LAB University of Applied Sciences

User Experience (UX) Design in ERP Systems

Optimizing User Interface

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Bachelor of Business Information Technology
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Abstract

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Abstract

By applying qualitative research techniques and professional interviews, this thesis investigates various elements of User Experience (UX) design in Enterprise resource planning (ERP) systems. These interviews will offer insightful information on the state of UX design processes today, the difficulties encountered, and the prospects for improvement. Industry experts and individuals with expertise in ERP system development and deployment will be interviewed.

The results will be a useful tool for small and medium businesses looking to improve the usability and efficiency of their ERP systems, which will eventually boost user satisfaction and performance in the modern workplace. The thesis attempts to bridge the gap between UX theory and actual execution in the context of ERP systems by combining expert perspectives with industry expertise. help improve UX design in ERP systems and provide useful suggestions for system designers and developers.

Keywords

User Experience, Enterprise resource planning systems, User Interface, Design, Usability, Interface

Contents

1 Introduction

Enterprise resource planning systems (ERP) have become essential tools for businesses of all sizes in a wide range of industries in the modern business operations landscape. From accounting and human resources to supply chains and customer relationship management, these complex software platforms smoothly connect and manage fundamental corporate processes. ERP systems frequently face a common difficulty, despite their evident value: ensuring that users can utilise their full potential efficiently and effectively. (Seth et al. 2011, 1-7.)

The absence of developers and designers who place the end-users at the center of software development is one of the major problems with UX. This thesis focuses on how to improve the UX Design in ERP Systems by closing the gap between end users and software designers in order to solve the critical problem of usability and efficiency within these complex systems.

The importance of an optimised user interface (UI) in ERP systems cannot be emphasized in a time when businesses depend more on data-driven decision-making. An ERP system with an easy-to-use interface can increase user adoption rates significantly, lower training expenses, cut down on errors, and it will ultimately lead to better operational performance. (Nowakowski et al. 2006, 146-151.)

In the discipline of ERP, research has mostly concentrated on technology and algorithms to keep up with escalating business process complexity and choppy market demands. The limited studies that are currently available primarily cover “external user factors” such as user involvement in the implementation process, self-efficacy, or perceived system utility. As a result, user and usability issues have primarily been explored from an abstract perspective. (Lambeck et al. 2014, 396-400.)

This thesis takes readers on a trip through the complexities of UX design in the context of ERP systems. We will go deep into the practical approaches for enhancing user experiences, examine the fundamentals of successful user interface design.

1.1 Background

This thesis shows the crucial role that UX design plays in ERP systems and how these elements directly impact user satisfaction, efficiency, and cost-effectiveness. In the complex field of ERP systems, these technologies' usability may make or break their effectiveness. When UX is ignored, users usually deal with dissatisfaction and decreased productivity. However, thorough research can support designers in locating issue areas and enhancing workflows, which will lead to happier and more productive users. By minimizing errors, optimizing processes, and reducing the need for intense training, investing in UX research may also result in significant cost savings, enhancing the organization's return on its ERP investment.

The authors' experience with ERP systems served as the inspiration for the thesis. The writers were initially introduced to ERP systems in university lectures where they were able to use and comprehend those systems' fundamentals. Later, when doing their internships, the authors got the chance to interact with ERP systems.

The authors found that ERP systems were not entirely utilized or understood at their places of employment. The end-users of the ERP systems failed to take advantage of all the capabilities available to them, and in other cases, they were completely unfamiliar with the systems. One of the organizations is attempting to best deploy the new ERP system.

This is where the authors' inspiration for the thesis topic of how to enhance the UX of ERP systems in order to reach the system's full potential and satisfy end users.

The reason as to why it is important to have an amicable UI is related to user satisfaction. The lack of satisfaction while using the system can actually affect user performance over a long period of time. The better users like the system, the more likely they are to experience good performance with it over a long term. (Hartson & Pyla 2012.)

A good UI facilitates communication, which is basically a dialogue between users and software that carries out activities to meet users' aims. Understanding what is required to communicate with users is a smart place to start when creating a design. If the UI is difficult to understand and use it will probably fail to effectively communicate the crucial information. (McKay 2013, 15-16.)

1.2 Research aims.

This thesis looks at the UX of ERP system design. How new users are adjusting to changes that have been caused by new technology in their workplaces. and how UI might be made easier to grasp. Easier to utilize for new users because of standardization in the design or through instructional techniques. It is critical to determine if the designers of ERP systems understand the requirements of end users and whether they consider potential system modifications to be beneficial.

Software cannot bring value if it is not being used properly. Throughout the product development life cycle, it is necessary to review each choice, activity, and procedure and to determine whether the user can see the value of the new program. It is crucial for the project that the users understand the logic behind any new initiatives. By incorporating design into the process, it is possible to make sure that the software created offers value to the company and resonates to the end user. (Ratcliffe & McNeill 2011, 10-11.)

The aim is to meet the consumers' requirements so that the designers may try to assist them in grasping its importance and determining how well they can use it with little to no prior knowledge. So that new users may contribute to the development of the product and developers have a better notion of what to build.

1.3 Research questions

Through inquiry for this thesis, answers to the research questions are sought. Concentrating on how the ERP system's design and execution may be more user-friendly for those who are not highly proficient in technology.

The key elements of the study, including the population, the intervention, the comparator, the outcome, the schedule or duration of the study, the environment, and the effect to be evaluated, will all be clearly defined by a well-stated research question. A study design that addresses the targeted question will be made easier by a clear specification of these components. (Suarez & Setoguchi 2021, 71-83.) Using inquiries to investigate problems, explore into their effects, consider solutions, and bring forward fresh ideas (Goldschmidt & Matthews 2022).

These following research questions collectively aim to address critical aspects of ERP system usability and design. The difficulty experienced by new users highlights a possible gap between system functionality and user understanding or expectations. Identifying the reasons behind these users' difficulty navigating the system might lead to the discovery of design defects or insufficient user training. The issues are reinforced by the review of design

standardization, which looks at the structural elements that may affect user experience. By examining these issues, the study aims to close the gap between complicated ERP systems and intuitive user interfaces, suggesting improvements to the UX design that are specially made to suit users with little experience. In conclusion, this research aims to provide workable solutions and design changes to improve the usability, intuitiveness, and adaptability of ERP systems for individuals with varying levels of familiarity and expertise.

- Can the ERP system UX design be standardized for small and medium enterprises?
- Why are new users for the ERP system struggling to understand it?
- Is the design of ERP systems flexible enough?
- How can the UX design of the ERP system be modified to be friendlier for inexperienced users?

The research questions revolve around the UX design challenges within ERP systems. The first inquiry asks into the potential standardization of ERP system UX design for SMEs, questioning whether a uniform design approach could be implemented cost effectively across many businesses. This is consistent with the growing demand for ERP systems that are accessible, efficient, and customized to meet the unique needs of SMEs. Highlighting a prevalent issue: the struggle of new users in comprehending ERP systems. This points towards potential complexities or deficiencies within the design, emphasizing the importance of user-centric design strategies. Lastly, the inquiry about the flexibility of ERP system designs prompts an evaluation of how adaptable these systems are to meet the diverse needs of users, especially considering the varying levels of user experience.

