

ASPECTS OF ARTIFICIAL INTELLIGENCE (AI) AND ERP SYSTEMS IN RELATION TO PROCESS OPTIMISATION

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1 OVERVIEW WITH AI

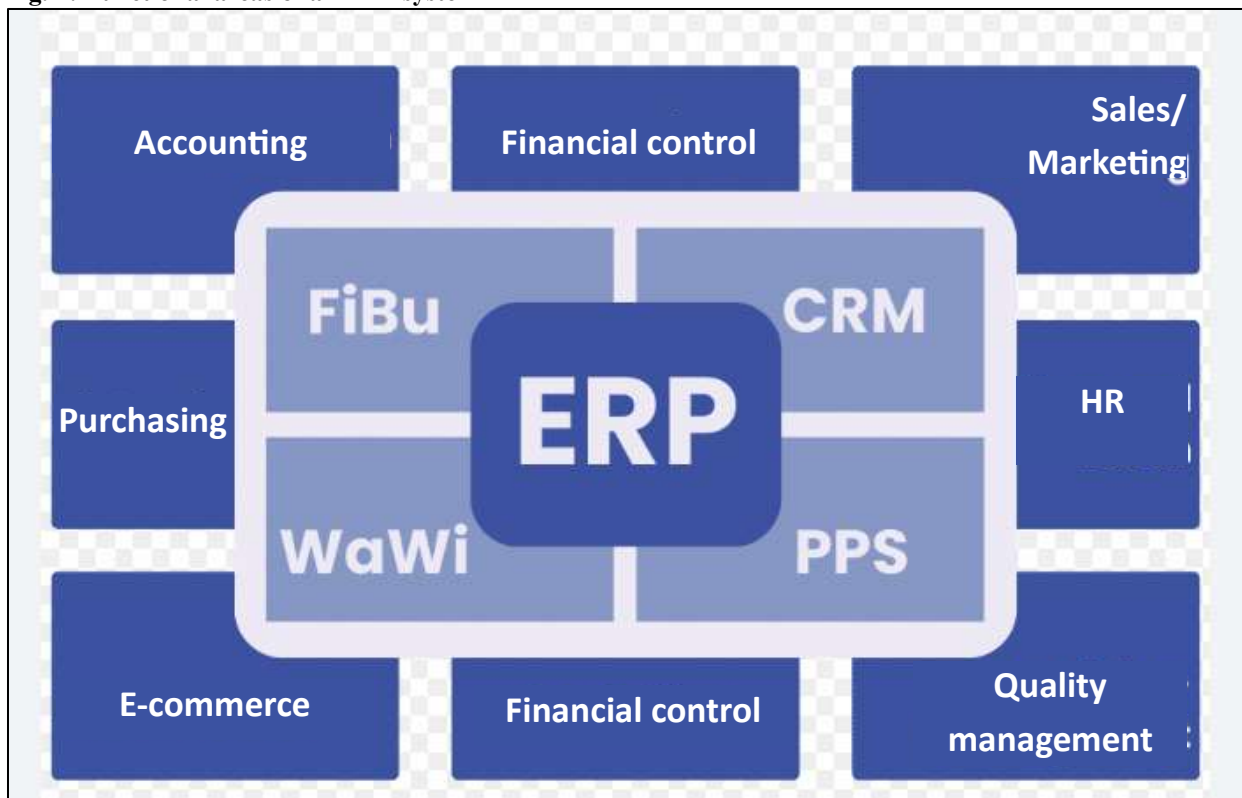
Abstract: An ERP (enterprise resource planning) system is a type of software that helps a company to manage and optimise its business processes. It integrates various company divisions such as finance, HR, purchasing, production and sales into a central platform. Put simply, an ERP system helps companies to control and monitor all major business processes by bringing together information and data from different departments and making it accessible. (n.a.¹, 2025, <https://www.google.com/erp-systeme>)

1.1 INTRODUCTION TO ENTERPRISE RESOURCE PLANNING

A good way to understand ERP is to imagine a company as a human body. Like the human body, it has core processes that are vital for its health and correct functioning, but rather than sleep and digestion, a company has a supply chain and sales. Although many of these processes take place independently of each other, they are still interconnected, as they affect the body – or the company – as a whole. This also means that when problems occur in one process, this can affect the other processes – and this is not uncommon.

