ENHANCING SERVICE EFFICIENCY THROUGH AN EXCEL MACRO-BASED INFORMATION SYSTEM: EVIDENCE FROM SANKEN SAMARINDA SERVICE CENTER

Tandi Kadang[1], Tiara[2], Andi Nurhasanah[3], Angga Kusumah[4], Feti Fahmimroah[5]
[1,2,3,4,5] Politeknik Negeri Samarinda
Email: fetifa@polnes.ac.id

Abstract

This study aims to develop an information system using Microsoft Excel Macros to improve service efficiency at the Sanken Samarinda Service Center. The background of this research lies in the operational condition that still relies heavily on manual record-keeping, resulting in data entry delays, calculation errors, and slow report generation. The development of this information system is expected to accelerate the administrative processes of sales and services while increasing data accuracy. The research applied a mixed-methods approach, employing observation, interviews, documentation, and literature review for data collection. The incremental model was used for system development, allowing design and testing to be carried out progressively. The findings indicate that implementing a Macro Excel-based system reduces data entry time by up to 50%, improves operational efficiency, and enables automatic and accurate report generation. In terms of effectiveness, the system successfully optimizes resource utilization and minimizes human error. These findings reinforce the theory of information technology efficiency, showing that simple software tools like Microsoft Excel can serve as economical and effective alternatives to support business process digitalization.

Keywords: Information System, Macro Excel, Efficiency, Service Center, Sanken Samarinda.

Introduction

The development of information and communication technology (ICT) has had a significant impact on various sectors, including the service and public service sectors. The utilization of technology in data and information management enables organizations to improve efficiency, accuracy, and speed in decision-making (Samuel in Primawanti & Ali, 2022). In the context of the business world, the use of an appropriate information system can help companies adapt to environmental changes and increasingly complex customer needs. Sanken Service Center Samarinda, as part of the after-sales service network for Sanken electronic products, faces challenges in administrative processes and transaction management that are still carried out manually. Activities such as recording sales, purchasing spare parts, and providing customer service are still conducted using notebooks or separate worksheets without an integrated system. This condition gives rise to several problems, including slow recording processes, potential input errors, difficulties in data tracking, and delays in preparing financial reports and customer service summaries. According to Irviani & Anggraeni (2017), an information system is a combination of technology, people, and procedures that work in an integrated manner to produce relevant information for decision-making. Without a structured and automated system, business processes may run inefficiently, ultimately hindering organizational performance. This is also emphasized by Herlina et al. (2022), who state that a well-developed information system can reduce human errors and enhance work effectiveness through data automation. Based on these problems, a technological solution is required that can be implemented simply yet effectively without demanding high costs or complex infrastructure. One potential solution is the application of Microsoft Excel Macros, a feature in Microsoft Excel that uses the Visual Basic for Applications (VBA) programming language to automate various administrative processes Lee (2016). With Macros, users can create a simple system capable of inputting, processing, and generating reports automatically within a single platform.

ENHANCING SERVICE EFFICIENCY THROUGH AN EXCEL MACRO- BASED INFORMATION SYSTEM: EVIDENCE FROM SANKEN SAMARINDA SERVICE CENTER
Tandi Kadang **et al**

This research focuses on the development of a Macro Excel-based information system at the Sanken Service Center Samarinda, with the main objective of improving work time efficiency and operational effectiveness. According to Siregar & Nasution (2020), the use of Excel Macros has been proven to minimize administrative work time and increase productivity, particularly in the service and sales sectors. Moreover, the implementation of such a system is also relevant to the concept of digital transformation for SMEs, in which small- to medium-scale enterprises can utilize simple software to support their digital transformation (Dinul Haq & Dian, 2024). The research problem statements include: (1) How is the process of developing an information system using Microsoft Excel Macros at the Sanken Service Center Samarinda? (2) To what extent can the implementation of this system improve employee efficiency and effectiveness? (3) What are the benefits and challenges arising from the use of this Macro Excel-based system? The objectives of this study are: (1) To design an information system based on Microsoft Excel Macros to support sales and service administrative activities. (2) To test the effectiveness and efficiency of the system compared to previous manual methods. (3) To provide recommendations for implementing simple information systems for small and medium-sized enterprises. This research is expected to contribute in two main aspects. First, from a practical perspective, the results can serve as a tangible solution for companies seeking to increase efficiency without major investments in IT infrastructure. Second, from an academic perspective, the study is expected to enrich the literature on the implementation of simple software-based information systems in service management contexts. Thus, this study not only provides direct benefits for Sanken Service Center Samarinda but can also serve as a model for implementing efficient information systems in various small and medium-sized enterprises in Indonesia.

