

E Purchasing Application to Improve Company Performance

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ARTICLE INFO

Keywords: data processing,
purchasing, UML.

Received : 23, April

Revised : 25, Mei

Accepted: 27, June

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ABSTRACT

This research aims to create a web-based purchasing application. With the current purchasing system, there are often errors in data processing and also difficulties in searching for documents because there is no use of databases in the system. Therefore, an application is needed in the management of web-based purchasing data with the warerfall development method. While the analysis and design of the application is done with an object-oriented approach described by UML notation. This system is made using the php programming language and MySql database, the result of this research is the creation of a web-based data processing application that can be used by companies to facilitate the data processing process.

INTRODUCTION

Developments in computer science and technology today have brought changes to human life (Kurt, 2019). Computer technology has become one of the choices to face the current era of globalisation (Mohamed Hashim et al., 2022). Computers that serve as data storage and processing are one of the supports that meet current needs (Sanchis et al., 2019). Computers are also a medium that provides easy access for someone to complete a job in all fields, so computers are a means that is widely used in government agencies, private companies, and also homes (Pradhan et al., 2021). Computers support obtaining accurate, relevant and timely information, so that it can determine the development of the company seen from the quality of the information produced (Dhanaraj et al., 2021). The information obtained is also useful in the development of the company in the future and can also be information for internal and external parties from the company (Nur Alamsyah et al., 2023).

In an increasingly competitive and rapidly changing business environment, operational efficiency and timely procurement are key to an organisation's success (Jamaludin, 2021). In the context of goods and services procurement, traditional processes involving manual communication, physical documentation, and the involvement of multiple parties often slow down the process and increase the risk of errors (Andriana, 2021). To address these challenges, information technology has played an increasingly important role in accelerating and enhancing the procurement process and one innovative solution that has emerged is the web-based e-Purchasing application (Peña-García et al., 2020).

Nowadays, electronic procurement (e-Purchasing) has become the main choice for many companies in optimising the procurement process (Ferdinand & Amrullah, 2021). By using a web-based e-Purchasing application, companies can improve efficiency in managing product catalogues, placing orders online, monitoring delivery status, and processing payments digitally (Singh & Chan, 2022). However, each company has unique and specific needs in the procurement of goods and services. Therefore, it is necessary to design an e-Purchasing application that can be tailored to the specific needs of the company. The development of the right web-based e-Purchasing application can help companies manage and control procurement more efficiently, reduce operational costs, improve procurement accuracy, and speed up the ordering and delivery time cycle. Based on this background, this paper aims to design and build a web-based e-Purchasing application that can be tailored to the company's needs. This paper will explain the detailed steps in designing and developing this application, including user requirements analysis, interface design, appropriate technology selection, and application implementation and testing.

LITERATURE REVIEW

1. System Design

The theory of system design refers to the principles, methods, and approaches used in designing effective and efficient systems. System design involves the process of composing the components of the system, the relationship between these components, and the interaction with the wider environment. The goal is to create a solution that optimally meets the needs and goals of the system. Here are some concepts in system design theory (Jaakkola, 2020):

- 1 Requirement Analysis: The initial stage in system design is to understand the needs of the users or stakeholders. This involves identifying the problems that need to be solved, the functions that the system should perform, and the criteria and constraints that must be satisfied.
- 2 Conceptual Design: At this stage, the basic design concepts and principles of the system are designed. This includes the identification of the main components of the system, the relationships between these components, and the general pattern and architecture of the system.
- 3 Detail Design: After conceptual design, detail design involves determining more detailed technical specifications for the system components. This involves technology selection, user interface design, and determination of the algorithms and data structures used.
- 4 Prototyping and Testing: Before the actual implementation of the system, prototyping of the system is often done. These prototypes are used to test the functionality and performance of the system, as well as to get feedback from users and other stakeholders. System testing involves identifying and correcting errors or flaws in the design and implementation.
- 5 Implementation: The implementation stage involves building the actual system based on the approved design. This includes software coding, procurement of necessary hardware, network configuration, and integration of system components.
- 6 Evaluation and Maintenance: After implementation, the system is evaluated to ensure that the initial goals and needs are met. Regular changes and maintenance are also performed to ensure continuous system performance, including bug fixes, functionality enhancements, and adjustments to changing user needs.
- 7 System Life Cycle: System design does not end after implementation. Systems have a life cycle that includes development, operation, maintenance, and retirement. During the system life cycle, the design can be improved and updated based on feedback and changing needs.