An ERP software system functions much like a company's central nervous system. It helps to efficiently manage all these important processes and workflows by linking them all together in an integrated system. (n.a.², 2025, <https://www.sap.com/germany/products/erp/what-is-erp.html>)

Fig. 1: Functional areas of an ERP system



Source: n.a.¹, 2025, <https://www.google.com/erp-systeme>

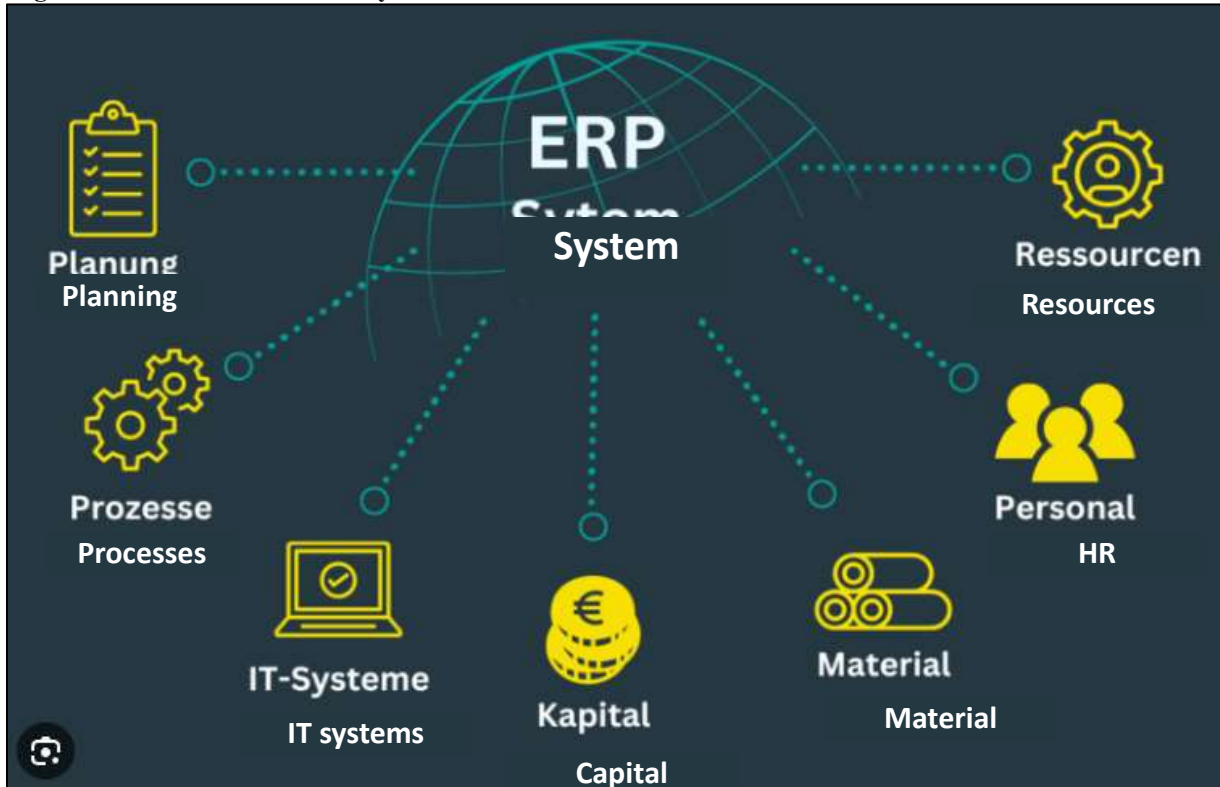
1.2 History and development of ERP

ERP had its humble beginnings more than a century ago – in the form of a paper-based manufacturing system for production planning. In the early 1960s, manufacturing companies started to introduce computerised business

applications. They were faster and more precise than manual processes, but they were also costly, had limited functions and were still relatively slow.

