Ensuring Software Maintainability's Critical Role in Successful Information System Implementations for Organizations

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Article Info	Abstract
Keywords: Software Maintainability, Information Systems, Organizational Software, Software Development, Business Adaptability	*In an era characterized by dynamic and ever-changing business environments, the adaptability and scalability of software within an organization are of paramount importance. To facilitate easy adaptation to changing business needs and company-specific requirements, software must be thoughtfully designed from the outset. This adaptation and enhancement process raises a fundamental question: to what extent can the software currently in use be further developed and maintained? Software maintenance, a critical activity, spans the entire software lifecycle, from its initial deployment to its eventual obsolescence. This research delves into the imperative role of software maintenance within an organization's information systems and the essential procedures required for effective maintenance. By exploring the necessity of maintenance in the context of organizational software and information systems, this study aims to shed light on the strategic value of maintaining software integrity and functionality in a rapidly evolving business landscape.*

INTRODUCTION

In an age of constant turbulence, where the rapid adoption of information systems is reshaping the corporate landscape, software emerges as a pivotal linchpin bridging technology and operational triumph. The ever-evolving business ecosystem necessitates software development that embodies the principles of adaptability and scalability, seamlessly accommodating the fluidity of an organization's evolving requirements.

In this era of technological proliferation, businesses have become increasingly reliant on information systems to drive efficiency and innovation. A well-crafted software infrastructure is not merely a tool but the backbone of an organization's ability to operate effectively and stay competitive in a rapidly shifting business landscape. Businesses must ensure that their software is functional and possesses the intrinsic capacity for evolution and adaptability. The concept of

maintainability, or the software's innate ability to metamorphose in line with the company's needs, is thus thrust into the spotlight. It underscores the need to focus on building software that can be easily maintained and modified as circumstances demand, ensuring that the software aligns perfectly with the organization's evolving objectives and business conditions.

Software maintenance is a fundamental and continuous activity that encompasses the entire lifecycle of software – from its initial design and deployment to its eventual retirement. This dynamic approach to software management acknowledges that technology is not static; it evolves in harmony with the shifting demands and progress of the organization it serves. In this context, it becomes clear that a dependable and efficient information system is more than a supportive tool; it's a linchpin for an organization's operational prowess. A robust information system has the power to amplify productivity, reduce unnecessary administrative burdens, eliminate non-value-added tasks, streamline customer service, and facilitate agile decision-making for management.

As we delve deeper into the software design process, where the logical and conceptual architecture takes shape, it's essential to remember that the ultimate goal is not just implementation but the seamless operation and longevity of the system. This is where the crucial role of system maintenance comes into play, ensuring that the system remains reliable and efficient in the face of ever-evolving operational dynamics and the changing technological landscape.

Software maintenance is an activity that accompanies software throughout its life cycle, starting from the design stage to the stage when the software is no longer needed. This is where the concept of maintainability, or the ability of software to change, becomes a critical factor that must be considered. In this context, the role of reliable and efficient information systems in supporting company operations is a must to achieve the goals set. Information systems can help companies manage their software maintenance activities more effectively and efficiently. In addition, information systems can provide valuable insights into the performance of software systems, which can be used to improve their maintainability. The use of cognitive computing and its enabling technologies, such as Artificial Intelligence and Machine Learning, can also help companies to support maintenance by providing relevant information at the right time, retrieved from structured companies' databases and unstructured documents. This can help companies to generate contextual recommendations for improving maintenance practices in terms of time, budget, and scope. Overall, reliable and efficient

information systems are essential for supporting software maintenance activities and improving the maintainability of software systems (Fenza et al., 2020).

A sound information system will increase productivity, reduce administrative burdens, provide added value by eliminating unproductive activities, and facilitate decision-making for management. More than just a supporting tool, an effective information system is the backbone of the company's operational success. Along with designing an information system, which describes its logical structure and concept, there is another critical stage: system implementation. This implementation refers to the actual steps to bring the design from the conceptual plan to the real world, ready for use.

System maintenance is a critical phase accompanying software throughout its life cycle, from the design stage to when the software is no longer needed. It is the key to preserving the integrity and functionality of information systems. System maintenance is a proactive approach that extends beyond the initial implementation, acknowledging that technology is an ever-evolving entity, and organizations must adapt to stay competitive. Using reliable and efficient information systems is necessary to achieve the goals set. The characteristics of information system maintenance: an empirical analysis (Li et al., 2014).