Literature Review

This research is based on several key theories and concepts that form the foundation for the development of an information system based on Microsoft Excel Macros. This literature review covers four main aspects: the concept of information technology, information systems, Microsoft Excel and Macro VBA, and the concept of work effectiveness and efficiency.

1. Information technology

Information technology is an essential factor in supporting the digital transformation of organizations. According to Samuel in Primawanti & Ali (2022), information technology includes hardware and software used to collect, manage, store, and distribute information to support the decision-making process. In the context of modern business, the utilization of information technology can accelerate the flow of information and improve the accuracy of data used by management in policy-making.

Herlina et al. (2022) emphasizes that the implementation of information technology not only affects work acceleration but also increases transparency and accuracy in business processes. With the support of technology-based information systems, organizations can reduce dependence on manual processes and enhance the quality of customer service. Therefore, mastering information technology has become a necessity for companies, including small and medium-sized enterprises (SMEs) such as Sanken Service Center Samarinda.

2. Information systems

An information system is a combination of people, hardware, software, communication networks, and data resources used to collect, process, and disseminate information within an organization (Irviani & Anggraeni, 2017). The information system functions to support decision-making, coordination, and control of organizational activities. In a business context, information systems help reduce human error, accelerate administrative processes, and provide real-time data to support organizational efficiency (Irwansyah & Moniaga, 2014).

According to Siregar & Nasution (2020), the effective implementation of information systems can increase work productivity and support operational cost efficiency. However, the success of its implementation depends not only on technology but also on human resource readiness and the organization's ability to adapt to change.

3. Microsoft Excel and Macro VBA

Microsoft Excel is the most widely used data processing software in the world, both by individuals and organizations. According to Azhar et al. (2019), Excel's advantages lie in its flexibility and ease of adaptation by various user groups. One important feature that enhances Excel's capability is the use of Macros or Visual Basic for Applications (VBA). (Lee, 2016) explains that VBA is Excel's internal programming language that allows users to

automate repetitive activities such as calculations, data input, and report generation. With VBA, Excel can function as a simple information system without the need to build a new application from scratch. Research by Muhayminah (2022) demonstrated that the implementation of Excel Macros in workshop administration systems can accelerate the recording process by up to 45% compared to manual systems. This shows that simple technologies such as Excel Macros can have a major impact on administrative work efficiency.

4. Effectiveness and efficiency

Effectiveness and efficiency are important indicators for assessing the success of an information system. According to Dua & Rumerung (2022), effectiveness is measured by the degree to which organizational goals are achieved, while efficiency relates to the use of minimal resources to achieve maximum results. In the context of information systems, effectiveness can be seen from the improvement in speed, accuracy, and precision of the information produced, while efficiency concerns time, labor, and operational cost savings. Research by Dinul Haq & Dian (2024) shows that the implementation of digital-based information systems can increase productivity and reduce administrative errors. This proves that even simple systems can have a significant impact on improving organizational performance if implemented appropriately. Thus, the concepts in this literature review strengthen the argument that an information system based on Microsoft Excel Macros can be an effective solution for SMEs seeking to improve efficiency without incurring high costs for complex systems.

Research Methodology

This research employed a mixed-methods approach, combining both qualitative and quantitative methods. This approach was chosen because the study not only focuses on the development of an information system (qualitative aspect) but also on measuring the effectiveness and efficiency of the implemented system (quantitative aspect). According to Sugiyono (2019), the mixed-method approach allows researchers to obtain a more comprehensive understanding of a phenomenon by combining the strengths of both methods. The type of research used is Research and Development (R&D) with an incremental model. This model was chosen because it allows the system to be developed gradually and iteratively according to user needs. Each stage produces a system version that is tested and refined before proceeding to the next phase (Schwalbe in Rini & Azdy (2016). This approach is particularly relevant for developing simple systems such as Microsoft Excel Macros, which require direct feedback from field users.