These groundbreaking applications led to the development of dedicated individual solutions such as customer order processing and material requirements planning (MRP). Ultimately, these solutions went on to be integrated into a single system by new software, which gave an enormous boost to operational efficiency. In the 1990s, ERP then served a broader range of business activities in various industries and changed the technology sector.

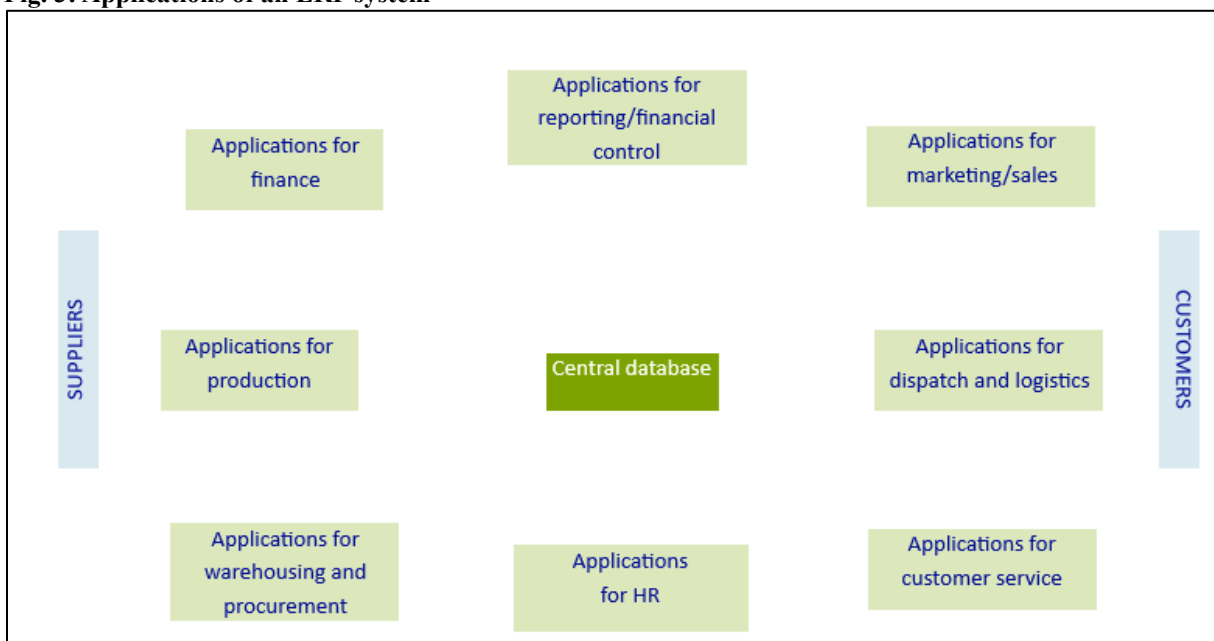
Fig. 2: The divisions of an ERP system

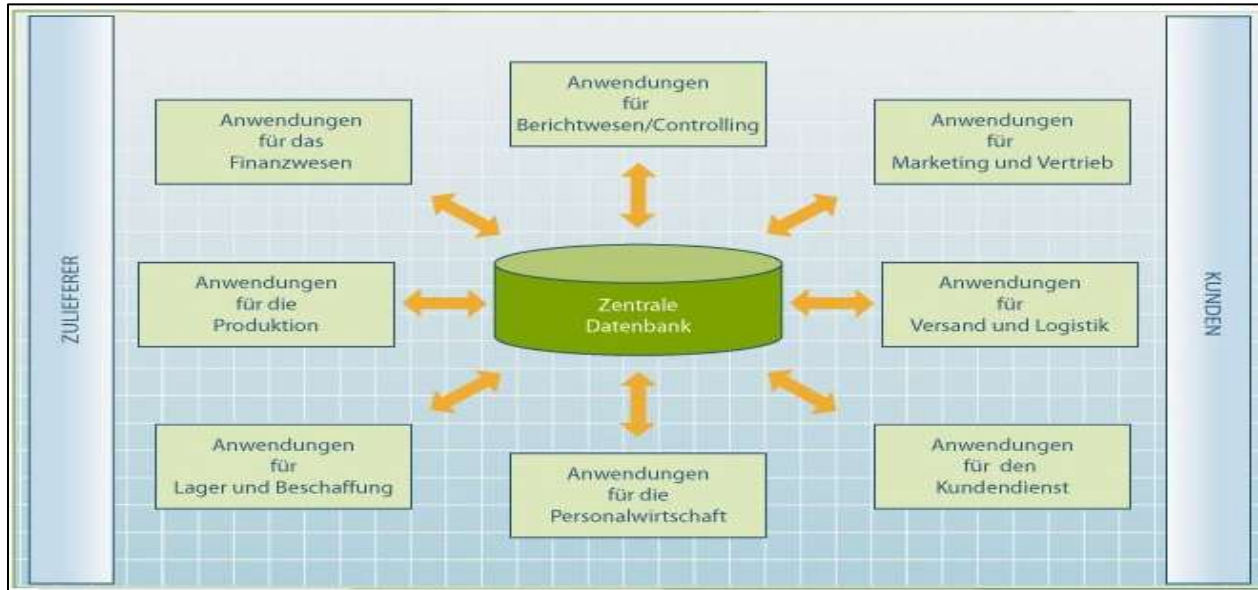


Source: n.a.³, 2025, <https://www.google.com/erp+system>

Faster Internet and new tools for software development further revolutionised ERP suites. The introduction of