2 Literature review

One of the primary user-centred critical success factors of an ERP system is sometimes referred to as user satisfaction. However, there are many different definitions of user happiness, and the factors that influence it can range greatly from organizational to user characteristics. (Lambeck et al. 2014, 396-400.)

ERP market studies frequently mention user happiness. This kind of survey compares current products to support the choice of an ERP system based on a few factors. Ergonomics is a parenthetical summary of user-centred considerations, even though “functionality is still the most important selection criterion” for an ERP system. While it is not even listed in the list of reasons for deploying a new ERP installation, this ergonomic factor is ranked sixth in the list of selection criteria. (Szajna & W. Scamell 1993, 493-516.)

When it comes to the installation of an ERP system, there is an organizational viewpoint on the concept of user satisfaction. (Amoako-Gyampah & Salam 2004, 731-745). Apart from user-centered factors like experience and perceived usefulness, other factors that are equally well thought to affect user satisfaction include corporate culture, top management support and user involvement in the implementation process (Bin et al. 2010, 58-66). On the other hand, user interface elements like interface complexity are not specifically listed as a factor that affects user happiness.

2.1 Usability and User Satisfaction

According to the usability definition, usability is the design of an interface that helps users in a certain context easily accomplish tasks, therefore making them happy with the system after using it (Ergonomic Requirements for Office Work with Visual Display Terminals 2018). Moreover, usability guarantees that the interface is safe, fulfils a function, and is easy for end users to understand and recall (Sharp et al. 2019). Usability is essentially the collection of characteristics that make an interface easy to use. The benefits of usability may be broadly divided into three categories: higher competitiveness, lower costs, and greater productivity. (Paa et al. 2016, 149-160.)

Since many businesses and sectors all around the globe have incorporated ERP solutions into their operations to streamline their workflows, users frequently run into problems and difficulties with the usability and user experience of these systems (Oja & Lucas 2011, 21-40). A software system's usability aspects are crucial in deciding whether it succeeds or fails. Moreover, usability has a big impact on how well end consumers embrace a project. (Masadeh et al. 2017, 49-71.) Usability issues prevent users from accomplishing their goals

within the framework of intended usage. Inadequate usability not only poses a risk for major project failures, but it also reduces user and team productivity. (Asif et al. 2022, 1-20.)

ERP market has several surveys available and in there, user happiness is mentioned frequently. This type of surveys compares current products to support the choice of an ERP system based on a number of factors. Where's one of the most important selection criteria in ERP system is functionality, user-centered considerations are being parenthetically summed up to the ergonomics component (Intelligent systems solutions gmbh 2011). In contrast to the reasons for adapting a new ERP installation, the ergonomical criteria is not even listed in the list of selection criteria, where it is rated fifth. However, additional goals sought with an ERP implementation project, such as quicker access to corporate data, point to the implied necessity of user interface considerations in addition to the frequently highlighted performance challenges. (Lambeck & Groh 2013, 170-178.)

In many papers it comes openly that users of ERP systems come across a variety of user interface (UI)- related issues that touch on cognitive and dialogue factors as they utilise these systems. The idea of user satisfaction today includes aspects like navigation, user assistance, visual design, reducing cognitive load, and ease of learning in addition to the previously mentioned characteristics. (Calisir & Calisir 2004, 505-515.) A few years ago, Topi et al. (2005) interviewed a small sample of ERP users to identify the most pressing issues they encountered when utilising these systems. Even though there were only ten participants in the study, it revealed definite and palpable issues with the user interface of the ERP system. Those issues were Identification of and access to the correct functionality, transaction execution support, system output limitations, support in error situations, terminology problems & overall system complexity. (Topi et al. 2005, 128-133.)

Singh & Wesson (2009) did a thorough analysis of the major usability factors found within current research literature with the aim of creating heuristics for improving ERP usability. Five main heuristics were produced as a result of this project, covering topics like navigation, learnability, task support, presentation (both input and output), and customization. The navigation heuristic has been linked to potential usability issues in situations when "locating information proves to be non-intuitive" and "users lack adequate guidance during the execution of business processes." Potential usability problems within the framework of the presentation heuristic include remarks like "the visual layout appears overly intricate," "output is not readily comprehensible," and "the system´s user interface lacks an inherent sense of intuitiveness." (Singh & Wesson 2009, 87-95.)

A 2011 pole of 58 participants from small and medium-sized manufacturing businesses in Eastern Germany found that 70% were extremely satisfied with the functionality of the ERP

system. However, there were obvious problems with how information was presented, with interfaces frequently failing to provide enough detail or cater to task-oriented requirements. Tables were the most popular visualization (90.9%), whereas floor layouts and 3D views were less frequent. Major issues with task-oriented visualizations (75.0%) and detail/overview (59.4%) were found in the survey, which had an effect on the graphical user interface and information availability. While aspects like semantic search (34.4%), 3D views (25.0%), and multi-touch devices (9.4%) received less attention, future research should address these problems. (Lambeck & Groh 2013, 170-178.)

2.2 Simplifying ERP systems

Organizations should start with careful planning and requirements analysis to minimize the complexity of ERP (Enterprise Resource Planning), making sure that the chosen ERP system is well suited to their requirements and sector. Internal process standardization, simplification, and restricting customization to only necessary adjustments can all greatly reduce complexity. To aid staff in adjusting to the new system, effective change management tactics and user training are crucial, and putting user experience (UX) design first guarantees that the interface is simple and easy to use. (Jackson & Desai 2021.) A staggered implementation strategy enables good improvement and problem solving. Data quality and integrity are maintained by using proper data cleansing and governance procedures. To detect and address complexity, organizations should also maintain regular system maintenance and updates, monitor performance, and carry out periodic evaluations. (Lambeck & Groh 2013, 170-178.)

2.3 ERP user adoption

The ability of users to adapt to an ERP system after it is implemented and lessen any mismatch between the ERP's features and functions and their work needs is known as user adaption of ERP. Because work duties are better aligned with the processing functions of the ERP, end users benefit from increased performance gains when there is a higher degree of user adaptation to the ERP. (Shiang-Yen et al. 2013, 59-81.)

In this context, "misfit" refers to a mismatch or misalignment between the ideal practises that the ERP system recommends and the actual practises that the organisation uses. In order to maximise the benefits of ERP, the company putting it into practise should work to improve user adaptability by reducing the gaps between user jobs and system features. (Maurer et al. 2012, 4652-4661.) Few studies have been conducted to investigate how users adjust to ERP systems and how such adaptation affects factors such as ERP utilisation, user benefits, and user satisfaction (Eid & Abbas 2017, 530-549).

