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Original Article

Leveraging Oracle Digital Assistant (ODA) to Automate ERP Transactions and Improve User Productivity

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Abstract *- The increasing complexity and volume of enterprise resource planning (ERP) operations in modern businesses demand smarter, more intuitive, and automated interfaces for routine tasks such as purchase requisitions, leave requests, and invoice queries. Oracle Digital Assistant (ODA), a conversational AI platform, has emerged as a powerful solution to address this challenge. This paper presents a detailed exploration of the integration and deployment of ODA in automating ERP transactions, with a focus on improving user productivity and operational efficiency. By leveraging natural language processing (NLP), machine learning (ML), and prebuilt enterprise skills, ODA significantly streamlines the interaction between users and ERP systems. This study examines the technical architecture, implementation methodology, integration strategies, and real-world use cases of ODA in Oracle ERP Cloud environments. Through performance metrics, case studies, and user feedback, we demonstrate how ODA reduces transactional overhead, minimizes errors, and enhances the overall user experience. The paper further discusses the challenges, best practices, and future directions for ODA-based ERP automation.*

Keywords *- Oracle Digital Assistant, ERP Automation, Conversational AI, NLP, User Productivity, Oracle ERP Cloud.*

1. Introduction

Enterprise Resource Planning (ERP) systems can be considered the backbone of contemporary organisations, as they organise and centralise all crucial business processes, including finance, procurement, human resources, and supply chain management. Even with their superior capabilities, traditional ERP interfaces tend to be complicated and not user-friendly, and thus, most users need to spend considerable time training and manually entering repetitive and monotonous data. [1-3] The challenges result in reduced efficiency on the part of users, an augmented error rate and general annoyance among workers. Following these shortcomings, the advent of artificial intelligence (AI) and chat technologies has created new opportunities for improving ERP usability. Interfaces like chatbots are conversational and require less guidance, making them more natural and allowing users to complete their tasks more efficiently with less learning. Oracle Digital Assistant (ODA) is a chatbot tool that provides intuitive communication with natural, human-like capabilities through natural language processing (NLP), contextual awareness, and an easily integrated backend utilising Oracle artificial intelligence (AI). In this paper, the practice of ODA in the Oracle ERP Cloud universe will be examined, and the automation of certain transactions, such as purchase requisitions, leave requests, and invoice queries, will be studied. Because organisations can combine ODA with ERP processes, they may become capable not only of streamlining their operations and minimising errors but also of providing users with real-time, mobile-friendly access to the most relevant business functions, thereby increasing productivity and user satisfaction.

1.1. Importance of Leveraging Oracle Digital Assistant

The use of Oracle Digital Assistant (ODA) within the enterprise represents a significant shift in how people interact with ERP systems. These subsections identify the main reasons why ODA is becoming an indispensable tool for modernising ERP user interfaces and enhancing business efficiency.

- **Enhanced User Experience:** ODA introduces a conversational interface, making complex back-end ERP systems easier to interact with. They can operate various functions just like they enter commands in ordinary language by keying or speaking. They do not have to go through various menus and forms. This minimises the learning process for new users, making ERP systems more accessible to all employees at all levels, regardless of their technical skills.
- **Automation of Repetitive Tasks:** Most ERP tasks, such as submitting a purchase requisition, taking leave, and all the processes involved in inquiries like checking the status of invoices, are monotonous and time-consuming when done manually. ODA automates such functions through fixed dialogue actions and advanced skills, enabling users to perform activities in a timely manner, every time, without needing to enter manual information or perform other error-prone processes.
- **Real-Time Data Access:** With the capabilities of quick access to the enterprise data, ODA is integrated with Oracle ERP Cloud. Without needing to ask for support and switching between multiple systems, users can immediately view the transaction status, account balances, or workflow updates at a glance. This enhances decision-making and responsiveness during operations.