browser-based software paved the way for cloud ERP and considerably increased the acceptance, scope and functionality of ERP solutions.

Fig. 3: Applications of an ERP system





Source: n.a.³, 2025, <https://www.google.com/erp+system>

Today's ERP systems are increasingly using intelligent technologies such as artificial intelligence (AI), machine learning, natural language processing (NLP) and in-memory databases. This allows companies to make their processes more efficient, gain fresh insight from transaction data and unstructured data and remain competitive in a fast-paced environment.

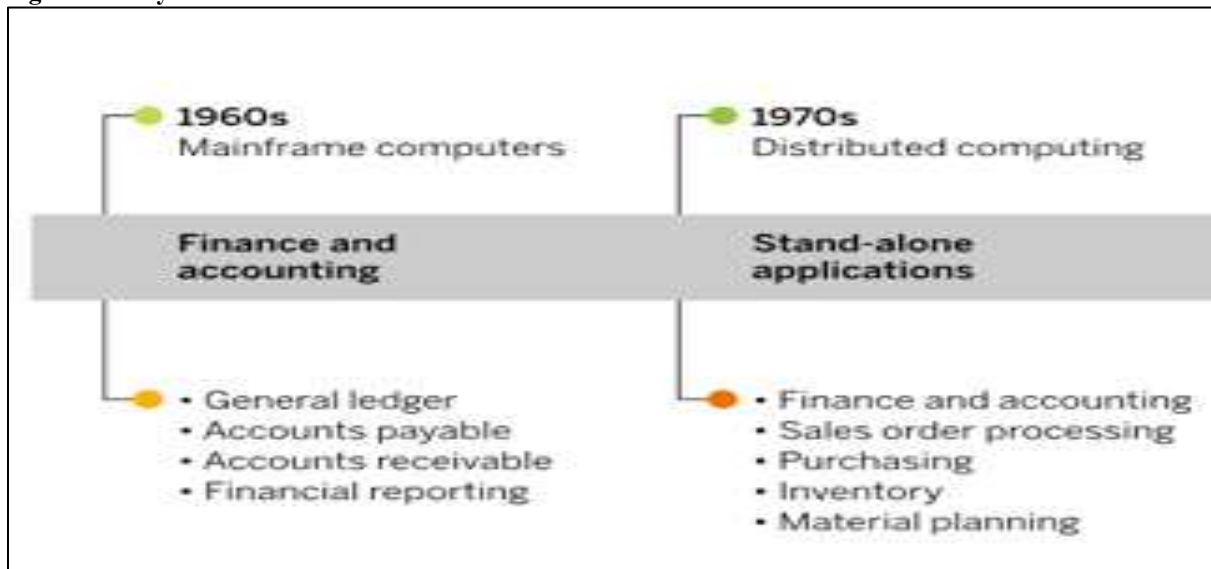
(n.a.⁴, 2025, <https://www.sap.com>)

What makes enterprise resource planning so important?