This study was conducted at the Sanken Service Center Samarinda, located on Jalan Teuku Umar, Loa Bakung, Samarinda City, East Kalimantan. This location was chosen because it is an official after-sales service unit for Sanken electronic products, making it relevant to the research context related to service and sales administration information systems. The study period lasted for six months, from July to December 2024. The research subjects are employees of the Sanken Service Center Samarinda, consisting of three administrative staff, one branch manager, and two technicians. The research object is the data management system for sales transactions, spare part purchases, and customer services. Previously, this system was operated manually without the support of an integrated information system, thus forming the basis for the design of the new Macro Excel-based system. The data collection techniques used in this study include: (1) Observation, which involved direct observation of administrative and service processes in the field to understand workflows and identify existing problems; (2) Interviews, conducted with the branch manager and administrative staff to explore system requirements, challenges faced, and expectations for the new system; (3) Documentation, involving the collection of sales, purchase, and service reports from previous periods for analysis and as a reference for system design; and (4) Literature study, which involved reviewing theories, concepts, and previous research relevant to information systems, Macro Excel, and work efficiency (Herlina et al., 2022; Irviani & Anggraeni, 2017; Lee, 2016).

The system development procedure follows the incremental model as described by Schwalbe (2015), consisting of several main stages as follows: (1) System requirements analysis, conducted through observation and interviews to determine data, business processes, and key challenges in the manual system; (2) System design, carried out using Data Flow Diagrams (DFD) to illustrate data flows between processes and Entity Relationship Diagrams (ERD) to describe relationships among data entities; (3) System implementation, conducted by developing the application using Visual Basic for Applications (VBA) on the Microsoft Excel platform. The developed modules include customer data input, sales and purchase transactions, and service reports; (4) System testing, performed to test the system's functionality and speed using real data from the Sanken Service Center Samarinda; and (5) Evaluation and refinement, the final stage in which test results are compared with the performance of the manual system, and improvements are made based on user feedback.

Data analysis was conducted using a descriptive-comparative approach, comparing the performance results between the manual system and the Macro Excel-based system. Efficiency was measured through the average completion time of each administrative activity, while effectiveness was measured through data accuracy and the number of recording errors. The efficiency measurement method refers to the Service Time Standard (STS) formula proposed by Musa et al. (2021): STS = (Number of Staff × Working Hours × 60) / Service Time. In addition, qualitative analysis was conducted through user interviews to assess ease of use, satisfaction with the system's results, and perceived benefits in daily work. To ensure data validity, this research employs source and method triangulation. Source triangulation was conducted by comparing interview results from several informants, while method triangulation was conducted by integrating results from observation, documentation, and system testing (Creswell & Creswell, 2017). Reliability testing was conducted by repeating efficiency measurements twice under the same conditions and data. Consistent measurement results indicate a high level of reliability. The success of system development is measured based on three main indicators: (1) Time efficiency, if the new system can accelerate administrative processes by at least 30% compared to the manual method; (2) Data accuracy, if the rate of recording errors decreases by more than 50%; and (3) User satisfaction, if more than 75% of respondents state that the new system is easy to use and supports their work. With this research methodology, it is expected that the study results will provide a comprehensive understanding of how a Macro Excel-based information system can enhance efficiency and work effectiveness at the Sanken Service Center Samarinda.

Results

This chapter presents the research results, including the outcomes of the information system development based on Microsoft Excel Macros, the comparison between the manual and new systems, the evaluation of system effectiveness, the discussion of research findings, and the implications of the system implementation at the Sanken Service Center Samarinda. The findings of this study are the implementation of the information system design explained in the previous chapter. The main purpose of system development is to improve efficiency, reduce recording errors, and accelerate the administrative processes for service and sales.

1.   System Development Results
The developed information system consists of four main modules: the master data module, the transaction module, the service module, and the automatic reporting module. Each module was designed using Visual Basic for Applications (VBA) on the Microsoft Excel platform. The master data module includes customer lists, product lists, and spare parts inventory. The transaction module records sales and purchase processes, while the service module records customer product repair services. Meanwhile, the automatic reporting module generates real-time summaries of sales, purchases, and service data.