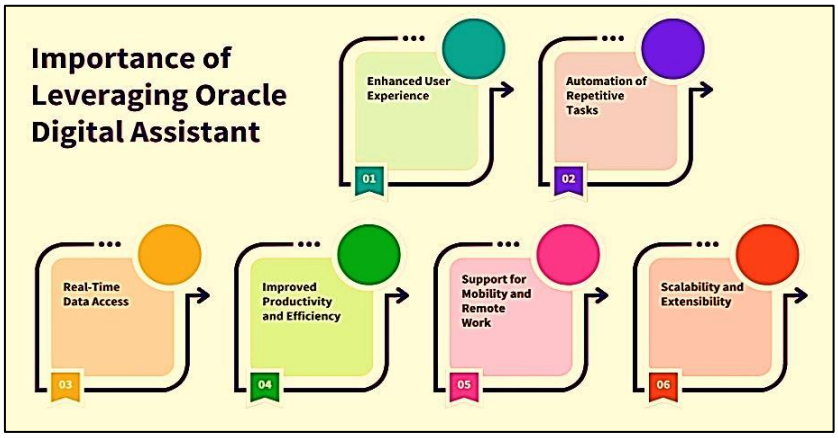

Fig 1: Importance of Leveraging Oracle Digital Assistant

- **Improved Productivity and Efficiency:** ODA enables organisations to enhance productivity by saving time spent on undertaking tasks perceived as routine and eliminating unnecessary processes. Requests can be approved directly via the chatbot interface, tasks can be executed more efficiently by employees, and workflows become less cumbersome.
- **Support for Mobility and Remote Work:** ODA will be an application that functions on multiple platforms, including the web, mobile applications, and voice-based applications. This is particularly significant in current remote and hybrid workplaces, which allow users to access ERP systems from anywhere, at any time.
- **Scalability and Extensibility:** With a modular design, ODA enables the creation of reusable chatbot skills that can be extended or customised as business requirements change. This scalability allows enterprises to start with a moderate number of use cases and gradually scale out the use of chatbots across different departments and functions.

1.2. Automate ERP Transactions and Improve User Productivity

The possibility of automating ERP transactions presented by conversational AI systems, such as Oracle Digital Assistant (ODA), appears to be one of the opportunities to enhance user productivity and operational efficiency. Powerful in-premises ERP systems often present simple users with a complicated interface, lengthy forms to fill out, and the manual initiation of workflows, resulting in time-consuming tools and a high likelihood of user error. [4,5] On incorporating ODA into the Oracle ERP Cloud, organizations can streamline common business transactions that are often used, like purchase requisitions, leave requisitions, and invoice inquiry. Whenever these processes are managed with the help of a conversational interface, they are much more intuitive and quick. For example, by removing the need to log into the ERP system and navigate several menus to create a purchase requisition, a user can now simply converse with a chatbot. The chatbot will ask a number of guided, context-sensitive questions to obtain the requisite information. This reduces the time required to complete a performance on average to several minutes, or even a couple of minutes, while ensuring completeness and accuracy due to built-in validations. Besides, ODA promotes automation, which reduces reliance on manual labour and allows employees to dedicate their efforts to more strategic assignments. Managers have the opportunity to approve requests following chatbot prompts on both desktop and handheld devices, which speeds up workflow cycles and minimises processing periods. This also reduces the barrier to working with the ERP system for non-technical users, as one can interact with the system using natural language, which further enhances overall system adoption and acceptance by all users. Moreover, the real-time response and 24/7 feature integrated into ODA help employees working in other time zones or remotely access ERP features without queuing to get an answer to a problem. Finally, when integrating ERP processes and connecting them with ODA during the execution of transactions, the company not only streamlines its business processes but also accumulates an even more resource- and needs-oriented digital workspace environment based on more responsive, efficient, and digitally friendly principles and directions of modern business development.

