Aksyaa: Web-based Accounting Information System with Sharia Financial Perspective

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Abstract. For small and medium enterprises (SMEs), tools for recording and managing company finances are critically needed. Many of these SMEs have not been successful in improving their business performance, partly because of their inability to manage their business resources. So if there is a freeware licensed financial management tool, this will be helpful. Aksyaa is an acronym for a web-based Accounting Information System developed by our research group. It can be said that Aksyaa is a start-up product. The system has been installed on a cloud server on the domain url: www.aksyaa.com. Aksyaa was developed using the Flask python web framework and the MariaDB database. UML diagram is also used as a design model. Aksyaa was developed based on an accounting reference book that follows international financial reporting standards. The development of Aksyaa has included the recording of general journals, sales reports, purchase reports and general ledgers. Its output includes sales reports, purchase reports, cash flows, balance sheets and income statements. Currently Aksyaa is in the beta testing phase. In further development, it will adapt the sharia perspective so that it is planned to become an accounting information system that applies sharia principles.

Keywords: Sharia Accounting Information System · Flask web-based financial reporting standard

1 Introduction

1.1 Literature Review

AIS is a system that can collect, record, store, and process data to maintain its accounting system by utilizing technology. These processes include buying, selling, and other business financial processes. The essential mission of AIS is to allocate a quantitative value of the past, current and future business events [1]. In addition, AIS is also functioned as a data collector and information provider for decision makers such as investors, creditors, and managers of a company to make decisions [2].

Manual and computerized systems are approaches used to produce accounting information. Approaches or tools used to produce accounting information include manual systems and computerized systems. To ensure its consistency, the system was developed

using documented, repeatable, understandable and feasible processes and procedures [2] using the Unified Modeling Language (UML) diagram.

Several types of use of accounting information [3] include: First, preparation of external reports to produce specific financial reports that can meet the information needs of stakeholders including investors, creditors, offices, taxes, government agencies and others. Second, support for handling routine operational activities throughout the company's operating cycle. Third, supporting non-routine decision-making processes at all levels of the organization. For example, to determine the performance of products sold, existing distributors and loyal customers. Fourth, budget planning and control. Fifth, internal control facilities include policies, procedures and information systems used to protect company assets from loss or misuse and maintain the accuracy of financial data. In its development, information systems develop and run well using a web-base so that it can be reached via an online computer network. Web applications have become complex and important for many companies, especially when combined with areas such as AIS [4]. All AIS transaction data will be stored in the database management system and will be used if there is a query data request [5].

AIS, like any other system, consists of a set of elements to achieve its goals [1]. Elsharif [1] stated that in general AIS is formed from six main elements: people (PE), procedure and instruction (PI), software (SW), data (DA), Information Technology Infrastructure (IT) and internal control (IC) [1]. This study assumes that the coefficient of the model study between the independent variables (PE, DA, IC) and the dependent variable Relevance (R) meets the limit value. It was found that the representation of the regression model regarding the relationship between the impact of AIS on the relevance of financial information was acceptable. It is written in Eq. (1),

$$R = 0.418 + 0.266(PE) + 0.272(DA) + 0.426(IC) + \text{Err} \tag{1}$$

1.2 IFRS Standard Requirements

Based on the IFRS (International Financial Reporting Standard) document, a proper accounting system must at least include the following aspects [6]:

- Financial position statement: This is a balance sheet. IFRS affects the way in which components of the balance sheet are reported.
- Comprehensive profit and loss statement: This can be in the form of a single statement or separated into a profit and loss statement and other income statements, including fixed assets.
- Cash flows statement: this report summarizes the company's financial transactions for a certain period, separating cash flows into operating, investing and financing.
- Change in equity statement. It is also known as a statement of retained earnings, it documents the changes in a company's earnings or earnings for a specific financial period.

1.3 Modeling with UML Diagram

Unified Modeling Language (UML) is a visual language that helps in the analysis and design of software systems using an object-oriented approach. An interesting relationship

between the UML Model and the framework is that the choice of available UML models is used to assist the interpretation of the problem domain with computations thereby enabling users to develop visual model concepts to facilitate software development. Conveniently, modeling with UML is used to demonstrate the relationship between models and how they can be used for software design [7].

1.4 Sharia Financial Perspective

Sharia is a term in Islam that regulates the life of a Muslim including for the purposes of muamalah which is the actualization of the aqidah which is his belief [8]. Sharia also prohibits money inflation (there is an accumulative interest due to the loan) where the loan amount increases if the borrower delays the payment process. The additional amount for the loan must be fixed throughout the period. There have been several attempts to generalize Islamic finance practices compared to traditional finance practices. In general, there are four principles in the practice of Islamic finance: among others, prohibition of bank interest or usury, ethical standards, moral and social values, and responsibility and business risk. Most Islamic financial practice systems or entities incorporate policy guidelines on how to handle financial transactions and ensure that everything is done according to the rules [9]. Muamalah can be interpreted as an interaction that surely occur between humans. One interaction that may definitely occur is the need for someone to sell or buy an item or service. When a muamalah interaction occurs, selling or buying goods and services, there are several different contracts that allow SMEs to carry out. Among the known contracts include; Murabaha or cost plus, mosharaka or joint venture, modharaba or profit sharing, wadeea'a or save keeping, Ijar or leasing that ends with ownership, Gardh Hassan or free loan, Sokook or Islamic bonds, Bai-Assalam, Ijar or Rent, and several others. The types of sharia transactions above will become a separate standard called the Islamic Financial Policy System (IFPS). The detailed model of sharia transactions can also be seen in [9].