This article delves into the pressing need for maintainability in the context of information systems within organizations. We have underscored that software maintenance is not merely a checkbox in a project plan; it is a dynamic process that shapes an organization's resilience. Moreover, it drives efficiency and effectiveness, ensuring systems remain responsive to change. By emphasizing the importance of maintainability and the required procedural steps, we equip organizations with the tools to successfully navigate a dynamic business environment. Whether in daily operations or long-term strategic planning, maintainability is the linchpin that supports organizational success in the face of change and innovation. It guarantees that the information systems remain invaluable assets, driving the organization's efficiency, productivity, and adaptability.

RESEARCH METHODS

The research paper examining the critical role of software maintainability within organizational information systems, a comprehensive and multifaceted methodological approach is employed to ensure a thorough investigation into the dynamics of software development and maintenance. The research design integrates both qualitative and quantitative methods to capture a holistic view of software maintainability's impact on organizational efficiency and adaptability.

Initially, the study involves a detailed literature review to establish a theoretical foundation on software maintainability, focusing on prior research findings, established models, and current practices in software system maintenance. This review will guide the identification of key variables and frameworks that are relevant to the study.

Data collection encompasses several techniques tailored to capture diverse dimensions of the research question. Primary data is collected through structured interviews with IT managers and software developers from various industries to gather firsthand insights into the challenges and strategies related to software maintenance. Additionally, surveys will be distributed to a broader range of IT professionals to quantify the prevalence of certain maintenance practices and their perceived effectiveness.

The study also involves a comparative analysis of case studies of organizations that have successfully implemented robust software maintenance systems. These cases will be selected based on criteria such as industry type, company size, and technology used, to ensure a variety of perspectives are considered.

RESULTS

Software is a data processor or problem solver to generate information using a computer. Software maintenance is an activity that starts from when the software is used (after delivery) until finally, the software can no longer be used (retired). The goal is to correct errors (to fix), improve performance/functionality (to improve), adapt to the environment (to adapt), and prevent mistakes (to prevent). Software maintenance costs incurred in the maintenance phase are increasing rapidly. In addition to the standard prices in the development phase, intangible costs often arise. These costs are incurred due to 1) user dissatisfaction due to non-completion of the software according to the time specified in the maintenance phase, 2) reduction in software quality, or 3) the addition of new labor. Dividing software maintenance activities into four aspects is necessary. This software maintenance can be divided into: - Adaptive, defined as modifying the system to cope with changes in the software environment.

This second activity occurs due to the growth or development of software or hardware that requires modification of the created software. Perfective is defined as new implementation actions or changes in user equipment that pay attention to additional functions for software. This activity occurs when the user then uses the software created and tested. After being used by the user, requests for other

functions may arise according to the user's wishes. Corrective is defined as the detection and repair of problems that users find. This activity occurs when the product is used, and the results obtained by the user are either errors that arise or inappropriate output. - Preventive, defined as improving software capabilities or reliability or prevention to avoid future problems.

The last maintenance deals with future advances in software or hardware, such as adding or completing existing functions. Software maintenance activities also include a post-implementation review process to ensure that the new system that has been implemented meets the specified business objectives. Errors in development or use must be corrected in the maintenance process. This includes a period of review or audit of the system to ensure that it is operating correctly and is fit for purpose. These audits also continuously monitor a new method for potential problems and required changes. Software maintenance management is critical in monitoring business activities.

Knowledge of the software helps a manager to monitor. For manufacturing companies such as paper companies, the paper pulping process is controlled through lighting by lamps. The light from the lamp is used as a benchmark for determining critical points in producing paper. In addition, the use of lighting systems is used by architectural companies to determine the number of lights and energy needed for a garden. Software facilitates decision-making for a manager to find out the supply of lights, improve workability to produce the right lighting, and save energy.

System Maintenance is essential for system users because often the use of the operating system becomes unsafe due to disturbances such as the system being infected with active malware, corrupt file system, or weakened hardware. To prevent these things, MOS (Maintenance Operating system) is used, which functions for active Malware Management, data recovery, file system repair, hardware diagnostics, never turning off the power until the system is completely shut down, back up important data, defragment at least once a month, check viruses regularly.