According to a 2012 study by Fadel, individual information systems (IS) adaptability has a favourable impact on IS integration at the person level. The main objective of Fadel's research was to distinguish between three categories of user adaptations: avoidance-focused, approach-focused, and problem-focused. Problem-focused user adaption was the only significant influence on the integration of individual IS that was found. Three kinds of items—self-adaptation, work-adaptation, and system-adaptation—were utilised in Fadel's study to evaluate problem-focused user adaptation. While work adaptation and system adaptation dealt with the reorganisation of work activities and procedures and changes to system features, respectively, self-adaptation focused on elements associated with user learning and training. (Fadel 2012, 1-10.)

2.4 Investing in the UX design of ERP systems

The phrase "user experience" (UX) has become quite popular in recent years. Don Norman came up with the term, which was once meant to apply to any consumer's whole interaction with a good or service—not only digital ones. This thorough comprehension of UX highlights that it pertains to each encounter a user has with a good or service across a variety of channels. It's crucial to remember, too, that Don Norman has voiced concerns about the phrase being "horribly misused" when used only in reference to online content. The fundamental idea of UX does not change in spite of this misapplication. UX primarily centres on the user's experience, regardless of the kind of digital product being used, be it a website, an application, or any other software. (Knight 2018, 1-13.)

User experience (UX) has changed the landscape of software development over the past ten years and has become one of the most important success factors. Achieving a top-tier UX becomes a difficult task in situations where a product’s complexity or its wide target population offer a problem. The active participation of users in the design process, supported by in-depth user research, is a crucial component in this endeavour.

According to Øvad and Larsen (2015), user experience (UX) design has made great strides in recent years and is now a competitive advantage in product development. However, there are two new issues with usability and UX approaches in the workplace. The first issue is that many of these methodologies were developed in academic settings, where real-world circumstances and industrial environment restrictions, particularly those relating to time and resources, were not properly taken into account. As a result, there is a disconnect between these approaches' theoretical aspirations and the real-world requirements of business. The second problem is that most approaches related to usability and user experience (UX) were created while the waterfall model dominated software development methodologies. These conventional techniques are frequently too labor-and time-intensive in today's flexible and

quickly evolving industrial environments. It is challenging to smoothly incorporate old approaches into the quick-turnaround, iterative development processes of today due to their mismatch with modern development practises.

To put it another way, as the value of UX design in the market has grown, it has become clear that the academically based traditional methods and the antiquated waterfall model are not necessarily suitable for the real-world challenges of contemporary product development. This mismatch can result in wasted effort, lost opportunities, and difficulties when attempting to modify UX techniques to fit the resource- and agility-constrained industrial environments. This mismatch can result in wasted effort, lost opportunities, and difficulties when attempting to modify UX techniques to fit the resource- and agility-constrained industrial environments. As a result, there is a rising need to improve and modify UX techniques in order to better fit the resource-sensitive and fast-paced nature of modern development. (Øvad & Larsen 2016, 1080-1090.)

Beyond traditional usability, user experience (UX) includes aesthetics, friendliness, task efficiency, and accessibility. One of the key components of an effective UX is simplicity, which enables users to efficiently navigate complicated ERP software; personalization, which gives users the freedom to customize their ERP experience to their roles and preferences and includes style, layout, sorting, and indicators; and empowerment, which gives users the power to make decisions. As, software development is evolving, proper UX has become most important thing. (Modh 2022.)

More broadly, user experience with technology may be very important to them when it comes to resolving incompatibilities between the technology, they use to perform their activities and the technology that other technologies use to carry them out. To put it simply, a person's ability to match a technology to the demands of their activities improves with increased usage. Consequently, more ERP technology experience might result in a better match between the ERP system and the demands of the user's tasks. Therefore, the way in which users interact with ERP systems may have a beneficial effect on their ability to adjust to these systems and, as a result, the advantages that they receive from utilising them. This implies that the benefits of ERP technology's increased work efficiency and effectiveness as well as user adaption to ERP will both be improved. To further clarify, take into account the fact that users who are proficient with ERP systems are more likely to optimise the technology and customise it to meet their requirements. This leads to greater outcomes in terms of productivity and effectiveness in addition to making job execution easier and more efficient. Additionally, because they have a thorough grasp of the ERP system and can utilise it to its fullest capacity, these users are more likely to spot chances

for innovation and development. This might then set off a chain reaction of ongoing process optimisation and improvement inside the company. (Eid & Abbas 2017, 530-549.)

2.5 Small and medium sized enterprises (SME's) in emerging markets

It's important to look into the ERP systems used by the small firms and the difficulties they experience in order to understand how enhanced interfaces affect how they use ERP systems. We look into small businesses, ERP systems, usability, and improved interfaces in this part. (Singh & Wesson 2009, 208-214.)

Small businesses are crucial to the development of emerging economies like South Africa because they help to reduce poverty and create jobs. Around 2.8 million small enterprises operated in South Africa alone in 2007, contributing significantly to both employment and the country's economic production. (Singh & Wesson 2009, 208-214.) Small businesses must constantly innovate to survive in marketplaces that are dynamic, competitive, and frequently unstable. They must span numerous industries, including manufacturing, trade, and services, while achieving operating efficiency with constrained resources. (Olsen & Saetre 2007, 379-389; Trimi 2008, 271-273.)

Also, these businesses must use information and communication technology (ICT) to thrive and compete. ICT has the potential to streamline and automate operations, improve operational efficiency, and increase profitability and sustainability. (Singh & Wesson 2009, 208-214.) This discussion provides an ICT software solution that integrates organizational data flows and processes to improve operational efficiency and sustainability.

In comparison to bigger organisations, the adoption rate of ERP systems in small and medium-sized manufacturing enterprises remains very low. The system's complexity, the high implementation and post-implementation costs, the system's perceived lack of relevance to business operations, and a general lack of knowledge or interest in ERP systems or information and communication technology (ICT) are some of the factors that contribute to this limited adoption. (Shahawai & Idrus 2010.) Several SMEs in the manufacturing industry are similarly hesitant to adopt ERP systems, according to earlier research (Seethamraju 2014, 475-492; Shahawai & Idrus 2010). SMEs in the industrial sector that have installed ERP systems usually select between two methods. Depending on their industry, several sectors need ERP modules that are specially designed for their unique business processes. Some industries, on the other hand, choose a more general ERP system. (Shahawai & Idrus, 2010.) Each strategy has implementation obstacles of its own, with complexity and high prices being major issues (Khaleel & Ayman 2017, 41-62).

From some other studies, it is clearly noticeable that ERP systems are pre-configured, standardised packages that may provide SMEs with advantages including effective information management, real-time access, efficient business operations, and visibility and quality of information (Seethamraju 2015, 475-492). Up until recently, many SMEs were unable to afford the high adoption and maintenance costs of an on-premises ERP system due to the substantial resource commitments involved. The deployment of on-premises ERP systems necessitates costly, time-consuming, and dangerous broad business process modifications. Additionally, on-premises ERP systems demand considerable investments in hardware infrastructure and software licencing. (Mijac et al. 2013, 132-140.) ERP systems have always been favoured by big, successful companies. Vendors such as SAP and Oracle now provide more reasonably priced on-premises and SaaS-based solutions to cater to SMEs. SMEs are using ERP systems for advantages including standardisation, integrated processes, information visibility, and real-time data as technology and competition change. (Seethamraju 2015, 475-492.)

