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CUSTOMIZED ERP SOFTWARE FOR LOGISTICS MANAGEMENT

Chandrakiran GR, Bhushan Shettigar, Aman Akhtar V
CSE .dept
AMC engineering college (of VTU)
Bangalore, India

Dr. V Mareeswari
Professor and Head, CSE .dept
AMC engineering college (of VTU)
Bangalore, India

Anirban Bhattacharya
CSE .dept
AMC engineering college (of VTU)
Bangalore, India

Abstract— **A Customized Enterprise Resource Planning (ERP) System is a solution created specifically to solve problems and meet the needs of a particular organization. This paper presents the customization of ERP software and presents how an ERP Software can be designed to cater to and manage the logistics of an organization's transit movements. A customized ERP Software typically involves the use of software development tools and techniques to create custom modules, reports, and functionality that are not available in a standard ERP Software.**

Keywords—**ERP, Customized ERP Software, Logistics Management.**

I. INTRODUCTION

Enterprise Resource Planning (ERP) systems are widely applied in business processes and in supply-chain activities to manage and perform process integration of various supply-chain management processes, business processes such as accounting, finances and human resources . These are software solutions designed to cater for the needs of organizations across a certain demographic as shown in Figure 1. ERP Software are standardized software packages intended to support the majority or all of an organization's processes[1]. A customized ERP Software is a software solution that is designed to meet the specific needs and requirements of a particular organization.

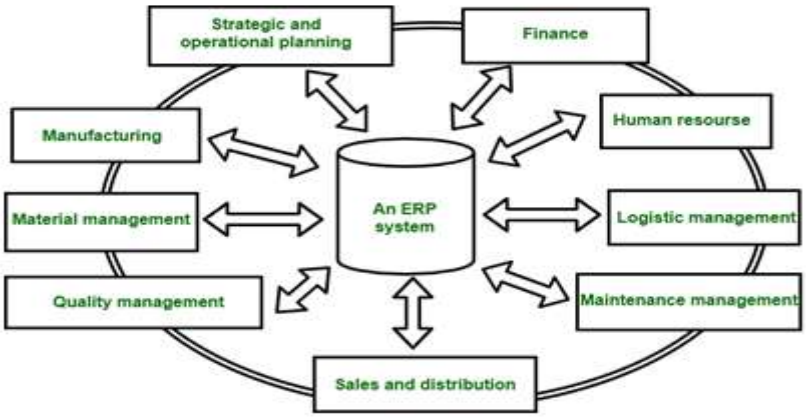


Figure 1: Enterprise Resource Planning (ERP) System [4]

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This means that the system is developed and configured to cater to the unique processes of the organization, as well as the industry in which it operates. Customization of an ERP Software can involve the creation of custom modules, reports, and functionalities that are not available in a standard ERP Software. This helps organizations to achieve greater efficiency, flexibility, and competitiveness. By designing the system to meet specific requirements, organizations can streamline their operations and achieve better results.

Therefore, a customized ERP Software is an excellent solution for organizations looking to enhance their business processes and stay ahead of the competition. It allows organizations to achieve better results by integrating their unique workflows and requirements into the system, resulting in a more efficient and streamlined operation.

Customizing is considered one of the most precarious matters when implementing an ERP Software. Despite its importance for implementation outcomes, research on ERP customization is scarce. There is some research describing models for customization options [8,14-16] that are meant to aid practitioners in managing the customization of their ERP Software [2].

II. LITERATURE SURVEY

The recent developments and related works to ERP customization are presented in this section.

Major modifications of an ERP Software are difficult to realize and the traditional advice is to avoid customization as much as possible. On the other hand, an organization whose competitive advantage are due to customized processes might lose their benefits if they reengineer their processes after the ERP Software. The view of customization as something that should be avoided has, however, started to change. There is an ongoing trend for ERP Software to become more flexible. Interviews were performed for better validity of data which later is verified during collection because in interviews there is a better possibility to clarify, ask additional questions and deepen statements. All interviews performed followed the same structure. First, questions were asked to the respondent to find out relevant information about the expert. Then, questions were asked to the respondent to find out relevant information about the organization ERP related systems and services. Then questions about the configuration and customization of ERP Software were posed [1].