System design theory involves a combination of scientific principles, design methodologies, and technical expertise in developing systematic solutions to complex problems. A good system design approach pays attention to the technical, functional, and nonfunctional aspects of the system, and takes into account user needs and relevant business aspects (Rahman et al., 2020).

2. Rekayasa Perangkat Lunak

Theoretical foundations in software engineering include principles, methodologies, and approaches used in software development in a systematic and disciplined manner. Here are some of the main theoretical foundations in software engineering (Alamsyah et al., 2022):

1. **Software Engineering Principles:** These principles help in designing, developing, and maintaining high-quality software. Some of the key principles include:
 - **Needs-Based Development:** Software should be developed based on user and stakeholder needs. A good needs analysis and a clear understanding of the problem to be solved are key in successful software development.
 - **Separation of Concerns:** This principle proposes the separation of concerns on different aspects of the software, such as the interface, business logic, and data storage. This allows for easier software maintenance and development, and improves the readability and simplicity of the code.
 - **Modularity:** The principle of modularity emphasises the separation of software components into independent modules. These modules can be developed, tested, and modified separately, which eases software repair, expansion, and management.
 - **Software Quality:** This principle encourages a focus on aspects of software quality, such as reliability, readability, security, and performance. Efforts should be made to ensure that the software meets established quality standards.
2. **Software Development Methodology:** A software development methodology is a framework that helps in planning, organising, and managing the software development process. Some commonly used methodologies (Soobia.et.al., 2019):
 - **Waterfall Model:** This model involves a linear sequence of development stages, namely requirement analysis, design, implementation, testing, and maintenance.
 - **Iteration-based Software Development Methods:** Methods such as the Spiral Model, Object-Oriented Development Method, and Extreme Programming (XP) involve an iterative approach to software development, with repeated iterations that include analysis, design, coding, and testing.

- Agile Method: Agile is a collaborative and adaptive approach to software development. Some popular Agile methods include Scrum, Kanban, and Lean Software Development.
3. Software Project Management: Software project management involves organising, controlling, and supervising software development projects. The principles of software project management, such as risk identification, resource planning, time management, and effective communication, are critical to achieving project success (Bukanová & Šimíčková, 2019).
 4. Software Testing Practices: Software testing is an important process in software engineering. Testing practices include test strategy development, test planning, test scenario creation, unit testing, integration testing, system testing, and acceptance testing. The goal is to ensure that the software functions correctly, addresses errors, and meets user needs (Scatalon et al., 2019).

By understanding and applying these cornerstones of software engineering theory, software developers can produce solutions that are better, more reliable, and more efficient in meeting user needs.

4. Website

The theoretical foundations of websites include principles and guidelines used in designing, developing, and maintaining effective websites. Here are some of the main theoretical foundations in website development (Saura, 2021):

- 1 User Experience (UX): User experience is the main focus in creating a good website. UX principles include a deep understanding of the target user, clear organisation of information, intuitive, responsive and user-friendly interface design, and providing a satisfying experience for the user.
- 2 Responsive Design: In the era of increasingly dominant mobile devices, responsive design is important. Responsive design principles ensure that websites can adapt well to different devices and screen sizes, such as desktops, tablets, and smartphones.
- 3 Information Architecture: Information architecture deals with the organisation and structure of content on a website. This principle includes creating a clear hierarchy, easy-to-understand navigation, and logical placement of content to ensure users can easily find the information they are looking for.
- 4 Visual Design: Visual design relates to the use of visually appealing design elements, such as attractive layouts, appropriate use of colours, easy-to-read typography, and graphics that support the message the website is trying to convey.

- 5 Performance and Speed: The speed and performance of a website is critical to providing a good user experience. This principle includes image optimisation, use of caching, data compression, and selection of efficient technologies to ensure the website can load quickly and provide responsive responses.
- 6 SEO (Search Engine Optimisation): SEO is a set of techniques and strategies used to improve a website's visibility and ranking on search engines. SEO principles include the use of relevant keywords, URL structure optimisation, proper meta tags, and quality link building.
- 7 Web Accessibility: Web accessibility means ensuring that a website can be easily accessed by everyone, including those with physical or sensory limitations. This principle includes the use of semantic markup, adequate colour contrast settings, support for screen readers, and good keyboard navigation.
- 8 Analysis and Measurement: Website analysis and measurement is an important cornerstone in understanding website performance and effectiveness. This principle involves using web analytics tools, such as Google Analytics, to monitor visitors, user behaviour, and the success of website goals.