2.6 Enterprise Resource Planning Systems

By combining information and business operations, ERP systems can considerably assist small businesses (SEs). These solutions improve SE operations by increasing efficiency, productivity, service quality, lowering costs, automating processes, and implementing best practices. Some South African SEs, particularly those with 100 to 200 full-time employees, have already implemented ERP systems. (Singh & Wesson 2009, 208-214.)

As a company grows, it requires more sophisticated and integrated business systems that represent its dynamic and adaptable nature. ERP systems designed for SEs should be affordable, simple to adopt, localised, and adaptable to serve a wide range of SE processes. However, many existing ERP systems for SEs are strict and complex and are frequently difficult to use. (Trimi 2008, 271-273.)

Enterprise Resource Planning (ERP) systems typically consist of various modules, each of which performs a distinct task to integrate and optimise corporate operations. Common ERP system modules include modules for supply chain management, manufacturing, finance, human resources, and customer relationship management (CRM) are a few examples.

Many businesses use ERP systems as their primary system for a number of reasons, including regulatory compliance, scalability, integration, efficiency, data accuracy, comprehensive reporting, and improved customer service. In conclusion, ERP systems serve as an organization's central nervous system, promoting unity, effectiveness, and flexibility in a business environment that is always shifting.

2.7 Enterprise Resource Planning System Usability

Currently, ERP systems frequently suffer usability issues, which has resulted in a lack of relationship between usability and ERP. These systems are notorious for their complexity and user annoyance. (Chaudhry et al. 2012.)

A 2005 usability assessment identified a number of difficulties, including confusing navigation, insufficient assistance, a lack of adaptability, inefficiencies in data retrieval, difficult output display, and threatening user interfaces. To overcome these difficulties and improve user satisfaction, ERP systems are increasingly requiring more useable and adaptive user interfaces (AUIs). AUIs seek to deliver personalized, user-friendly, and efficient interactions in order to allow effective task completion, potentially providing a solution to the fundamental usability concerns seen in most ERP systems. (Chaudhry et al. 2012; Topi et al. 2005.)

2.8 The ERP revolution

The use of ERP systems has increased significantly during the last decade. The worldwide ERP market was valued at €22.4 billion in 2013. (Costa et al. 2016.) These systems have grown into necessary instruments for good company administration and are now seen as requirements for business competitiveness and modernisation. ERP systems, which were first used largely in the industrial sector, are now widely sued in a variety of industries, including non-profit organizations, government agencies, and non-governmental organizations. ERP systems are simply software packages that consist of several components that handle and gather data relevant to certain operational or functional domains. They connect numerous software units to a single database to assist effective resource management, which includes assets, human resources, and other resources. (Costa et al. 2020.)

Traditional information systems lacked cooperation, with various systems such as customer management and finance working independently. ERP systems have switched their focus from functional silos to supporting overall company operations. Investing in ERP systems centralises vital data in a single database accessible to all organisation members, ensuring real-time changes. Organisations use ERP systems to comply with government standards or to copy competitors who have invested in them. ERP systems are seen as more complicated than older systems. ERP system implementation necessitates considerable changes in corporate operations and might even have an influence on organisational culture. ERP systems have several potential benefits, including process simplification, information exchange, shorter process completion times, enhanced business practises, and enterprise integration. Given these benefits, businesses are more motivated to invest in ERP systems,

with both large and small businesses adopting them during the previous decade. (AlMuhayfith & Shaiti 2020.)

ERP implementation is critical for small and medium-sized firms (SMEs) to compete on a worldwide basis. ERP systems were traditionally used mostly by large firms, putting SMEs at a disadvantage in comparison to better-equipped competitors. SMEs now have access to a variety of solutions that might help them improve their performance and competitiveness, necessitating ERP adoption. Small businesses can use information technology to close the gap with larger organisations. However, as compared to big organisations, installing ERP systems in SMEs brings distinct problems, such as greater installation costs. (Qureshi & Abdulkhalaq 2015.)

SMEs confront unique challenges, such as resource constraints, making it more difficult for them to recover from failed ERP deployments. They frequently lack the resources required for comprehensive training and may find it difficult to afford costly consultation costs. ERP system implementation in SMEs entails overcoming a number of challenges, including change management, business process innovation, data transfer, and user training. These complications might raise the chance of ERP system failure. (Christofi et al. 2013.)

Given the differences between SMEs and large corporations, there is a need for in-depth study on how SMEs use ERP systems to improve their business operations and overall system performance. Understanding how SMEs use ERP systems is critical for understanding their specific difficulties and potential, which will be the emphasis of the section that follows.

2.9 ERP empirical research

ERP systems provide a broad research domain, providing a powerful, interdisciplinary answer to today's corporate concerns. While the majority of existing research focuses on ERP deployment success, other aspects of the ERP lifecycle, such as usage, advantages, and acceptance, have attracted academic attention. This shift in focus is largely driven by reasons such as small-sized firms already having ERP systems in place, obstacles associated with failed installations, and the market's abundance of options. (Eden et al. 2014.)

Notably, institutions, like organisations, see the need of comprehending the progress of information technology and the potential benefits it provides. As a result, integrating information systems ideas and techniques into educational curriculum has emerged as a key issue for higher schools. Adoption theories are frequently used by researchers in this sector to explain the decision-making process that people go through before engaging in a certain activity. (Sussman and Siegal, 2003.) The Theory of Reasoned Action (TRA) is an important

component to these adoption theories, arguing that people's behavioural intentions are influenced by their beliefs. The Technology Acceptance Model (TAM) explains why consumers select or reject information technologies for job completion. (Wallace & Sheetz 2014.) TAM has been frequently used by information system researchers to explicate and anticipate system utilisation since its debut. While several writers use these models to expand on ERP lifecycles inside organisations, quantitative models in education are uncommon. (Alshare and Lane, 2011.) Instead, the majority of studies prefer qualitative methods to elucidate the process and benefits of incorporating ERP into student curricula (Costa et al 2020).

When considering the incorporation of information systems concepts and methods into curriculum, especially in higher education, it is imperative to include the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM). The adoption of TRA and TAM offers a theoretical foundation for comprehending the decision-making process people go through prior to using information technology in a learning environment. When addressing the variables influencing the adoption of information systems in education and providing an explanation for why people choose to accept or reject technologies for educational purposes, these ideas are referred to in this area of the literature study. It can be used also in the companies to see if the adoption of new technologies will work out or not.

2.10 Adoption models theory

The Theory of Reasoned Action (TRA), as previously stated, serves as the cornerstone for many information system theories. Researchers have proved the effectiveness of TRA in predicting and explaining behaviour in a variety of contexts. As a result, according to TRA, behavioural intention is the major predictor of an individual's actual behaviour, and two essential aspects, namely personal intention and subjective norms, impact attitudes. (Marangunić & Granić 2015.)