Most, if not all, of a company's data should be stored in the ERP system, providing the company with a central data source. Some examples of why this is include:

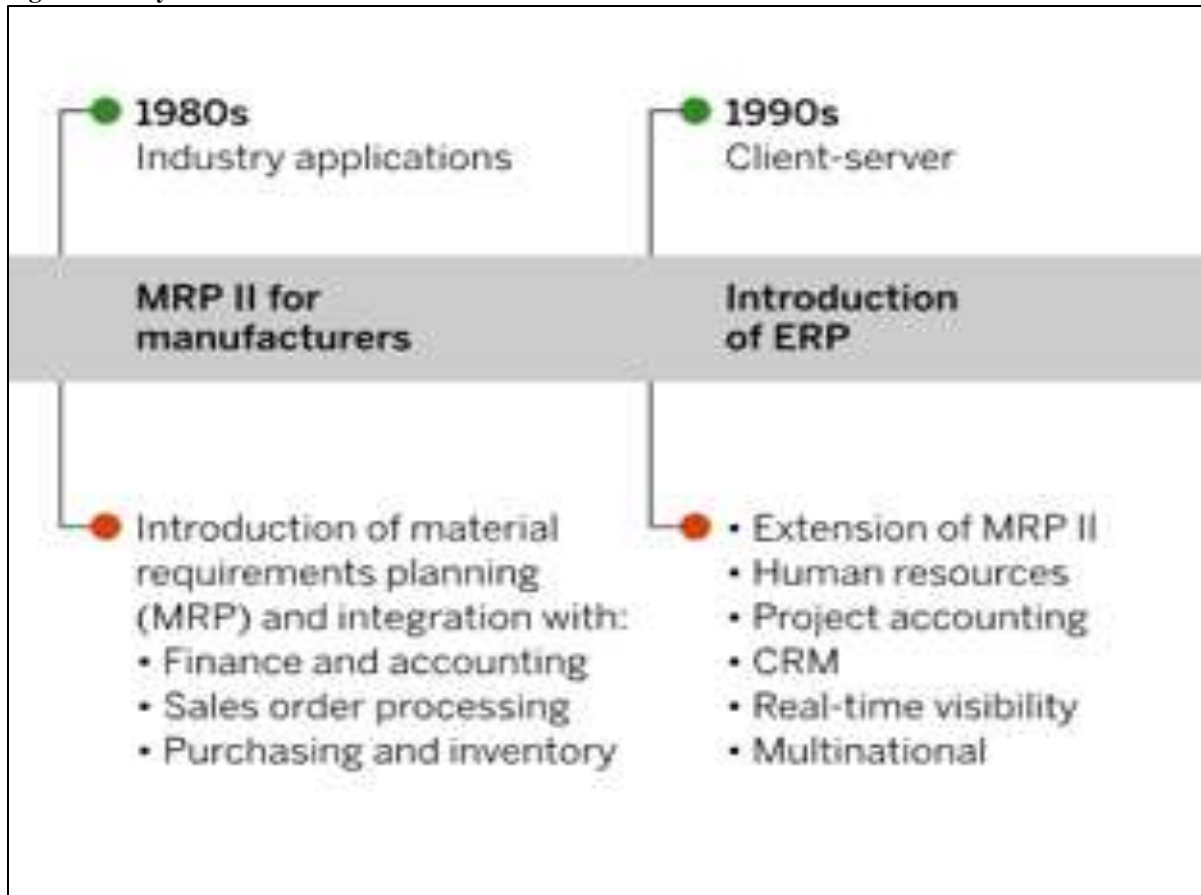
- Finance needs ERP to quickly and efficiently close its books.
- Sales needs ERP to manage all of the customer orders.
- Logistics relies on effective ERP software to provide customers with the right products and services.
- Procurement uses ERP to procure goods and services and to manage supplier relationships.
- Accounts Payable uses ERP to pay suppliers correctly and on time.
- Management needs a direct overview of the company's performance in order to make decisions with sufficient speed.
- Banks and shareholders need accurate financial documents and therefore place their trust in reliable data and analysis – provided by the ERP system (n.a.⁴, 2025, URL: <https://www.google.com/erp+system&sca>).