By understanding and applying these theoretical foundations, website builders can produce a better user experience, improve visibility and ranking in search engines, and ensure that websites perform optimally and are accessible to all users.

METHODOLOGY

Research methodology is needed to find correct and valid data, in which there are basic concepts and references for conducting research in the field to find truth logically or rationally about certain objects (Guezzaz et al., 2021). This research uses quantitative research methods. Quantitative research is a systematic, planned, and structured scientific research on parts and phenomena and their relationships clearly from the beginning to the final result of the research based on data collection information in the form of numerical symbols or numbers (Arsandaux et al., 2020). At the conclusion stage, the research results will generally be accompanied by figures, tables, graphs, or other displays. This quantitative method aims to find deeper information in detail in the analysis of its needs, in analysing the needs that exist in the system the author uses object-oriented analysis and design methods that are modelled with UML (Unified Modelling Language) diagrams in order to analyse the needs that exist in the system. The following is the methodology we used to make this research:

1. Determining the Topic

The topic aims to be the head of a work that represents the work as a whole.

2. Problem Statement

The formulation of the problem aims to find out or identify the problems being experienced by the research object (company).

3. Data Collection

In order for the data obtained to be in accordance with the existing problems, the authors use data collection, namely research conducted by observing directly to the place that is used as the object of research (company). The data collection methods used by the author are as follows:

a. Interview Method

Interviews were conducted with the Director about the history, vision and mission, and organisational structure of the company. Administration and Finance conducted interviews related to purchasing activities.

b. Literature Study Method

Literature study is a series of activities in which literature reviews are carried out from several journals, E-Books, library data, and processing research materials and so that they can support the making of the research.

4. System Analysis

Conducted based on data that has been obtained from research that has been done. Namely by analysing system weaknesses and analysing user information needs.

a. Analysis of the running system

Done by studying in detail how the existing system operates. System analysis needs to study how the operation of the existing system operates before trying to analyse the problems, needs and weaknesses of system users to be able to provide recommendations for solutions.

b. Problem Analysis

After analysing the running system, a search will be made for problems that occur in the running system. For later it will be used as a reference at the system design stage.

5. System Design

System design aims to design data structure design, software architecture. Interface representation, and coding procedures.

- a. *Unified Modeling language* (UML). In the design of the system that will be used are 13 unified modelling language diagrams. Among them are: Class diagram, Object diagram, Component diagram, Composite Structure diagram, Package diagram, Deployment diagram, Use case diagram, Activity diagram, State machine diagram, Sequence diagram, Collaboration diagram, Timing diagram, Interaction overview diagram.
- b. Table Structure. Make a table design that will be used by applications that can make it easier to manage data that can be changed, added, and deleted according to the user's wishes.
- c. Interface Design. Interface design is a design for user display to make it easier to communicate with the system.

6. Coding.

Dari hasil perancangan sistem yang telah dilakukan menggunakan *unified modeling language*, struktur table, dan perancangan antar muka, untuk membangun perangkat lunak *purchasing* berbasis *website*.

RESEARCH RESULT

1. Login Page

The login page is a website page that will first be displayed when the user accesses the web application. This aims to keep this application can only be used by users involved in the purchasing system. The following display of the login page can be seen in Figure 1.