TAM, the most extensively used technology adoption model, includes the key concepts of TRA to explain and predict person behaviour while engaging with information systems. TAM provides insights into why people choose to use or avoid technology when doing tasks. (Wallace & Sheetz 2014.)

3 Methodology

To better comprehend human experiences, qualitative research collects non-numerical data and looks for patterns in language, theme, and structure, among other characteristics. Observations, interviews, and questionnaires are all examples of qualitative research tools. (Chris 2021.) According to some qualitative researchers, qualitative methods can offer a "deeper" understanding of social behaviours than is possible from simply quantitative data (Silverman 2005, 10-11).

It is visible that there is a gap between the UX design developer and the product's end user. Qualitative researchers emphasize that the relationship between the researcher and the subject of the study affects the investigation. (Silverman 2005, 10-11.)

3.1 Research method

It is required to conduct an investigation by interviewing ERP specialists to obtain information which provides insight into particular technical aspects inside the ERP systems. Insights such as the way of working for developers and how end users are involved in the developing process. The flexibility value that results from the suggested measurement approach may be used to help the developer evaluate and choose the best product to use in a company. It will be simple for an advisor to select potential items from the list with a better understanding of an ERP system's overall capabilities, and it will also be easier for a potential customer to understand and evaluate the quality value of each product. (Dimas 2018,10.)

3.2 Data collection

Researching qualitatively is intriguing as well as significant. It is a highly rewarding activity since it involves the researcher into important issues in important ways. (Mason 2002, 1.) Goulding (2002) says that the researcher's interests, convictions, and ideals should be taken into account when choosing a methodology. There are many different approaches or strategies for collecting data. Saunders et al. (2009) state that a researcher may employ one or more methods while gathering data.

The qualitative research approach makes it possible to gather genuine opinions from specific subject-matter specialists. The information created from these concepts may then be leveraged to create valuable content that supports the provided brand messaging. When this procedure is properly implemented, the value proposition is enhanced and favourable, which benefits everyone. (Ugwu & Eze 2023, 20-35.)

Asking questions as a technique to investigate problems, enquire about their effects, consider potential solutions, and provide novel ideas. A useful research question in design finds phenomena of interest, locates presently unexplored fields of investigation, and has immediate consequences for many other parts of a study that add to the body of knowledge. (Goldschmidt & Matthews 2022.)

3.2.1 Interview Protocol

Interviews were conducted face to face in LAB university of Applied Sciences as well as via web meetings using Microsoft Teams as the medium agreed with the respondents. Each interview lasted for approximately 60 to 90 minutes. Respondents were open to have follow up interviews in case the thesis research need it. Respondents were contacted through e-mails, where they were asked if they were willing to participate in the data collection part of the thesis process. Respondents were informed that their participation in the interview was voluntary and without incentives. Respondents were informed of the thesis topic and the profile of the professionals needed to conduct the interviews.

This thesis utilizes an open-ended interview style with semi structured questions which allowed the interviewers for follow-up questions and clarifying questions. The interviews were transcribed by the authors verbatim not to lose the accuracy of the respondents.

The researchers used independent Microsoft Word files as the medium for verbatim transcription of the interviews, which were then transferred to the main Microsoft Word document for the thesis paper. The confidentiality of some individual names, employers, and connections had been upheld for the participants; nevertheless, they were requested to give their informed agreement for the description and reporting of common themes, patterns, and experiences as anonymous.

The goal of in-depth interviews is to learn about the participant's, in this case experts, thoughts, feelings, and opinions about the topic of the study in order to validate the findings. An organized list of questions is used as a guide during the interview to acquire the necessary data while also allowing room for further in-depth follow-up inquiries depending on the participants' responses. (Dimas 2018, 33.)

In-depth or unstructured interviews get their names from how little structure they actually have. The interviewer creates further inquiries in response to the interviewee's prior response with the intention of talking about a small number of subjects, possibly as few as one or two. Despite the fact there are just one or two topics discussed, they are thoroughly explored. (Mathers et al., 2000.)

4 Results

4.1 Interview I

Interviewee: Pasi Tiihonen

Profession: Lecturer, IT Data Processing, LAB University of Applied Sciences

Date: 12 October 2023

Interviewer: Can you please provide a brief overview of your experience in ERP design and development?

Interviewee: I have been teaching courses in LAB and previously worked as an information system manager in the forest industry. I was involved in building a new information system, a totally new kind of software solution, back in the 90s. It didn't have a graphical interface, unlike today's systems which are more user-friendly. Companies in those days built their own systems, mostly character-based, with text lines and numbers. Now, there are personalized views for different users, reducing complexity and the need for extensive training.

Role of User Experience in ERP Design:

Interviewer: In your opinion, what role does user experience (UX) play in ERP design, and how can it be optimized to enhance user satisfaction and productivity?

Interviewee: The system must fulfil its purpose. UX in old legacy systems was character-based, with text lines and numbers, which everyone could understand. Nowadays, personalization is key. Users should only see information relevant to them. Training is necessary, but the system should be intuitive. Bad systems lead to frustration, impacting mental health and productivity. Training should focus on what users need and should be done in the production environment, not in isolated sessions.

Challenges in ERP Development:

Interviewer: Can you share examples of challenges faced during ERP development and how these challenges were overcome to achieve successful outcomes?

Interviewee: Often, developers and designers create systems without considering users. Tailoring systems to users' needs can be expensive but is necessary for usability. Cultural differences should be taken into account when designing global systems. Big companies sometimes resist change and prefer older systems. Training is crucial; companies should involve end-users from the start. Iterative testing involving different user groups helps in refining the system.

User Training and Adoption:

Interviewer: What methods do you employ to facilitate user training and smooth adoption of the ERP system within organizations? Do you think the training provided is sufficient?

Interviewee: Users should be involved in the development process. Training should happen in the production environment and be interactive, focusing on real cases. Companies should assess their specific needs for training duration. The transition from old to new systems is psychological; users tend to prefer what they are used to. Proper training can mitigate resistance and ensure a smoother transition.

ERP Interface Design and Upgrades:

Interviewer: How do you design ERP interfaces to be intuitive, reducing the learning curve for end-users? What challenges are associated with upgrading ERP systems, and how do you mitigate these challenges?

Interviewee: Designing intuitive interfaces requires multiple iterations, involving end-users in testing. Upgrading ERP systems is challenging due to users' attachment to old systems. Training and gradual changes can help in overcoming resistance. Effective communication strategies among stakeholders are crucial throughout the development process.

Fostering Collaboration and User Feedback:

Interviewer: How do you foster collaboration between development teams, business stakeholders, and end-users during ERP design and development? What communication strategies do you find most effective?

Interviewee: Collaboration is hindered by budget constraints and resistance to change. Training new users can alleviate stress. Communication strategies must be deep and cooperative to align stakeholders' interests.

Interviewer: Can you provide examples of how feedback from end-users has directly influenced design decisions, leading to a more intuitive and user-friendly ERP system?