Fig. 4: History of ERP I



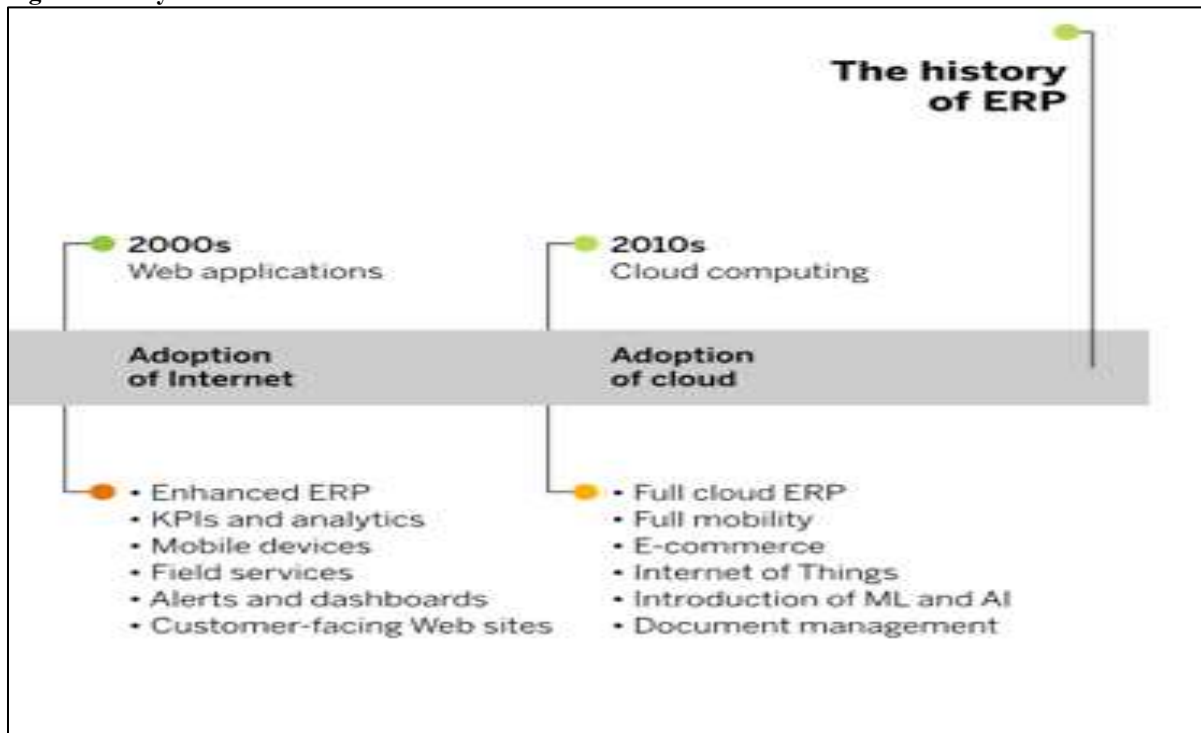
Source: n.a.⁴, 2025, URL: <https://www.google.com/erp+system&sca>

Fig. 5: History of ERP II



Source: n.a.⁴, 2025, URL: <https://www.google.com/erp+system&sca>

Fig. 6: History of ERP III



Source: n.a.⁴, 2025, URL: <https://www.google.com/erp+system&sca>

2 Four ERP examples from specific industries

Selected examples of industry-specific ERP applications are provided below:

- Manufacturing companies

Manufacturers with discrete, batch-based and continuous processes rely on ERP systems to achieve quality goals for their products, optimise their utilisation of system capacity, keep track of overtime costs and much more. Moreover, manufacturers can monitor their stocks continuously by tracking stock movements, identify products with good or poor performance and make procurement more efficient.