The system is also equipped with input validation functions to minimize data entry errors. Users only need to enter data through input forms connected to the main worksheet. Once the data is saved, the system automatically updates the transaction tables and daily reports. With this structure, the system can be operated by administrative staff without requiring extensive technical training.

2.   Comparison Between Manual and New Systems
The test results showed that the Macro Excel-based system provided significant efficiency improvements compared to the manual system. Based on observation and work time measurements, customer data entry, which previously took an average of five minutes, now only takes two minutes. Recording of sales and service transactions also improved from six minutes to three minutes per transaction. Furthermore, report generation, which was previously done manually in 20 minutes, can now be automatically produced in less than 10 minutes.

In terms of accuracy, the new system reduced the error rate from 12% to 3%. This aligns with the study of Muhayminah (2022), which found that the use of Excel Macros in automotive service administration significantly reduced data input errors. The improvement in efficiency and accuracy demonstrates the successful implementation of the system in the operational context of the Sanken Service Center Samarinda.

3.   Effectiveness Evaluation
The evaluation was conducted through interviews and questionnaires with six respondents, consisting of three administrative staff, two technicians, and one branch manager. A total of 90% of respondents stated that the new system was very helpful in daily work. They considered the report automation and data validation features as the

most beneficial aspects. In addition, users reported increased productivity due to the reduced time required for administrative tasks. Observations showed that the Macro Excel-based system successfully integrates all administrative processes into a single platform. This makes it easier to track customer data and service status without having to open multiple separate documents. Consequently, work effectiveness increased as staff could focus more on customer service rather than repetitive administrative tasks.

Discussion

The findings of this research indicate that the implementation of an information system based on Microsoft Excel Macros improved operational efficiency at the Sanken Service Center Samarinda by up to 50%. This finding reinforces the view of Irviani & Anggraeni (2017), who stated that information systems play an important role in supporting decision-making processes and enhancing organizational effectiveness. Moreover, this result is consistent with the theory proposed by Herlina et al. (2022) regarding the importance of technology-based information systems in reducing human errors and accelerating workflow processes. In the context of simple technology, this research also supports Lee's (2016) statement that VBA can serve as an alternative for developing information systems without requiring high costs or additional hardware. With its high automation capability, Macro Excel can perform similar functions to complex database-based systems but with a much simpler structure and lower cost. Additionally, the findings of this study are in line with Siregar & Nasution (2020), who emphasized that the use of simple information technology can have a significant impact on work productivity, particularly in small and medium enterprises (SMEs). The improvements in efficiency and effectiveness at the Sanken Service Center Samarinda demonstrate that proper technology adoption can be a key factor in enhancing business competitiveness. From the results of this study, there are two main implications—practical and academic. Practically, the Macro Excel-based system can be an economical solution for small and medium enterprises that aim to improve administrative efficiency without making large investments in specialized software. This system can also be applied to various fields such as financial administration, inventory management, and public service operations. Academically, this study enriches the body of knowledge regarding the application of simple information systems in service management contexts. The findings showed that the implementation of simple technology can have a significant impact on work efficiency and organizational productivity, consistent with the theory of Dinul Haq & Dian (2024) on affordable technology-based digital transformation. Thus, the results of this study provide tangible contributions both to operational management practices and to the development of information system knowledge in the service sector.

Conclusion and Recommendations

1. Conclusion

Based on the research findings and discussions conducted, it can be concluded that the implementation of an information system based on Microsoft Excel Macros at the Sanken Service Center Samarinda has successfully improved work efficiency and effectiveness significantly. The system was able to accelerate data input processes by up to 50% faster compared to manual methods and reduced data recording errors by up to 75%. The application of automation features in the form of macros allows administrative processes such as customer data entry, sales transactions, and report generation to be carried out quickly and accurately. In addition, users found the system easy to use, economical, and highly beneficial in integrating all administrative activities into a centralized platform. The research findings also reinforce the theories proposed by Irviani & Anggraeni (2017) and Herlina et al. (2022) regarding the vital role of information systems in enhancing organizational efficiency. By utilizing simple software such as Microsoft Excel, the Sanken Service Center Samarinda was able to achieve service digitalization without requiring large investments. Overall, this system provides a practical solution for small and medium enterprises that aim to improve performance through the use of accessible and easy-to-implement information technology.