Interviewee: In reality, feedback seldom influences design decisions. Although attempts are made, practical changes are rare, especially in large-scale implementations.

Trends and Best Practices in ERP Systems:

Interviewer: Are there specific trends or best practices you've noticed or applied to enhance usability and user satisfaction in ERP systems?

Interviewee: Lean methodologies have been applied for many years to enhance usability, but trends vary. User-centered design and service design are essential. Involving users in the design process is becoming increasingly important.

Approach to User Training:

Interviewer: How do you approach user training to ensure that end-users have a strong understanding of how to effectively utilize the ERP system?

Interviewee: Training should be interactive, taking time to ensure understanding. Involving users in the design process and continuous training are essential. The first impression of the system is crucial; users should be personally guided through the new system for a positive experience.

4.2 Interview II

Interviewee: Majedul Hoque

Date: 19 October 2023

Interviewer: Can you please provide a brief overview of your experience in ERP design and development?

Interviewee: Certainly. I have worked on applications closely related to ERP. In my previous role, I designed a customer experience solution (CX) and currently, I'm involved in an e-commerce delivery system that uses an API similar to SAP, specifically the headless CMS API system named Elastic Path Cloud Commerce.

Role of User Experience (UX) in ERP Design:

Interviewer: In your opinion, what role does user experience (UX) play in ERP design, and how can it be optimized to enhance user satisfaction and productivity?

Interviewee: ERP solutions are inherently complex and confusing for end-users. The key to success lies in simplicity – a simple interface with a smooth user flow is crucial. Users should be guided from start to finish without needing extensive training. It is a team effort involving developers, designers, system architects, and product owners. User feedback is invaluable in this process.

Challenges in ERP Development:

Interviewer: Can you share examples of challenges faced during ERP development, and how these challenges were overcome to achieve successful outcomes?

Interviewee: ERP systems are complex, and one solution often leads to new challenges, especially when fulfilling specific customer needs. Balancing numerous requirements with the necessity for a simple and easy process presents a significant challenge.

User Training and Adoption:

Interviewer: What methods do you employ to facilitate user training and ensure smooth adoption of the ERP system within organizations?

Interviewee: We provide training through partners, ranging from 2-3 days based on tasks. In-house training and guideline documentation are also employed. The goal is to simplify the learning curve, ensuring users are guided through the system without overwhelming them with unnecessary options.

Designing Intuitive ERP Interfaces:

Interviewer: How do you design ERP interfaces to be intuitive, reducing the learning curve for end-users?

Interviewee: ERP interfaces should be streamlined, guiding users from point A to Z. Minimizing options and providing hints-based systems can significantly enhance user experience, reducing the need for extensive training.

Challenges in Upgrading ERP Systems:

Interviewer: What are the challenges associated with upgrading ERP systems, and how do you mitigate these challenges to ensure a smooth transition?

Interviewee: Checking updates, informing users about changes, providing necessary training, and minimizing downtime are crucial steps. Proactive and reactive measurements are taken to ensure a smooth transition during upgrades.

Collaboration and Communication:

Interviewer: How do you foster collaboration between development teams, business stakeholders, and end-users during ERP design and development?

Interviewee: Gathering requirements from all teams, categorizing them based on importance, and ensuring open communication are vital. Understanding each team's perspective and maintaining a collaborative environment is key.

Interviewer: What communication strategies do you find most effective in ensuring that all stakeholders are aligned throughout the ERP development lifecycle?

Interviewee: Online meetings, calls, and in-house meetings are used. Collaborative tools such as Miro and Trello facilitate effective communication. Consensus among stakeholders is essential before proceeding.

User Feedback and System Enhancement:

Interviewer: Can you provide examples of how feedback from end-users has directly influenced design decisions, leading to a more intuitive and user-friendly ERP system?

Interviewee: In one instance, user satisfaction was the primary focus. Continuous feedback was gathered, and users' interactions were analysed, leading to improvements in the system's usability and user-friendliness.

Usability and User Satisfaction Trends:

Interviewer: Are there specific trends or best practices you have noticed or applied to enhance usability and user satisfaction in ERP systems?

Interviewee: We follow W3C ARIA accessibility standards, ensuring color contrast and guidelines for blind users. Google Material UI is trusted for its user-friendly design. Adherence to these standards ensures enhanced usability and satisfaction.

Approach to User Training:

Interviewer: How do you approach user training to ensure that end-users have a strong understanding of how to effectively utilize the ERP system?

Interviewee: Training includes understanding the development environment, including technologies like full-stack JavaScript with Express.js for backend and React.js for frontend. PostgreSQL is used for the database, and AWS is the infrastructure provider. Testing frameworks include JEST for unit testing and Cypress for end-to-end testing. Applications are published using Azure Dedicated, considering the popularity of AWS and JavaScript worldwide.

4.3 Interview III

Interviewee to remind anonymous per request.

Interviewer: Can you please provide a brief overview of your experience in ERP design and development?

Interviewee: Certainly. I have 7 years of experience in ERP software development. In my current role at a start-up company, we specialize in treasury management software systems. We listen to customer requirements, add new features accordingly, and focus on design and development. We conduct browser testing, ensure server compatibility, and address scalability concerns during deployment.

Role of User Experience (UX) in ERP Design:

Interviewer: In your opinion, what role does user experience (UX) play in ERP design, and how can it be optimized to enhance user satisfaction and productivity?

Interviewee: User experience is critical as it boosts user adoption and productivity while reducing training time and errors. User-centered design is essential, considering different devices and accessibility needs. Minimalistic, clear, and responsive designs are key. Regular feedback from users shapes our design decisions, ensuring user-friendliness.

Challenges in ERP Development:

Interviewer: Can you share examples of challenges faced during ERP development and how these challenges were overcome to achieve successful outcomes?

Interviewee: Resistance to change, data migration complexities, API integration, and budget constraints pose challenges. Addressing these, we record customer needs, automate processes, and ensure seamless data migration. Regular communication, user acceptance testing, and providing post-launch support help overcome challenges.

User Training and Adoption:

Interviewer: What methods do you employ to facilitate user training and ensure smooth adoption of the ERP system within organizations?

Interviewee: We assess diverse user needs, create tailored training programs, and offer online seminars and technical documentation. We also provide a support portal and prioritize customer feedback, enabling us to refine the system continually. Training duration and methods vary based on user experience and company size.

Designing Intuitive ERP Interfaces:

Interviewer: How do you design ERP interfaces to be intuitive, reducing the learning curve for end-users?

Interviewee: Understanding user needs, gathering feedback, and focusing on minimalistic, clear, and responsive design are vital. Considering different user roles, like admin and front

office, ensures tailored experiences. Intuitive design is an ongoing process based on user feedback and continuous improvement.

Challenges in Upgrading ERP Systems:

Interviewer: What are the challenges associated with upgrading ERP systems, and how do you mitigate these challenges to ensure a smooth transition?

Interviewee: Data migration remains a significant challenge, especially when dealing with different database systems. Transparency, detailed planning, and regular communication are crucial. Addressing these challenges requires meticulous preparation and ongoing support.