- Retailers

With brick-and-mortar retail business merging with e-commerce and other digital sales channels, retail has undergone a profound transformation. Consistent, integrated data are crucial to enable a company to provide self-service options for identification, configuration, purchasing and product dispatch. ERP also helps retailers to reduce the number of orders that are not completed, increase conversion rates on the Internet and raise the average order value.

- Wholesalers

Wholesalers, importers, direct suppliers and 3PL/4PL companies aim to lower their sales expenses, increase stock turnover and reduce the time needed to process orders. To achieve these goals, they need integrated stock management, logistics functions and tailored automated processes.

- Service-oriented companies

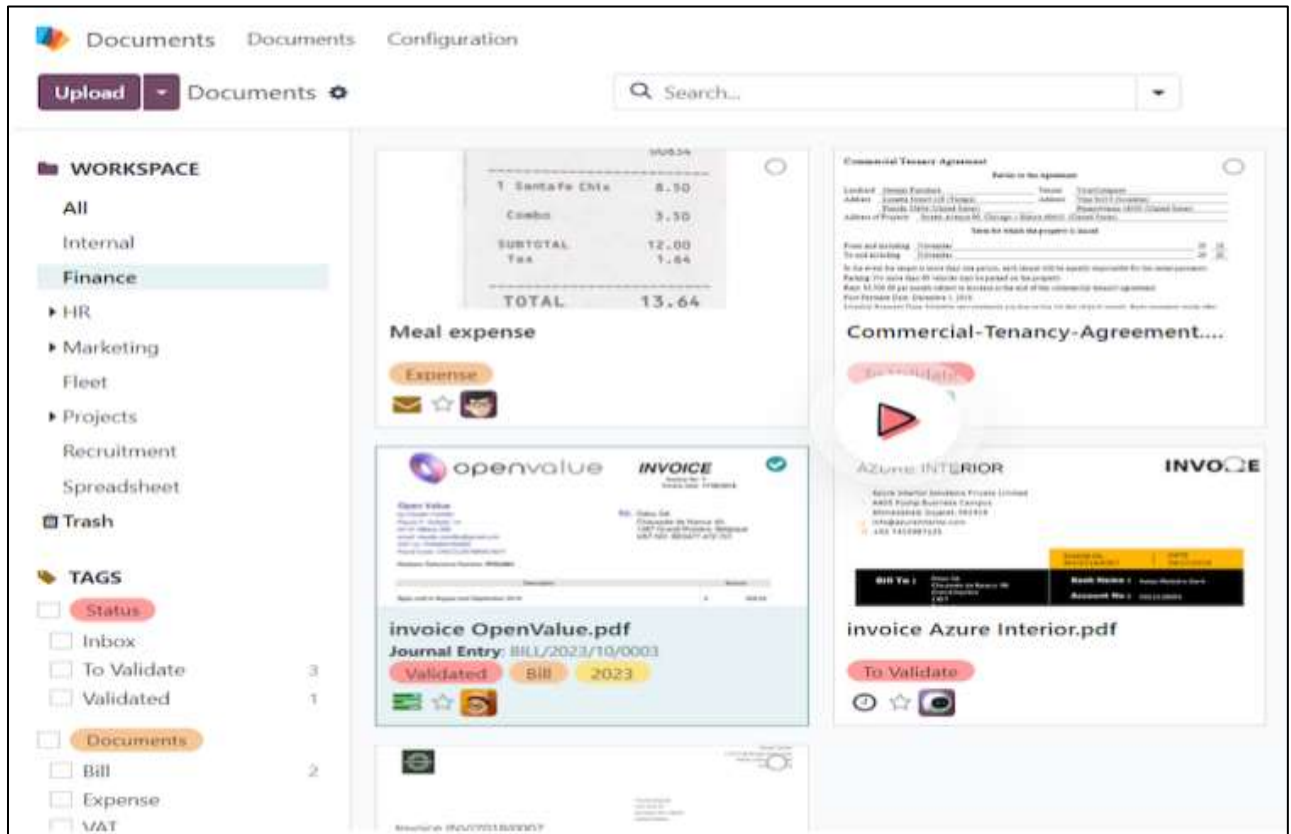
Service providers operating in the areas of accounting, tax, engineering and law, for example, need powerful, mobile, real-time ERP technology to provide their services at a reasonable operating expense. The ability to adhere to a schedule while keeping track of the profitability of projects, utilisation of resource capacity and opportunities for growth is key to the success for these companies.