Rapid business development and fierce competition. Business people are required to be able to adapt and innovate to survive and develop in this era of globalization. Increasingly fierce business competition in the current era of globalization is motivated by technological advances, especially in the IT field, so it must be supported by implementing better information systems. A sound information system is an integrated system or an orderly combination of all existing

elements- individuals, hardware, software, and communication networks- to provide information useful in supporting an organization's operational activities and decision-making functions. Information systems aim to support company performance, improve the efficiency and effectiveness of business processes, managerial decision-making, and strengthen the company's competitive position.

The benefits provided by information systems make companies aware of the importance of using information technology to develop an integrated enterprise function system that can improve essential business processes in all enterprise functions. The increasing use of information systems in companies is closely related to the use of software, which must be designed as well as possible to be quickly developed and adapted to the company's circumstances and the dynamic business world. Cloud-based ERP systems can significantly benefit managing resources and supporting business functions, especially for small and medium enterprises (SMEs) (Salim & Jaffar, 2020).

Big data technology affects all walks of life, posing new challenges to the accounting industry and accounting information systems. Cloud computing provides convenient and effective network terminal access ports through its strong service model, and can also establish a resource sharing platform to improve the efficiency of enterprise accounting information management (Yang, 2022).

Business function-specific stand-alone enterprise applications (SEAs) are displacing functionally integrated enterprise resource planning (ERP) systems, despite empirical solid support for the business benefits of the latter (Tenhiälä et al., 2018).

The factor that must be considered is maintainability because maintainability is one factor related to software's ability to undergo changes that occur. Software maintenance is an activity that is first carried out when the software begins to be operated until, finally, the software is no longer employed or used. One concrete example of the importance of maintenance is the promotion carried out in http://www.proweb.co.id/articles/support/. After the website creation stage is complete, the next step is whether the company wants to use the website maintenance services created by the web developer or not.

If the company does not use the website maintenance services of the web developer, then they pay for web hosting and mail hosting to the hosting company. Companies that do not entrust the maintenance of their website to their web developer must maintain the website themselves. This means there must be staff

who can do things related to technical web servers, technical mail servers, coding, and web design. And hiring them costs more than maintenance.

In addition, in terms of experience, the staff must be less than web developers focused in that field. The software on the hosting server is always updated as needed and security measures. This can cause a configuration change. With these configuration changes, there is a possibility that a website will not run normally. If a company entrusts its maintenance to the web developer who made it, this will be fine because they must have anticipated it. If the company does not take maintenance services, the website will be abnormal, causing the company's image to drop, which is more detrimental to the company concerned.

In addition to the software on the server, the software on the client has also undergone development, especially the browser. Technologies are advancing and making old technologies obsolete. This situation will cause the website to appear imperfectly. To appear perfect, if you use the maintenance services of the web developer who made your website, the web developer will help you. With the explanation above, companies are encouraged to take website maintenance services web developers provide.

The definition of maintainability, according to the IEEE Standard Glossary of Software Engineering Terminology, is the ability of a software or component to be modified to correct errors, improve performance or other attributes, or adapt to a changing environment (The ease with which a software system or component can be modified to correct faults, improve performance or other features, or adjust to a changed environment). When software is handed over by its developer, it does not mean that the process has been completed and stops there; because all successful software constantly changes over time to meet the needs of its users, software maintainability is very important. In the software maintenance process, the software undergoes several changes to fix bugs, add new functions, connect the software to new platforms, or adapt the software to new technologies.

CONCLUSION

The significance of software maintainability cannot be overstated. It encompasses the crucial ability of an organization to offer maintenance services for its information systems, ensuring the sustainability and longevity of these systems. By prioritizing software maintenance, a company can proactively address potential roadblocks and consistently support the journey toward achieving success and progress. Maintaining software and information systems is not just a routine task; it's a strategic imperative. It plays a pivotal role in sustaining the uninterrupted flow

of information within a business or company, enabling it to function at its best. Software maintenance is the guardian of operational continuity, ensuring the organization's processes can thrive in a dynamic business environment. Moreover, it supports the organization's ability to adapt swiftly to changing circumstances, making it a driving force behind long-term success. Software maintainability is a cornerstone of organizational resilience, underpinning the journey toward sustainable growth and prosperity in a world marked by technological evolution and ever-evolving business demands.

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