2. Literature Survey

2.1. Evolution of Conversational AI in ERP

Conversational AI-enabled Enterprise Resource Planning (ERP) systems have undergone significant changes over the last decade, with a notable surge in advancements before 2023. Large ERP providers, such as SAP, Microsoft, and Oracle, saw the potential of artificial intelligence-based chatbots in redefining how things work within an enterprise. [6-9] These chatbots were first introduced to optimise user experience through easy, dialogue-based interfaces, which would minimise the time spent learning the hard-to-use ERP applications. One of its goals was to reduce manual typing by enabling users to input commands to the system using natural language, thereby increasing speed and reducing data entry errors. Moreover, chatbots allowed for automating routine and repetitive functions, such as searching for data, routing approvals, and producing reports. Literature shows a constant growth in their use, as they contribute to the delivery of real-time support, better accessibility to ERP features and end-to-end streamlining of business processes.

2.2. Oracle Digital Assistant Overview

Oracle Digital Assistant (ODA) is an end-to-end AI platform that enables the development of complex digital assistant agents by coordinating a collection of highly specialised bots, known as skills. It is text and voice-based, and thus can be used on various communication channels across different enterprises. In essence, ODA is characterised by its powerful Natural Language Processing (NLP) engine, which enables ODA to interpret user intent, extract relevant entities, and monitor the contextual dialogue throughout the conversation. The architecture also contains dialogue flows that establish conversational logic and integration adapters that will integrate with Oracle Cloud Applications and other enterprise systems. Oracle Labs research, as well as independent academic and industry research, all focus on the modular and extensible architecture of ODA, which enables organisations to design assistants tailored to address their operational requirements. These experiments underscore ODA as a significant player in the sphere of shortening the time of reactions, concerning the accuracy of tasks, and offering an analogous user experience across all functions of ERPs.

2.3. Use Cases in ERP Transactions

An increasing number of studies and practices show that conversational AI, including Oracle Digital Assistant, is effective in processing various ERP transactions. To illustrate, chatbots can automate the purchase requisition process by guiding users through the form-filling process, confirming adherence to procurement policy, and channelling the requisition to the relevant approval authority, all through a conversational channel. Chatbots also facilitate leave requests, check whether an employee has days left, and leave an application, all while addressing it to the manager, thereby saving administrative costs. On the same note, invoice queries are an employee/vendor self-service mechanism that utilises chatbots to retrieve the invoice status, payment due date, and processing updates in real-time. These applications emphasise how chatbots can not only ease the use of intricate ERP systems but also minimise dependence on intermediary brokers, leading to greater transparency and more expeditious decision-making.

3. Methodology

3.1. System Architecture

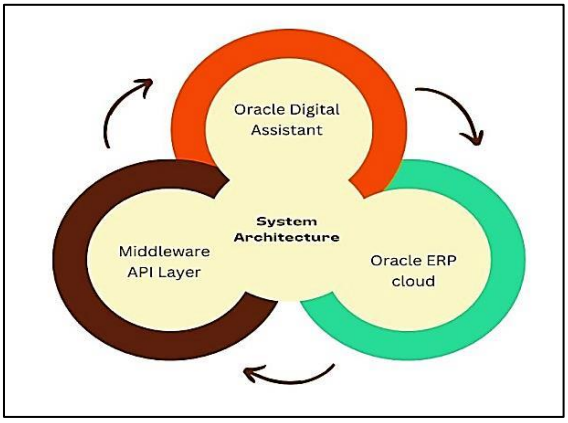

Fig 2: System Architecture

- **Oracle Digital Assistant:** Oracle Digital Assistant (ODA) is an interface used by users to communicate with the system. It applies the concept of natural language processing (NLP) to interpret user questions and offer context-related answers in a natural language conversation. [10-12] ODA is voice- and text-based, so it can be used on a web form, mobile, or messaging basis. It is the brain that interprets the user's intent into formalized actions that the ERP system can objectify.
- **Oracle ERP Cloud: Oracle ERP Cloud serves as the primary back-end system for enterprise transactions, managing and maintaining these transactions**. It contains modules for finance, procurement, human resources, and supply chain. For example, when a user raises a request, such as a leave request through ODA, the ERP Cloud is actually the one processing, validating, and storing the data. This will ensure the safe recording of all interrelations following organisational performance and policy regulations.
- **Middleware API Layer:** The Middleware API Layer serves as the intermediary, negotiating communication between the ODA and Oracle ERP Cloud. It performs authentication, transformation and routing of requests and answers between two systems. This layer ensures security, reliability, and enterprise integration standards for all interactions. It also offers abstraction and flexibility, and the various ERP modules can be linked; the chatbot interface does not need to be changed.