The differences in the understanding of customization are especially visible between cloud ERP and on-premise ERP. The respondent working with on-premise ERP did to a large extent agree with the definition of configuration (setting parameters) although extended configuring options, such as visual workflow configuration, were also visible. The cloud ERP respondents had a different view of what changes are possible to do through configuration but there were also large differences in how different cloud vendors regarded the possibilities of configuration [1].

There was even the use of mathematical modeling compatibility for ERP selection. Articulation of the comprehensive model algorithm, for the optimization constraints based selection of ERP and the relevant modules from an ERP or Modules set is done. An algorithm for optimization of ERP selection and implementation was proposed. Listing of contemporary ERP packages available was made [2].

The components of an ERP, i.e. Various Functional areas, Transaction processing systems, Business processing systems and Enterprise management systems were listed. A Combinatorial Optimization based technique Hodge Podge Optimization technique was designed using mathematical modeling so as to facilitate ERP selection based on decision constraint concerned to decision parameters set as prerequisites. The selection based on trends using mathematical model in deterministic unpredictable scenario is guided by polynomial derivations [2].

The data collection provided rich information about the ERP Software implementation projects in the case organizations. First, we provide the results from the cross-case comparison of ERP Software customization in the four companies. Second, we present the identified reasons for ERP Software customization [3]. Unique business processes is the main reason for ERP Software customization emerging from the interviews was that the companies wanted to keep their existing business processes because these were perceived as unique for their operations. In fact, keeping the idiosyncratic processes was reported as critical for the further functioning of the business [3].

III. UNDERSTANDING THE DOMAIN OF THE STUDY

To better understand the domain for creating a one-of-a-kind ERP Software we found it was better to review an organization's needs and requirements through standard Interviews that help in better understanding of the goals and objectives. It requires knowledge of the different customization options available, such as configuration, custom development, and third-party add-ons. It also involves an understanding of the limitations and challenges associated with customization, such as the potential for increased complexity, higher costs, and longer implementation times.

IV. METHODOLOGY

A. On-Premise ERP Customization

On-premise ERP customization refers to the process of modifying an ERP Software that is installed and hosted on the organization's own servers or data centers. In other words, the ERP Software is not cloud-based but is installed on the organization's own infrastructure.

On-premise ERP customization allows organizations to have greater control over their ERP Software, including data security and customization options. It also enables



organizations to integrate the ERP Software with other on-premise systems and applications used by the organization.
The process of on-premise ERP customization involves identifying the specific requirements of the organization, including business processes and workflows, and then tailoring the ERP Software to meet these requirements. This may involve customizing the user interface, creating custom modules, reports, and functionality, and integrating the ERP Software with other on-premise systems or applications.
One of the main advantages of on-premise ERP customization is that it provides greater control over the ERP Software's configuration, security, and data privacy. However, it also requires more significant upfront costs and ongoing maintenance, as the organization must provide its own infrastructure to host and maintain the ERP Software.
In summary, on-premise ERP customization involves modifying an ERP Software that is installed and hosted on the organization's own servers or data centers. It allows organizations to have greater control over their ERP Software but requires significant upfront costs and ongoing maintenance.

B. Recent ERP Trends

There are several additional drivers that impact the trend towards more flexibility in ERP Software. The growth in the ERP market and that Small and Midsized Enterprises (SME) companies have adopted ERP Software at a larger scale [1] are two drivers. SMEs have different characteristics compared to large companies and the same considerations regarding implementation of ERP Software in large organizations do not necessarily apply to SME's. One example is the importance for small businesses to rapidly response to changes in the market, thus requiring flexibility in ERP Software. Many small ERP service vendors have also taken substantial market shares from the traditional ERP vendors. These niche vendors can compete on price and time-to-deployment [3] and they also offer new financing terms instead of the traditional license fees to pay for the ERP Software. This creates a need for ERP vendors to offer more flexible systems to stay competitive.