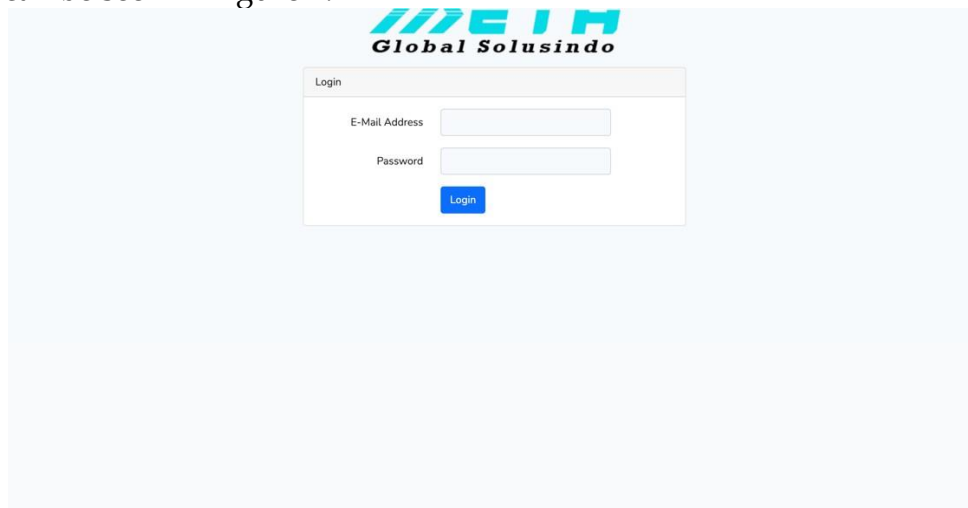


Figure 1. Login Page

Based on Figure 1, users must first have an account before they can log in. After the user gets an account, the user can enter the application by filling in the email and password then pressing the "Login" button. If the user successfully logs in, the system displays the main page of the application according to the division owned by the user.

2. Client Page

Figure 2 below is a client management page where on this page administrative staff can add client data, edit client data, and also search for clients.

The screenshot shows the 'Client' management interface. At the top, there are navigation tabs: Client, Quotation, PO Client, Invoice, and Delivery Order. The user is logged in as 'admin'. The main form contains the following fields:

- Sales Name: Restu Hanggara Putra
- Company: PT.Synkrona Enjiniring Nusantara
- NPWP: 983455348599901
- Email: restuhanggaraputra@gmail.com
- Address: Jalan Mampang Prapatan Raya No. 17 Blok G-H, Jakarta Selatan 12790
- Telephone: 087773388993
- Term Of Payment: 30 days

Buttons for 'Update' and 'Close' are visible. Below the form is a 'Client' table with a 'Create' button and a search bar. The table has 5 rows (indicated by a dropdown) and columns for #, Sales, Company, Email, No Telephone, and Term Of Payment.

#	Sales	Company	Email	No Telephone	Term Of Payment
1	Restu Hanggara Putra	PT.Synkrona Enjiniring Nusantara	restuhanggaraputra@gmail.com	087773388993	30 days
2	Daud	PT BONKA TEKNIK UNGGUL	daud2123@gmail.com	0213484353	14 days
3	Bapak Ahmad Novel	PT Yanmar Indonesia	ahmadnovel@gmail.com	0218970701	30 days

Figure 2. Client Page

3. Quotation Page

In Figure 3 below is a quotation management page where on this page administrative staff can add quotation data which will be directed to the quotation form page, edit quotation data which will be directed to the quotation edit form page, view quotation details, and also search for quotations.

The screenshot shows the 'Quotation' management interface. At the top, there are navigation tabs: Client, Quotation, PO Client, Invoice, and Delivery Order. The user is logged in as 'admin'. The main form contains the following fields:

- No: 10 (dropdown)
- Search: [Search bar]

Below the form is a 'Quotation' table with 10 rows (indicated by a dropdown) and columns for No, Date, No Quotation, Client, and Status. The table contains four entries:

No	Date	No Quotation	Client	Status
1	Sunday, 19 Jun 2022	QUO-MGS/2206/003	PT BONKA TEKNIK UNGGUL(Daud)	Active
2	Friday, 10 Jun 2022	QUO-MGS/2206/002.1	PT, Meta Global(ismi)	Active Approve Paid off
3	Friday, 10 Jun 2022	QUO-MGS/2206/002	PT, Meta Global(ismi)	Revisi
4	Thursday, 02 Jun 2022	QUO-MGS/2206/001	PT Yanmar Indonesia (Bapak Ahmad Novel)	Active Approve

Figure 3 . Quotation Page

4. Purchase Order Client Page

Figure 4 below is the client purchase order management page where on this page administrative staff can add client purchase order data, view client purchase order details, and also search for client purchase orders.