3.2. Chatbot Skill Design

- **Purchase Requisition Skill:** The Purchase Requisition Skill is developed to guide users through the development and submission of purchase requests. It captures the most important details, such as the name of the item, the quantity of the item, and the supplier required, as well as the budget code. The proficiency ensures that no required information is left off the table and the informational process is conducted in a conversational style that minimises the chances of error and increases the likelihood of deliberate adherence to procurement policies. It also verifies the information and then submits the requisition to the ERP system, through which it monitors the status.

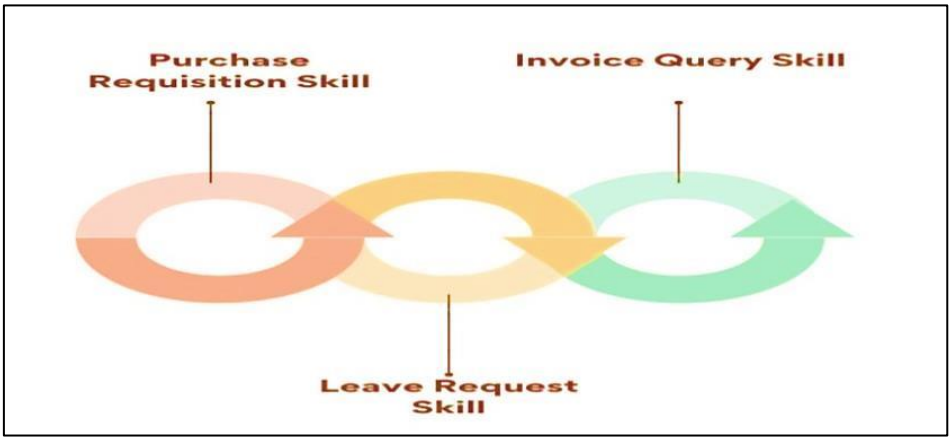

Fig 3: Chatbot Skill Design

- **Leave Request Skill:** This capability is involved with matters of employee leave, such as recording vital information (e.g., type of leave, commencement and end dates, and time duration). It automatically matches the request with the company's leave policies and the user's leave balance. The Leave Request Skill simplifies the process by providing an instant response and sending the request to the relevant manager for approval, thereby saving on administrative work and response time.
- **Invoice Query Skill:** The Invoice Query Skill can be used by vendors, finance personnel, and all users to query the status of invoices by entering a supplier ID or invoice number. It obtains current data from the ERP system, including, for example, payment due dates, processing statuses, and pending issues. Such a skill enhances transparency and reduces the frequency of manual follow-ups, as the required information is readily available through self-service options on the dialogue-driven, user-friendly interface.

3.3. Integration and Authentication

Secure RESTful APIs are utilised to integrate the Oracle Digital Assistant (ODA) and Oracle ERP Cloud, ensuring seamless data exchange between the chatbot front-end and the enterprise resource planning (ERP) system. These APIs are based on the needs of various data retrieval operations, transaction posting, and workflow status updating processes, which clarifies the communication stream between system components. One of the issues with this integration is security. [13-16] To secure sensitive enterprise information on a transmission, the system utilizes OAuth 2.0 as the authorization model. OAuth 2.0 can be used to enable secure delegated access, a feature that allows the chatbot to perform actions on behalf of the user without requiring their login credentials.

Additionally, JSON Web Tokens (JWT) are used in the authentication and authorisation process for access tokens, where only valid and authenticated requests are handled by the ERP Cloud. Such tokens contain critical assertions, e.g., user roles and session validity, that facilitate the implementation of role-based access controls in the ERP system. Additionally, chatbot credentials and access authority are managed by Oracle Identity Cloud Services (IDCS), which serves as the central identity provider. IDCS is used to perform user authentication, single sign-on (SSO), and role assignment to all integrated Oracle services. IDCS performs user authentication on behalf of the user when they access the chatbot and provides an access token, allowing the chatbot to use it to identify itself when accessing its APIs. The centralised scheme for identity management also simplifies access control and enhances security compliance by applying global authentication policies. The combination of REST APIs, OAuth 2.0, JWT, and IDCS can ensure that the integration architecture achieves high rates of data confidentiality, integrity, and data availability, while also offering a platform that can be extended in the future, providing scalability and security of a deployed enterprise-grade application. Such a model of security becomes necessary to safeguard some critical trade in ERP functioning in real business setups.

