mini-review." Available at SSRN 3540140 (2020).
 - [15] Johansson, Jennifer, and Senja Herranen. "The application of artificial intelligence (AI) in human resource management: Current state of AI and its impact on the traditional recruitment process." (2019).
 - [16] Fahle, Simon, Christopher Prinz, and Bernd Kuhlentötter. "Systematic review on machine learning (ML) methods for manufacturing processes—Identifying artificial intelligence (AI) methods for field application." *Procedia CIRP* 93 (2020): 413-418.
 - [17] Mumford, Enid. "Defining system requirements to meet business needs: a case study example." *The Computer Journal* 28, no. 2 (1985): 97-104.
 - [18] Lv, Fan, and Jinliang Chen. "Influencing factors on ERP system selection." In *2010 IEEE International Conference on Software Engineering and Service Sciences*, pp. 671-673. IEEE, 2010.
 - [19] Mahajan, Vidur, Vasantha Kumar Venugopal, Murali Murugavel, and Harsh Mahajan. "The algorithmic audit: working with vendors to validate radiology-AI algorithms—how we do it." *Academic radiology* 27, no. 1 (2020): 132-135.
 - [20] Katuu, Shadrack. "Enterprise resource planning: past, present, and future." *New Review of Information Networking* 25, no. 1 (2020): 37-46.
 - [21] Dilmaghani, Saharnaz, Matthias R. Brust, Grégoire Danoy, Natalia Cassagnes, Johnatan Pecero, and Pascal Bouvry. "Privacy and security of big data in AI systems: a research and standards perspective." In *2019 IEEE International Conference on Big Data (Big Data)*, pp. 5737-5743. IEEE, 2019.
 - [22] Muro, Mark, Robert Maxim, and Jacob Whiton. "Automation and artificial intelligence: How machines are affecting people and places." (2019).