Collaboration and Communication:

Interviewer: How do you foster collaboration between development teams, business stakeholders, and end-users during ERP design and development?

Interviewee: Regular meetings with treasury department heads and stakeholders ensure alignment. User acceptance testing and continuous communication are essential. Providing priority support initially and clear communication channels post-launch help maintain collaboration and resolve issues promptly.

User Feedback and System Enhancement:

Interviewer: Can you provide examples of how feedback from end-users has directly influenced design decisions, leading to a more intuitive and user-friendly ERP system?

Interviewee: User feedback is invaluable, prompting changes like mobile responsiveness and graphical data representations. Customization requests, like personalized dashboards, are considered, enhancing user satisfaction. Adapting to user needs keeps our ERP system user centric.

Usability and User Satisfaction Trends:

Interviewer: Are there specific trends or best practices you have noticed or applied to enhance usability and user satisfaction in ERP systems?

Interviewee: User-centered design and mobile accessibility are current trends. Personalization, AI integration, and intuitive interfaces are in demand. Responding to these trends enhances usability, ensuring a more satisfying user experience.

Approach to User Training:

Interviewer: How do you approach user training to ensure that end-users have a strong understanding of how to effectively utilize the ERP system?

Interviewee: Training methods vary based on users' experience. We offer online seminars, detailed video tutorials, FAQs, and a support portal. Tailoring training to individual needs ensures a deep understanding. Keeping communication channels open ensures prompt issue resolution, ensuring user competence.

Technical Development Environment:

Interviewer: Can you provide details about the technical development environment, including backend and frontend frameworks, database, and deployment methods?

Interviewee: We utilize Laravel for the backend and Express.js for the frontend, creating a full-stack solution. MySQL is our database, and we implement web sockets for real-time updates. Version control is managed through Bitbucket, and our code is deployed on Google Cloud, serving both frontend and backend to our customers.

4.4 Interview IV

Interviewee to remind anonymous per request.

Interviewer: Can you please provide a brief overview of your experience in ERP design and development?

Interviewee: I have primarily served as a back-end developer, specializing in ERP systems at the database level. My focus has been on creating a seamless front-end experience, often utilizing SAP tools. In one project, I had to bridge the gap between the front-end and back-end systems by creating APIs, a task that many developers tend to avoid due to its complexity and cost implications. I've witnessed a shift in the industry where companies prefer configuring UI using standard SAP tools rather than investing in custom API solutions. This choice often leads to challenges in user adoption, especially when the pre-made tools don't align with the specific workflows of the users, such as doctors dealing with intricate document management and PRP-related tasks.

Role of User Experience (UX) in ERP Design:

Interviewer: In your opinion, what role does user experience (UX) play in ERP design, and how can it be optimized to enhance user satisfaction and productivity?

Interviewee: The complexity of ERP systems poses a unique challenge in terms of user experience. These systems are used across diverse companies, each with its own set of practices. Customization is both the need and the challenge. Larger companies might afford

to invest in UI enhancements, but even there, the misuse of ERP applications is common due to lack of user understanding. This cultural challenge is compounded by resistance to change; users often prefer traditional methods, like typing, over dropdown boxes or forms. To optimize UX, it is essential to strike a balance between customization and simplicity. Simplifying the UI by trimming down unnecessary options and guiding users through the system can enhance satisfaction and productivity.

Challenges in ERP Development:

Interviewer: Can you share examples of challenges faced during ERP development, and how these challenges were overcome to achieve successful outcomes?

Interviewee: One significant challenge lies in UI customization. Users frequently request changes, aiming to align the ERP system with their unique workflows. While these requests are valid, implementing them often creates technical complexities, leading to unstable updates. Stability is crucial; users prefer consistency over constant changes. A stable ERP application that doesn't dramatically alter in new releases provides a sense of reliability to the users. Striking a balance between customization and system stability is a continuous challenge that requires careful consideration and expertise.

User Training and Adoption:

Interviewer: What methods do you employ to facilitate user training and ensure smooth adoption of the ERP system within organizations?

Interviewee: User training is a multifaceted approach. Animation and in-house materials are utilized to guide users through the system. In larger companies, where support for UI is relatively better, in-depth training sessions are conducted. However, the challenge lies not just in training but in guiding users to employ the ERP system effectively. Misuse often stems from a lack of attention or understanding, leading to a disconnect between the system's capabilities and the user's perception.

Designing Intuitive ERP Interfaces:

Interviewer: How do you design ERP interfaces to be intuitive, reducing the learning curve for end-users?

Interviewee: An intuitive ERP interface is one that guides users seamlessly from one point to another. Reducing the learning curve involves simplifying instructions and minimizing unnecessary options. For instance, using visual cues like a red balloon to highlight essential elements can enhance user understanding. The goal is to create a UI that empowers users

to navigate the system effortlessly, ensuring they focus on their tasks rather than wrestling with the interface.

Challenges in Upgrading ERP Systems:

Interviewer: What are the challenges associated with upgrading ERP systems, and how do you mitigate these challenges to ensure a smooth transition?

Interviewee: Upgrading ERP systems, especially heavily customized ones, poses challenges, primarily due to customizations becoming obsolete or incompatible with newer versions. The solution lies in avoiding extensive customizations. Tools like Odoo Studio simplify the customization process without delving into intricate Python code, facilitating smoother transitions. Proactive measures, such as informing users about upcoming changes and providing necessary training, coupled with reactive approaches to address issues promptly, are crucial in ensuring a seamless upgrade process.

Collaboration and Communication:

Interviewer: How do you foster collaboration between development teams, business stakeholders, and end-users during ERP design and development?

Interviewee: Collaboration is facilitated by having a central contact person who acts as a bridge between different teams. Open communication channels allow for the gathering of diverse requirements, which are then categorized based on importance. Understanding each team's perspective is key, especially when balancing user demands and financial constraints. Customizations need to be evaluated critically, with an eye toward minimizing them and, if possible, eliminating them altogether. The end-users' input is invaluable; however, aligning these inputs with the company's profitability goals can sometimes lead to challenging decisions.

Interviewer: What communication strategies do you find most effective in ensuring that all stakeholders are aligned throughout the ERP development lifecycle?

Interviewee: Early builds of the application play a significant role. Pushing these versions to users, especially higher-ups, fosters familiarity with the system. Transparent communication regarding what features is being paid for and what is being customized is essential. Detailed estimates of the time required for each customization and the severity of changes are provided, ensuring stakeholders have a clear understanding of the development process. Visual aids, like UI mock-ups, are helpful in enabling non-technical stakeholders to grasp the system's potential and limitations.

User Feedback and System Enhancement:

Interviewer: Can you provide examples of how feedback from end-users has directly influenced design decisions, leading to a more intuitive and user-friendly ERP system?

Interviewee: User feedback acts as a compass in the design process. For instance, in one case, a highly customized UI was modified based on user feedback. Users expressed dissatisfaction with dropdown boxes, leading to the implementation of drop-down boxes instead of radio buttons. While these changes enhanced usability, they came at a cost. Balancing user satisfaction with financial implications is an ongoing challenge in ERP development.