3 How an ERP system works

- An ERP system is made up of integrated modular solutions or business applications that share a common database that connects them and enables them to communicate with each other. Each ERP module is typically geared towards a particular business unit. They are, however, interlinked and use the same data to fulfil the company's requirements.

- Companies select the modular solution that best suits their needs – e.g. finance, logistics, procurement and HR – and they can add to it or scale it as needed. ERP systems can also cover industry-specific requirements, either as part of the core functions of the system or by means of application add-ons that are integrated into the module suite (n.a.⁵, 2025, https://www.odoo.com/de_DE/app/documents).

Fig. 7: Extract from odoo's ERP system



Source: n.a.⁵, 2025, https://www.odoo.com/de_DE/app/documents

The ERP software system shown here illustrates the use of enterprise resource planning in sales. Typical ERP modules, among others, cover finance, manufacturing, procurement and the supply chain. Modern ERP systems provide an enormous range of business functions, but they need to be connected and synchronised with other applications and data sources in order to be effective. These include CRM and HCM software, e-commerce

platforms, industry-specific solutions and even other ERP systems. This integration gives companies a consistent overview of information from different systems, which makes business processes more efficient, improves customer satisfaction and facilitates collaboration between teams and business partners (Muffatto & Panizzolo 1995). The flexibility of an ERP system makes it possible to integrate a large number of software products via connectors or customer-specific adapters, e.g. programming interfaces (APIs). Other methods for ERP integration include the enterprise service bus (ESB) and a modern integration platform as a service (iPaaS) (n.a.⁵, 2025, https://www.odoo.com/de_DE/app/documents).

4 Generative AI

4.1 Integration

Integrating GenAI functions into ERP software helps companies to automate manual tasks and also to adapt and optimise their core processes to suit company-specific requirements. In addition to automating tasks and providing insight, generative AI helps users who do not have a background in IT to interact with the ERP system by enabling commands and queries in natural language. Any user can ask a question and immediately receive an answer that takes into account all the available documents and data (n.a.⁶, 2025, <https://www.sap.com>).

4.2 Vertical integration

Companies are now at a point where it no longer makes sense to pit best-in-class solutions and integrated ERP against each other. New offers promise the best of both worlds – a fully integrated ERP system with vertical add-ons that enable companies to have the specific functions they need without tedious integration problems or data silos (n.a.⁶, 2025, <https://www.sap.com>).

5 SUMMARY AND OUTLOOK

Cloud, cloud, cloud

Cloud ERP is set to become even more popular, as more companies are recognising the benefits it provides, e.g. access from any location, lower costs for hardware and technical support, greater security and integration with other systems. With business processes becoming even more accelerated, having a cloud mindset is becoming increasingly important.

Customisation for users

Staff, customers and suppliers want content and functions that meet their specific needs and interests and that can boost their productivity. The demographic changes in the workforce, in particular in industries like manufacturing, are leading to an increasing interest in low-code or no-code platforms (Guthardt et. al 2024).

These platforms make it easy for users to customise their experience, instead of forcing them to adapt to the software themselves. Users can also look forward to custom dashboards, AI-supported search, personalised chat and customised workflows across various devices (n.a.⁶, 2025, <https://www.sap.com>).

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