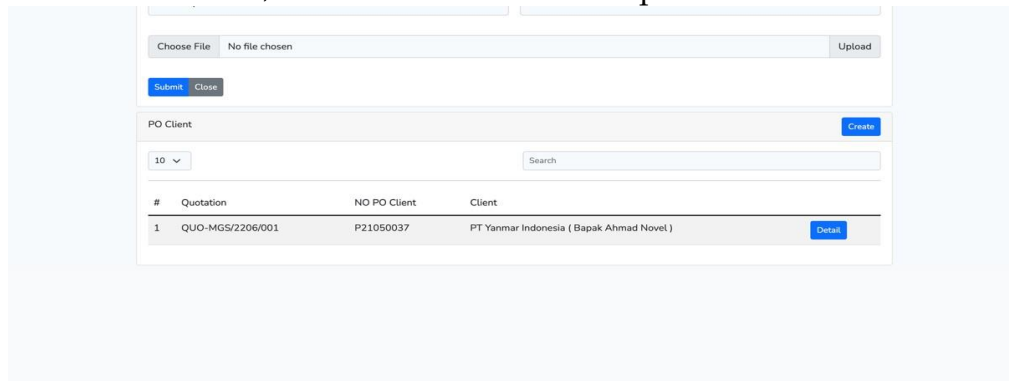


Figure 4. Purchase Order Client Page

5. Report Page

Figure 5 below is the Report management page where the finance director can release data in excel form and also search for reports.

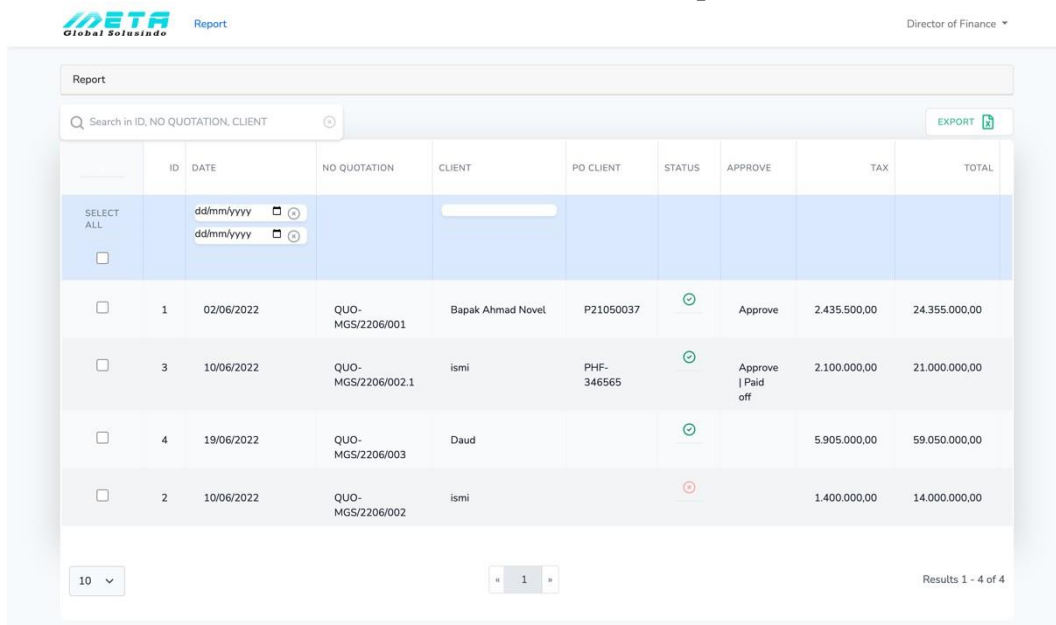


Figure 5. Laporan Page

DISCUSSION

E-purchasing applications, also known as electronic purchasing or e-procurement, refer to the process of purchasing goods and services online using a digital platform. E-purchasing applications provide a convenient and efficient way for businesses and individuals to purchase products and manage their procurement processes. Some important points to consider such as. Convenience, e-purchasing applications offer convenience by allowing users to browse and purchase products anytime and from anywhere with an internet connection. Users can access various suppliers and products, compare prices, and place orders without the need to visit physical stores or suppliers. Cost savings, e-purchasing applications can help businesses save costs by simplifying the procurement process. They allow organisations to automate tasks such as requisitions, approval flow, and supplier management, reducing manual work and administration. In addition, the ability to compare prices and access multiple suppliers can result in cost savings through better negotiations and competitive pricing. Supplier management, e-purchasing applications generally provide features to effectively manage relationships with suppliers. They enable businesses to maintain a database of approved suppliers, track supplier performance, and evaluate their reliability and quality. This helps build long-term partnerships with reliable suppliers and optimise the procurement process. Integration and compatibility, e-purchasing applications can be integrated with other business systems such as enterprise resource planning (ERP) systems, inventory management software, and accounting systems. This integration enables smooth data exchange, improves accuracy, and avoids duplication of information inputting in various systems.