3.4. Development Environment

- **Oracle ODA Studio:** The primary tool used to design, create, and maintain chatbot skills in Oracle Digital Assistant is Oracle ODA Studio. It provides a graphical interface and low-code capabilities for building dialogue flows, training

natural language models, and configuring entities and intents. Developers will be able to test logic, simulate conversations, and index skills directly within the studio. Version control management and collaborative features are also enabled, making ODA Studio a useful tool for organising chatbot project development across the enterprise.

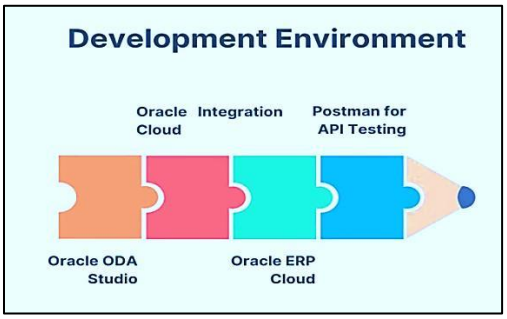

Fig 4: Development Environment

- **Oracle Integration Cloud:** Oracle Integration Cloud (OIC) serves as the middleware that enables the Oracle Digital Assistant to interact with the Oracle Cloud ERP suite and other third-party systems. It enables designers to create and control integration procedures with the help of preexisting adapters, transformation resources, and process automation specifications. OIC is important in managing data mapping, service orchestration and triggered events, which facilitate the seamless interaction between the chatbot and ERP modules and comply with the best practices in integration
- **Oracle ERP Cloud:** Oracle ERP Cloud is the back-end server to the enterprise, within which business transactions and data are processed. It has RESTful APIs with which external applications, such as chatbots, can communicate with its different modules, e.g., Finance, Procurement, and Human Resources. This environment is based on which end-to-end functionality of a system can be tested during development, ensuring that data transactions launched by a chatbot are correctly validated and that high-level business processes are adhered to. User roles and data access settings are also determined in ERP Cloud by developers to align with organisational policies.
- **Postman for API Testing:** Postman is a prevalent API testing framework used throughout development to test and debug REST API requests during the chatbot, Oracle Integration Cloud, and Oracle ERP Cloud integration. It enables developers to mock requests, examine responses, validate authentication tokens and test their erroneous functionality. Postman allows me to ensure that I can check the reliability, performance, and security of APIs prior to including them in the chatbot workflows.

4. Results and Discussion

4.1. Test Scenarios

Table 1: Test Scenarios

Transaction Type	Improvement
Purchase Requisition	75%
Leave Request	70%
Invoice Query	66%

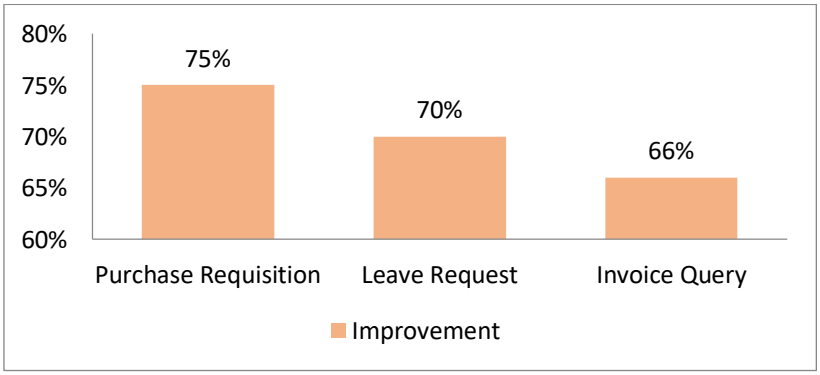

Fig 5: Graph representing Test Scenarios

- **Purchase Requisition:** During the purchase requisition test, the presence of the traditional ERP interface for making and sending requests was tested, along with the Oracle Digital Assistant interface, which users used to build and present requests. With the traditional ERP UI, this procedure took an average of 8 minutes, requiring manual data