C. Cloud ERP

Cloud ERP (Enterprise Resource Planning) refers to an ERP Software that is hosted and delivered through the cloud, rather than being installed on the organization's own servers or data centers. In a cloud ERP Software, the software and data are hosted and maintained by a third-party provider and accessed through the internet.
Cloud ERP Software offer several advantages over traditional on-premises ERP Software. One of the main advantages is that they require significantly lower upfront costs, as organizations do not need to invest in their own infrastructure to host and maintain the ERP Software. Cloud ERP Software are also generally more scalable and flexible, as organizations can easily increase or decrease their usage and pay only for what they need.
Another advantage of cloud ERP Software is that they offer greater accessibility and mobility, as users can access the system from anywhere with an internet connection. This is especially important in today's increasingly mobile and remote work environments.
The customization process for cloud ERP Software is similar to on-premises ERP Software but may require different tools and methodologies. Cloud ERP Software typically offer a range of customization options, such as custom modules, reports, and workflows, as well as integration with other cloud-based systems and applications.
In summary, cloud ERP refers to an ERP Software that is hosted and delivered through the cloud, offering several advantages over traditional on-premises ERP Software, including lower costs, greater scalability and flexibility, and increased accessibility and mobility. Customizing cloud ERP Software requires a similar process to on-premises ERP Software but may require different tools and methodologies.

D. Implementation and Statistical Evaluations

Based on the criteria provided to us we then created a customized ERP Software that can track and manage an organization's logistics and transportation, this was curated to accommodate the already existing database in the organization. The key deliverables of this application were: to provide an extensive real-time report on the whereabouts of the movement and status of the trucks and transits used by that organization, to mitigate the chance of delay in transportation by rectifying any sort of vehicle breakdowns, continuous updating of transit status by the truck drivers and keeping the people in-charge in the loop of the process.
For the implementation of one of the main features of this application, we used Geo coordinate validation. Geo-coordinate validation refers to the process of verifying the accuracy and validity of geographic coordinates, which are numerical values that represent a location on the Earth's surface. Geographic coordinates are typically expressed in latitude and longitude and are used for a variety of purposes, such as navigation, mapping, and location-based services. Using this we can easily validate if the actual whereabouts of the vehicle are true to as they have updated on their mobile application. We've made use of the OpenStreetMap for Geo-coordinate validation.

1) The OpenStreetMap (OSM) API: It is a community-driven, open-source project that seeks to develop a comprehensive map of the world. The OpenStreetMap API provides developers with a range of tools and services to access, contribute, and improve the OSM data.
The API provides various services to developers, including access to map data, geocoding, routing, search, and editing of the map features. Developers can leverage these services to create location-based applications that can be tailored to meet specific needs.



To use the OpenStreetMap API, developers need to sign up for an API key, which authenticates their requests and monitors their usage. The API is compatible with several programming languages, including Python, Java, and JavaScript, making it accessible to a wide range of developers.

2) Backend API Deployment:

Express is a popular backend web framework for Node.js. The API endpoints are made express. It handles all the incoming requests from the frontend and sends responses after executing the function. Express provides a minimalist approach to web development, allowing developers to build web applications and APIs quickly and easily. It provides a set of middleware functions that can be used to perform common tasks such as handling HTTP requests and responses, parsing request bodies, and serving static files.

CORS is used to enable cross-origin resource sharing between the frontend and the backend. It is a security mechanism implemented in web browsers that allows a web page to access resources from a different origin than the origin from which the resource originated.

We've made use of an MSSQL module to connect to the database and execute queries and take results from database server. MS SQL Server supports a wide range of database features, including support for transaction processing, stored procedures, triggers, views, and more. It also includes a robust set of administration tools for managing and monitoring databases, as well as built-in security features for protecting data from unauthorized access. One of the key strengths of MS SQL Server is its scalability. It can handle large amounts of data and high levels of traffic, making it an ideal choice for enterprise-level applications and websites with heavy data loads. It also supports distributed database architectures, allowing data to be distributed across multiple servers for increased performance and reliability.

A dotenv module is also incorporated to store configuration settings or sensitive information such as API keys, passwords, or database credentials. dotenv is a popular module in the Python programming language used for loading environment variables from a .env file.

Finally for the deployment of all these modules Azure App Service is used. It enables us to build, deploy, and scale web and mobile applications. It supports several programming languages, including .NET, Java, Node.js, PHP, and Python, making it suitable for a wide range of application development scenarios. With Azure App Service we can focus on building their applications without worrying about managing the underlying infrastructure, operating system, or runtime environment. App Service also provides features such as automatic scaling, continuous integration and deployment, and integration with other Azure services.

3) Frontend Deployment:

The Frontend deployment is done through Azure Static Web Service. Azure Static Web Apps is a service offered by Microsoft Azure that enables developers to build and deploy static web applications in the cloud. It provides a fully managed platform for hosting static websites, web applications, and APIs, making it easy for developers to focus on building their applications without worrying about infrastructure management. All these modules are then compiled in Node.js.