Security, e-purchasing apps prioritise security measures to protect sensitive information such as payment details, personal data, and transaction history. They use encryption, secure payment gateways, and comply with data protection regulations to ensure the security of user information. (6). Analytics and reporting, many e-purchasing applications offer reporting and analytics capabilities, providing insights into spending patterns, supplier performance, and procurement efficiency. These features help businesses make data-driven decisions, identify cost-saving opportunities, and optimise their procurement strategies and (7). Mobile accessibility, with the growing use of smart phones, e-purchasing applications often have mobile-friendly versions or dedicated mobile apps. This allows users to access the platform and make purchases wherever they are, increasing convenience and flexibility. However, it is important to consider the potential challenges and limitations of e-purchasing apps as well. These can include concerns about data privacy, cybersecurity risks, the need for reliable internet connectivity, supplier verification, and the learning curve for adopting new technologies. Overall, e-purchasing applications can significantly improve the efficiency, transparency, and cost-effectiveness of the procurement process for businesses and individuals.

CONCLUSIONS AND RECOMMENDATIONS

Based on the discussion in the previous chapters, several conclusions can be drawn, namely:

- a. With the design and development of a new application, it will be able to create quotation documents, delivery orders, and invoices, and purchase orders can be printed immediately and purchasing transactions are immediately recorded in the system. Efficiency also occurs in the use of reports, users can view the information needed easily, select the desired report with the desired date or period.
- b. With this purchasing application, the process of recording reports in organisations or companies becomes organised, namely by recording using a computer which starts from recording for data input in the form of product data, client data, and vendor data. Then recording transactions is carried out and later the records are stored and can be seen in the form of purchasing reports.

Due to the limited time, knowledge and knowledge when making this research, so that the e purchasing application made still requires further development, namely by adding several new menus, such as, connecting with inventory, cash receipts, cash disbursements, sales returns, purchase returns and adding several reports, such as income statements and cash flow reports. As well as in the database structure section, it is recommended that a user history column be added to each table related to data changes.

ADVANCED RESEARCH

Advanced research on this e-purchasing application in the future can be added to Natural Language Processing (NLP) technology and Intelligent Chatbots. Advanced research can be done in the development of natural language processing (NLP) capabilities and intelligent chatbots in e-purchasing applications. This involves using more advanced NLP techniques to understand user requests, provide more accurate product recommendations, and perform more natural interactions. Intelligent chatbots can also be developed to recognise context, provide problem solutions, and handle users' complex questions. Then in the future, Supplier Verification Process Automation can be created. This research can be developed with automated algorithms to verify and assess suppliers. These algorithms can utilise data from various sources, including public databases, user reviews, and supplier performance track records.

This can help ensure the quality and reliability of suppliers accessed through e-purchasing applications. Then the use of the Internet of Things (IoT) in Inventory Management. Advanced research could involve further integration between e-purchasing applications and Internet of Things (IoT) technology. This involves the use of IoT sensors to monitor inventory in real-time, detect replenishment needs, and provide accurate information on product availability to users. Thus, inventory management can be optimised to ensure availability of the right product at the right time. Then the future can apply Artificial

Intelligence in Negotiation. Research can be done to develop artificial intelligence algorithms that are able to negotiate with suppliers automatically. These algorithms can take into account user preferences and constraints, consider factors such as price, quality, and delivery schedules, and maximise benefits for users in the negotiation process. Continued research on e-purchasing applications aims to continue pushing the boundaries of technology and improve the efficiency, effectiveness and user experience of the procurement process. By adopting more advanced technologies, businesses can stay competitive, make data-driven decisions, and drive innovation in their procurement practices.

ACKNOWLEDGMENT

The authors would like to express their sincere appreciation to all those who have contributed to the successful completion of this journal article. First and foremost, we would like to thank our research supervisors, for their invaluable guidance, expertise and support throughout the research process. Their insightful input and encouragement have significantly shaped the direction and quality of this research. We are also grateful to the faculty of FTI Universitas Informatika Dan Bisnis Indonesia for supporting this research.

We also thank our colleagues and research team members for their collaboration, fruitful discussions, and support throughout the research process. Their diverse perspectives and contributions have enriched this research and strengthened the validity of our results. Finally, we would like to express our deepest appreciation to our family and friends for their unwavering support, understanding and encouragement. Their belief in our abilities and continuous motivation were crucial in the completion of this research.

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