entry and the use of several screens. Comparatively, conversation flow enabled the chatbot to guide users, resulting in an average completion time of only 2 minutes. This represents a 75 per cent efficiency increase. This saved a lot of time due to the automation of data input and the ease of initiating approval.

- **Leave Request: A leave request scenario is one in which we file different categories of employee leaves, such as** vacation and sick leaves. Conventionally, before they could access the ERP system, users had to log in, navigate to Modules, leave the module, and manually fill out forms, a process that used to take an average of 5 minutes. By using the Oracle Digital Assistant, people can simply talk to the chatbot in natural language, indicating the type and dates of leave. The system verified leave balances and processed the request within 1.5 minutes, achieving a 70% improvement in processing time. This was made easy and fast, which significantly improved the user experience.
- **Invoice Query:** When checking invoice status, users were required to review the finance modules or seek assistance, which took an average of 6 minutes per request. With the aid of ODA, users can access the latest information concerning invoices by simply providing the supplier identification or invoice number within a chat window. The mean time for completing this task was reduced to 2 minutes, representing a 66 per cent improvement. The near-immediate access of the chatbot to backend ERP data, as well as its ability to provide immediate responses, made manual intervention minimal.

4.2. User Feedback

- **Simplified Interfaces:** Users noted that the conversational interface of the chatbot makes it very intuitive and a significant upgrade to conventional ERP forms. Users did not have to click through several screens and complicated menu items; they could type or say the things in their own words. This lowering of cognitive load facilitated easier task completion compared to non-technical users or those who had not been exposed to navigating the ERP system. Owing to this, the chatbot interface contributed significantly to improving user confidence and minimising errors in carrying out these tasks.
- **Real-Time Status Updates:** This feature, which displays the live status of various transactions related to leaves, purchase requests, and invoices, was probably one of the best and most liked features by customers. They no longer needed to write follow-up emails or check which ERP module to visit to get updated. Transparency enabled optimisation through real-time feedback, shorter response times, and gave users the ability to take appropriate action on time (at least, to approve and escalate in specific instances).
- **Mobile and Voice Accessibility:** The ability to use ERP services on mobile phones or via voice requests was a revolution for remote workers and field personnel. Its work on a mobile-friendly platform made it perform conveniently on mobile phones, and audio communication enabled hands-free interaction. Such flexibility not only increased convenience but also extended ERP functionality beyond desktop use, resulting in high degrees of engagement and productivity among users at various levels and in multiple locations.

4.3. Challenges Faced

- **NLP Misinterpretation:** A significant challenge encountered during development was that the natural language processing (NLP) engine would occasionally fail to accurately process user input. Although the system was very successful in dealing with straightforward queries where its structure was sought, it did not always accurately comprehend the meaning of complex, ambiguous, and multipurpose sentence structures. This led to the chatbot triggering unrelated skills or responding to irrelevant issues. To respond to it, it was necessary to constantly improve the training data, refine the classification of intentions, and utilise fallback mechanisms to request human reclarification as needed.
- **Security Constraints:** Integrating the chatbot with the ERP system presented significant security challenges. Oracle ERP Cloud features robust API access controls, profile-based application of the OAuth 2.0 protocol, and authorisation of functions. It was necessary to coordinate in detail with IT and compliance teams to adjust these roles, handle the lifecycles of the tokens, and ensure safe data exchange. Although this limitation was required to protect the data, this process caused a lag in the integration process, specifically, and the overall development process in general.
- **Initial Training Time:** The company took a considerable amount of time to train its NLP model for the chatbot to understand the terminology and workflow of the enterprise. In contrast to most general-purpose bots, a bot integrated into an ERP solution needs to be able to recognise vocabulary specific to a domain, e.g., item codes, supplier names, or the names of HR policies. It involved the development of specific training datasets, improvements in entity recognition, and experimentation with various dialogue settings. This resulted in a significant portion of the development run being consumed by recurring testing and adjustment processes, as the chatbot had not yet achieved satisfactory levels of accuracy and reliability by the project's end.