Node.js provides a wide range of built-in modules, including modules for handling HTTP requests, working with the file system, and interacting with databases. It also allows developers to easily create their own modules and packages for reuse in other applications. For the frontend web interfaces, React is a popular JavaScript library for building user interfaces. It is designed to be component-based, which makes it easier to build reusable UI components. This can be especially useful in an ERP system where you may have many different types of data that need to be presented in different ways.

4) Statistical Evaluation and Analysis:

Data analysis can be a powerful tool in identifying which trucks had the most deliveries. By collecting, cleaning, and organizing the data, analyzing it using various techniques, visualizing the results, and drawing conclusions, businesses can gain valuable insights into their operations and make data-driven decisions to optimize their delivery processes.

The first step is to gather data on all deliveries made by each truck, including the truck ID, date of delivery, and number of deliveries made. The data should be cleaned and organized to ensure accuracy and consistency. This may involve removing duplicates, correcting errors, and formatting the data in a way that is easy to analyze.

To identify which trucks had the most deliveries we used Python, Python is a popular programming language for data analysis and offers a wide range of libraries and packages for sorting, filtering, and grouping data. Some popular libraries include Pandas, Numpy, and Scipy, which offer advanced data manipulation and analysis capabilities. It offers a wide range of libraries and packages for statistical evaluations, ranging from basic statistical analysis to advanced modelling and machine learning.

For visual representations of the data, we used Python libraries Matplotlib, Seaborn, and Plotly, which are libraries which offer advanced visualization capabilities and can be used to create interactive visualizations.

Intermittently, in the case of a truck breakdown, the application logs in the key details that entailed the breaking down of the vehicle such as the location and state of the vehicle along with the reasons for the breakdown. The recorded data can then be further used for avoiding such scenarios. Further, the application provides insights into the logistics by use of data analysis of the existing records of data, Figure 2 shows the trucks that had the most deliveries in that specific period of time and Figure 3 gives the exact idea of the year that had the most deliveries done.

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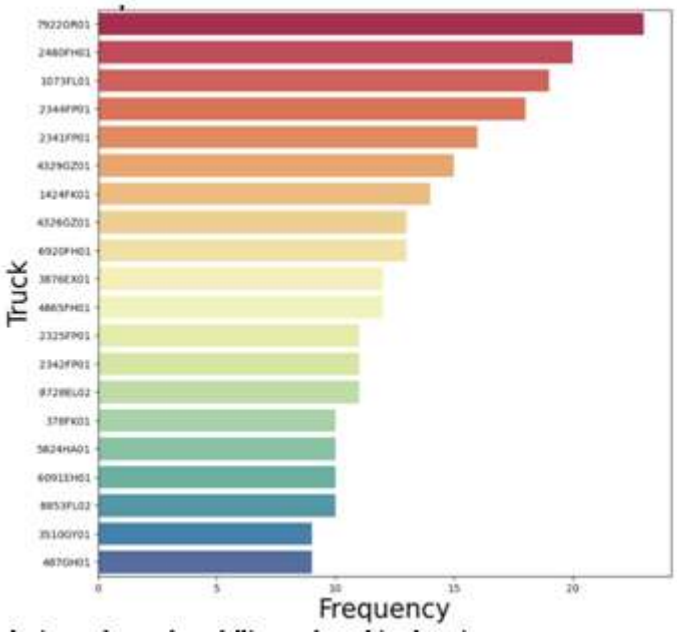


Figure 2: Top 20 trucks with the most deliveries

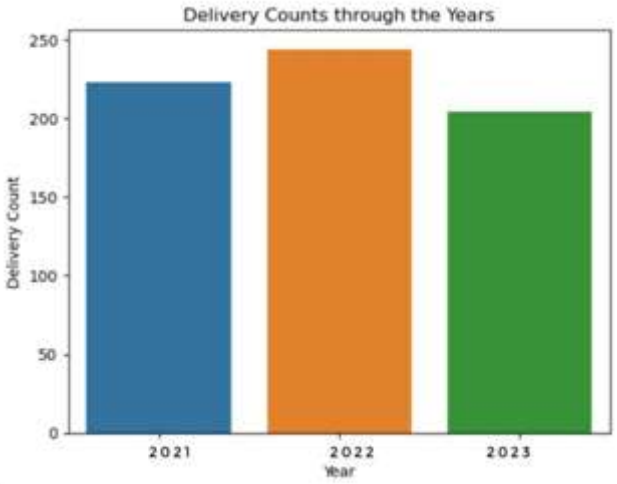


Figure 3: Number of deliveries done in that year.