Usability and User Satisfaction Trends:

Interviewer: Are there specific trends or best practices you've noticed or applied to enhance usability and user satisfaction in ERP systems?

Interviewee: Adhering to accessibility standards, such as W3C ARIA, and embracing user-friendly design principles, notably Google Material UI, has proven effective. These standards ensure proper colour contrast and provide guidelines for users with disabilities, enhancing overall usability. By following these best practices, ERP systems can provide a more inclusive and satisfying user experience.

Approach to User Training:

Interviewer: How do you approach user training to ensure that end-users have a strong understanding of how to effectively utilize the ERP system?

Interviewee: User training involves a comprehensive understanding of the technology stack, including full-stack JavaScript with frameworks like Express.js for the backend and React.js for the frontend. PostgreSQL serves as the database, and AWS is the chosen infrastructure provider. Rigorous testing frameworks, such as JEST for unit testing and Cypress for end-to-end testing, are employed to ensure the system's robustness. Applications are published using Azure Dedicated, considering the widespread popularity of AWS and JavaScript, ensuring accessibility and responsiveness for users across different platforms and devices.

5 Discussion

By the process of conducting in-depth interviews, experts who have experience with ERP systems provided the information. After that, the data was thoroughly examined and utilized to fulfil the thesis objectives. Key findings have been made from the interviews such as training is required from early stages of the process and the system ought to be simple to use. Frustrated users have negative effects on productivity and mental health due to inadequate systems utilization.

Usability demands that systems be customised to the needs of users, and when creating worldwide systems, cultural variances must be considered.

End-User Involvement is very important. Businesses should include end users in the process from the beginning. Iterative testing with various user groups also aids in system improvement.

Users ought to be part of the development process, and training ought to take place in a real-world setting with an emphasis on actual instances.

Moreover, there is a psychological component to switching from outdated to new systems, because users do not like to upgrade from an old system to a new one. because they are used to the old system and with the right training, resistance may be reduced, and the process goes more smoothly.

It takes several rounds to design an intuitive interface, and end users must participate in the testing process.

The difficulty in upgrading ERP systems originates from users' loyalty to outdated systems. Effective communication and gradual improvements are crucial.

Financial constraints and opposition to change hinder collaboration. Educating new users can reduce anxiety.

In practise, especially for large-scale implementations, feedback hardly affects design choices.

Interactive training that takes time to guarantee understanding is best. Users must be included in the design process, and training must be ongoing.

Users should receive personal guidance when navigating the new system to ensure a favourable first impression.

These significant findings emphasize how crucial it is to build and execute ERP systems with a user-centered design, employing effective training techniques, fostering teamwork, and being responsive to user input.

After reviewing the interviews, we successfully got the data from which we got the following answers to our research questions.

- Can the ERP system UX design be standardized for small and medium enterprises?

  All ERP systems designs are standardized but can be modify as much as a customer need or has the budget for.

- Why are new users for the ERP system struggling to understand it?

  Many times, the ERP system can have a cluttered design. where is possible to see all the information available for all the users even if they do not need to see It or interact with it. Minimalistic design has been mentioned by specialists as a possible solution.

  End-users lack of involvement during the designing process. Another reason as to why new users are struggling is not being able to be part of the designing. Some specialists mention that end-user feedback is extremely important to build these systems while other specialist argues that end-user's involvement is not entirely necessary. The reason is that different users have different needs and by customizing the ERP systems they become more difficult to keep updated as well as safety issues rising.

- Is the design of ERP systems flexible enough?

  Using the term "flexible" related to software can be understood better with other words. Are ERP systems at the moment malleable, meaning are ERP systems easily modified.

  ERP systems can be modified through configuration, these systems often provide a level of configuration through its settings. These allows users to tailor the system to their specific needs, without making changes to the software's code. Configuration is less problematic than customization. Although, customization cannot be avoided if the users are in need of some specific feature that cannot be implemented through mere configuration.

The technical expertise of the company also affects how complex it will be to adapt an ERP system. An organization may find it simpler to make changes if its developers or consultants are experienced and knowledgeable about the ERP system. Businesses that utilize ERP systems frequently sign with suppliers that provide the support; as a result, technical assistance is outsourced and results in costs.

- How can the UX design of the ERP system be modified to be friendlier for inexperienced users?

  One solution where all the specialist interviewed agreed on was the end user should be trained on the new ERP system from the early on stages. Giving end-users the possibility to interact with the system before the go live date.

  The UX design can be modified to be friendlier for inexperienced users. Simplified interface is one of the best ways to do that. To decrease the cognitive pressure on new users, just the most important elements and options should be displayed on the main screen. Guided onboarding is another good process that introduce users to the system's features step by step. Moreover, Continuous training and feedback from users will help developers or designers to improve the design of ERP system slowly.

6 Conclusion

The UX of ERP system design is examined in this thesis. How recent users are adapting to the changes brought about by modern technology at their places of employment. And how the user interface should be made clearer. Throughout this process, literature review was done in a concise way. Many papers and publications were used to find existing research and there was a substantial amount of information available and at the same time there were research gap in certain area including user satisfaction and usability issues. From the qualitative point of view, research was done, and interviews were conducted in order to gather data. The process was quite smooth. More importantly, answers to the research questions were found from the data we received from interviews.

There appears to be a gap between software developers and end users, according to the thesis goal. This gap can be identified throughout the company's ERP system's development stages, and as a result, end users may occasionally perform poorly. We gathered the information from experts with ERP system knowledge and examined the responses to determine that the information we obtained was crucial in helping to realize that there are several reasons why users may not fully comprehend the design of the ERP system. Based on the demands of the business, this data has also proven crucial in identifying certain solutions and contradicting others that were deemed to be beneficial but could really cause more problems than what they solve.

ERP systems typically have clutter designs with plenty of tabs and information. It might take some time to locate the items which are being searched. Minimalistic designs that allow the user to filter what they see on their ERP home page while still providing access to all necessary information are recommended by the experts consulted. Although some developers disagree with customization, customers may find it vital in specific cases. Certain functionalities must be included; this is especially true if the end customers run an unusual business. An ongoing consultant is required every time the ERP system has to be updated since excessive customization of the system causes significant code modifications. Consequently, businesses who needed a lot of modification have to have the funds to keep it up to date.

The training of end users was a key concept that was accepted by all of the experts who contributed to the thesis. The experts point out that end users have to become acquainted with the system from the start. Before the new system is installed and set up for operations, the end user should be able to experiment and learn about it. Not only should the end user receive training tailored to their activities, but they should not be trained in such a generic style.

Future Research: This research outcome can't be generalized. More research needs to be done on this field in future. Depending on the project or the exact scenario, the future research can be done with a methodology of the given scenario choice.

further research interests that emerged from this thesis investigation:

How to include the end user early on in the design process with customization that is both affordable and does not substantially change the code.

Budget-friendly, easily navigable ERP solutions need to be standard practice these days.

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