4.4. Benefits Observed

- **Reduced Data Entry Errors:** The formatted conversation imposed by the chatbot also significantly reduced the number of invalid/non-completed submissions. The system also helped avoid errors such as empty fields or inaccurate date formats, as well as other issues, since fields like item descriptions in purchase requisitions or accurate dates in

leave requests would be prompted step-by-step to the user. This assurance, given at every turn of the conversation, guaranteed the superiority of the data and lessened any need for follow-up corrections of information by managers.

- **Faster Approval Cycles:** The chatbot streamlined the approval process across various workflows within the ERP, thanks to automated routing and real-time alerts. Immediately after a user makes a request, they would inform the respective department or manager, thereby eliminating manual hand-offs and bottlenecks. The combination of these timely notifications and one-click approval links, provided either through chat or email, will reduce the total time spent in the approval cycle by up to 75%, thereby expediting the decision-making process and accelerating business.
- **Improved Employee Engagement:** The physical interface, which was modern and conversational, stimulated more employee behaviour in ERP systems than traditional menus and forms. Users reported that they found it easier to use and interact with a chatbot, resulting in increased adoption of self-service activities. This additional activity was most noticeable among non-technical employees and those who work remotely, as the chatbot became more accessible through mobile devices and voice calls, making it easier to integrate with organisational workflows and increasing confidence in their work.

5. Conclusion and Future Work

The utilisation of Oracle Digital Assistant (ODA) on ERP systems provides an opportunity for a revolutionary way of enterprise resource management, as it transforms the interaction of users with complex back-end systems. Legacy ERP systems are powerful, though they may reduce usability due to their complex interfaces and often manual procedures. The proposed conversational layer of ODA minimises these challenges by localising interaction with NLP technology, guided dialogue, and voice (or textual) input. Automation of normal duties, such as purchase requisitions, leave requests, and inquiries about the status of invoices, not only improves the productivity of the user but also speeds up the transaction process and minimises the possibility of human error, as these duties were previously performed manually. The use of smart chatbot skills, which are specifically tailored to certain ERP functions, has been effective in reducing data entry errors and shortening approval processes. Additionally, a secure connection between ODA and ERP Cloud via REST API and OAuth authentication ensures that the enterprise's information is not exposed, yet can be accessed in real-time for key business operations.

Along with the obvious benefits, the application of ODA also has its problems. Vocabularies within the particular domain used in chatbots, handling the ambiguity of user queries, and upholding the security of roles, are difficult to implement initially. Additionally, maintaining NLP models and dialogue flows to reflect changing business needs can be a resource-intensive process. Yet, returns and benefits such as enhanced employee engagement, flexibility in carrying out operations, and long-term savings on support costs are worth pursuing by any organisation seeking to streamline its digital architecture.

As we gaze into the future, it is possible to add further improvements that can help reinforce the role and power of ODA in ERP contexts. Multilingual support is one of the most important development areas, as it would enable global organisations to provide a localised chatbot experience to users in various parts of the world and different languages, making it more inclusive and accessible. Another potential development involves the third-party integration of ODA with Slack, Microsoft Teams, and Zoom. The provision of the chatbot on the most popular platforms would enable workers to complete ERP tasks via their preferred communication means, thereby raising the level of convenience and workflow productivity. Moreover, the implementation of more sophisticated AI and machine learning algorithms may help ODA evolve even further in terms of transactional automation and smarter decision-making, e.g., placing approval recommendations on top of historical data and recognising delays, or even detecting anomalies. These developments would not only enhance the chatbot's capabilities but also improve its strategic positioning as a digital assistant that can support more advanced aspects of company functionality.

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