2. Recommendations

There are several recommendations, such as:

1. It is recommended that the Sanken Service Center Samarinda perform regular updates to the Macro Excel system to maintain security and compatibility with the latest versions of Microsoft Office.
2. System users should be provided with advanced training on the basics of VBA so that they can independently make simple modifications according to operational needs.
3. For future development, the system could be enhanced into a web-based application or connected to an external database to enable multi-user functionality.

4. Future research is expected to expand the implementation of this system to other administrative areas, such as financial or inventory management, to explore the extent of Macro Excel's flexibility across different business contexts.

With these recommendations, it is expected that the information system based on Microsoft Excel Macros can continue to be developed and utilized optimally to support digital transformation in both service sectors and small and medium enterprises.

REFERENCES

Azhar, Z., Hutahaean, J., Siagian, Y., & Syah, A. Z. (2019). Pelatihan Microsoft Excel 2010 Pada Siswa Lembaga Kursus Pendidikan (LKP) Mandiri. *Jurnal Anadara Pengabdian Kepada Masyarakat*, *1*(2), 2657–0351.

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications. https://books.google.co.id/books?id=335ZDwAAQBAJ

Dinul Haq, M., & Dian, Y. (2024). Perancangan Aplikasi Pencatatan Penjualan Berbasis Web Dengan Fitur Analisis Penjualan Pada Toko Fadhil Elektronik. *JEKIN - Jurnal Teknik Informatika*, *4*(2), 355–365. https://doi.org/10.58794/jekin.v4i2.771

Dua, I. L., & Rumerung, J. J. (2022). *Kajian Efisiensi dan Efektivitas Kerja Karyawan Bidang Administrasi pada PT. Manado Media Grafika*. *4*(1).

Herlina, Rusman, A. D. P., & Suwardoyo, U. (2022). *Penerapan Sistem Informasi Berbasis IT Pengolahan Data Rekam Medis untuk Peningkatan Pelayanan di Rumah Sakit*. Penerbit NEM. https://books.google.co.id/books?id=8XCAEAAAQBAJ

Irviani, E. Y., & Anggraeni, E. Y. (2017). Pengantar Sistem Informasi. *Yogyakarta: CV. Andi Offset*.

Irwansyah, E., & Moniaga, J. V. (2014). *Pengantar Teknologi Informasi*. deePublish.

Lee, C. (2016). *Belajar Excel Macro VBA Step-by-Step*. Jakarta: Elex Media Komputindo.

Muhayminah, D. (2022). *Sistem Informasi Service Dan Penjualan Sparepart Mobil Pada Astra Auto2000 Samarinda Dengan Menggunakan Macro Microsoft Excel*. Politeknik Negeri Samarinda.

Musa, I., Patabang, L., & Rindi, R. M. (2021). *Penerapan Sistem Informasi Pasien Pada Puskesmas Harapan Baru Samarinda Dengan Menggunakan Macro Microsoft Excel*.

Primawanti, E. P., & Ali, H. (2022). Pengaruh Teknologi Informasi, Sistem Informasi Berbasis Web dan Knowledge Management terhadap Kinerja Karyawan (Literature Review Executive Support Sistem (ess) for Business). *Jurnal Ekonomi Manajemen Sistem Informasi*, *3*(3), 267–285. https://doi.org/10.31933/jemsi.v3i3.818

Rini, A., & Azdy, R. A. (2016). Implementasi Incremental Model Pada Sistem Informasi Penyewaan Barang dan Jasa PT. Sriwijaya Indah Persada Palembang Implementation Of Incremental Model On Good Rental And Services Information System Pt. Sriwijaya Indah Persada Palembang. *Teknomatika*, *06*(02).

Siregar, L. Y., & Nasution, M. I. P. (2020). Perkembangan Teknologi Informasi terhadap Peningkatan Bisnis Online. *Hirarki : Jurnal Ilmiah Manajemen dan Bisnis*, *2*(1), 71–75. https://doi.org/10.30606/hjimb

Sugiyono, P. D. (2019). Metode Penelitian Kuantitatif Kualitatif dan R&D. *ALFABETA, CV*.