V. FUTURE AND SCOPE

With the increasing availability of big data and machine learning algorithms, customized ERP Software are likely to incorporate advanced analytics and AI capabilities to provide more insights and intelligence. This will enable organizations to better understand and predict trends, identify opportunities and risks, and make more informed decisions.

As the workforce becomes increasingly mobile, customized ERP Software are likely to incorporate more mobile-friendly features and interfaces, enabling users to access and interact with the system from their mobile devices.

Customized ERP Software will increasingly integrate with other technologies, such as IoT, blockchain, and cloud computing, to enable more seamless and efficient operations.

They are likely to offer even more customization options, allowing organizations to tailor the system to their unique needs and requirements. This will enable organizations to optimize their workflows, automate processes, and improve efficiency. It will increasingly prioritize user experience, providing more intuitive and user-friendly interfaces that enable users to easily navigate the system and complete tasks.



VI. CONCLUSION

Customized ERP Software have become an essential tool for organizations in managing their business processes and operations. As every organization has unique needs and requirements, customized ERP Software enable them to tailor the system to their specific needs, resulting in improved efficiency, productivity, and profitability. The future and scope of customized ERP Software are vast and promising, with increasing integration with other technologies, more customization options, and a focus on user experience. Organizations that embrace customized ERP Software are likely to gain a competitive advantage and thrive in today's fast-paced and ever-changing business landscape. In conclusion, customized ERP Software have become an essential tool for organizations in managing their business operations and will continue to play a critical role in driving organizational growth and success in the years to come.

REFERENCES

[1] Shmeleva G.Anna, Ladynin I.Andrey, Smirnova E.Elvira, Ryabchik A.Tatiana, 2019, "Transport Logistics Management Information System" IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering

[2] Parthasarthy Sudhaman and Sharma Shrinarayan , 2016 , "Impact of customization over software quality in ERP projects: an empirical study" Springer Science, Newyork Ali El-Mousa, Fahed Jubair, 2018 9th International Conference on Information and Communication, "A comparative review of high-performance computing major cloud service providers"https://www.geeksforgeeks.org/introduction-to-erp/

[3] Mardan Azat , 2018, "Practical Node.js Building Real-World Scalable Web Apps"- book

[4] Zach Ondrej, Munkvold Bjorn Erik, 2018, "Identifying reasons for ERP system customization in SMEs"

[5] Uppström Elin, Lönn Carl-Mikael, Hoffsten Madeleine, Thorström Joakim, 2015 48th Hawaii International Conference on System Sciences, "New Implications for Customization of ERP Systems"

[6] G. R. Gosavi, V. M. Thakare , 2019, "Mathematically Modeled Algorithm For Intelligently Customized Optimization Of An Erp"

[7] V.Tilko Stefan, Vinoski Steve, IEEE Internet Computing (Volume: 14, Issue: 6, Nov.-Dec. 2020), "Node.js: Using JavaScript to Build High-Performance Network Programs"

[8] Dittrich Yvonne and Vaucouleur Sebastien , IEEE Software (Volume: 26, Issue: 6, Nov.-Dec. 2019), " ERP Customization as Software Engineering" A. Rothenberger Marcus and Srite Mark, IEEE Transactions On Engineering Management, Vol. 56, No. 4, November 2019, "An Investigation of Customization in ERP System Implementation"

[9] M.Gupta & V.Bhatia, (2012), Customization of ERP Systems: A Literature Review and Implications. International Journal of Enterprise Information Systems, 8(3), 1-19.

[10] R. Parthasarathy & R. Sharma, 2023 - International Journal of Information Management, 57, 102480, A framework for customizing ERP systems to meet industry-specific requirements.

[11] Y. Zhang , L. Zhang, 2020, A model-driven approach to customizing web-based ERP systems. Information Systems Frontiers, 23(1), 1-18.

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AUTHORS

- Chandrakiran GR
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- Aman Akhtar V
- Dr. V Mareeswari
- Anirban Bhattacharya

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