1.5 XACML with Context Diagram

Web services exchange data in XML message format over the network, using the HTTP protocol. Security mechanisms in web service settings protect when generating XACML requests related to the confidentiality and integrity of information. The information in question is the data that is exchanged between the client and the server. Security standards on web services were created because of the need to provide security on these web services, one of which is the access control policy. The policy regulates various things, such as the level of data confidentiality, data and resource settings, classifying data and resources into several categories with different access controls. In web service settings, access control policies are implemented by configuring each node, making policy changes very expensive and unreliable. Access control policies are often created using different languages and proprietary languages, making them difficult for other applications to use (shared). One solution to this problem is eXtensible Access Control Markup Language (XACML) [10].

   XACML is an XML-based standard request or response language developed to describe an application's access control decision policy language and ownership. The

policy language is used to describe general access control requirements, and has standard extension points for defining new functions, data types, combining logic, etc. The query or response language allows the researcher to construct a query to ask whether a given action should be taken or not. Allowed, and interpret the results. The response always includes an answer as to whether the request should be allowed to use one of four values including Permit, Deny, Indeterminate (an error occurred or some required values are missing, so a decision cannot be made) or Not-Applicable (the request cannot be unanswered by the service). This) [11]. XACML includes components for defining security policies for accessing computer resources (e.g. databases, applications, and web services). It also includes rules for defining users and their permissions or privileges [8].

2 Design and Methods

2.1 Design UML Diagram of AIS of aksyaa.com

Figure 1 shows the design use case diagram depicting user interaction with the internal system of the aksyaa.com system before implementing sharia priciples.

The user appears as an 'Accounting Employee' connected to several use cases or functionalities such as performing 'User Authentication' as the initial stage in accessing the aksyaa.com system. Then there are other functionalities such as 'identifying kind of transaction document', which means that the 'Accounting Employee' user ensures the type of transaction record before filling and storing transaction data into the AIS system. The design of this use case diagram is made to make it easier for common-stakeholders to understand the workflow of an AIS system that will be developed.
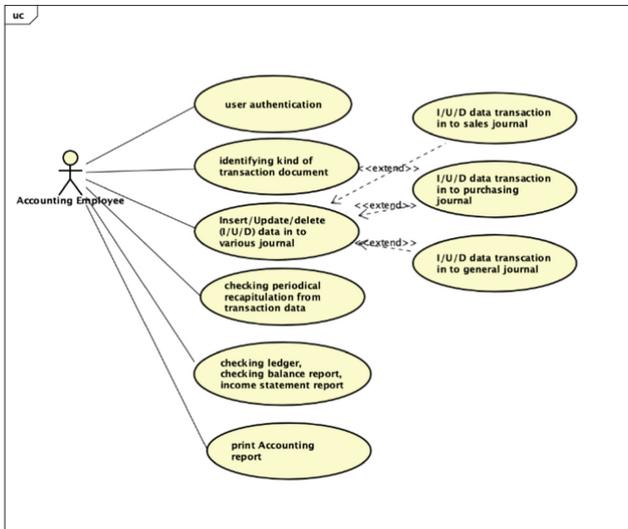
Fig. 1. Use case diagram of *aksyaa.com*—Accounting Information System (AIS).
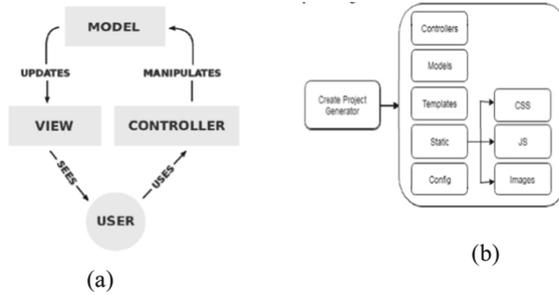
Fig. 2. (a) MVC Method (b) MVC rules with project generator.

2.2 Implementation of Website Development with Flask

The model-view-controller (MVC) concept will be used in the flask python micro-framework. This concept or method appears in Fig. 2a is divided into three interconnected parts, namely the model section, the view section, and the controller section [12].

Furthermore, the system design to implement the MVC method on the flask framework is described in this section. The design of this system will create a folder that has an MVC structure and contains a number of important files. on Fig. 2b shows the system process diagram. To implement the MVC method on the Flask framework, it will be divided into several stages as follows:

Create Project Generator. To create a new website, using Flask MVC, we simply create it from the project generator. the project generator will create folders and files in a structured and automatic manner, so users don't have to create folders and files manually.

Produce the MVC structure. The MVC structure is created based on the following steps: First, the user sends a data request to the controller, then the controller receives a data request from the user. If the data request from the user requires data access from the database, the controller will send it to the model, then the model will retrieve the required data from the database and will send it to the controller after the controller receives the data from the model, the data will be sent for viewing.

Generate File CSS, Javascript, Python, and HTML. Project generator tools also create css, javascript, python, and html files that are already in the folder.

3 Result and Discussion

3.1 Entity Relational Diagram as Database Table and Class Diagram

Following the initial design process, an entity relationship diagram (ERD) is generated from class diagram because they are identical. This ERD describes the relational structure of a database management system (DBMS) from AIS. The DBMS in this study uses MariaDB.

In general, the structure of a DBMS is composed of a number of tables. In this ERD diagram there are 25 tables, some of which are interrelated. The table serves as a space for storing data related to the implementation of the IFRS standard on AIS. As in Fig. 3

Fig. 3. Generate ER-Diagram of AIS *aksyaa.com.*

there are several tables, namely, the 'general ledger' table, the 'general journal' table, the 'sales journal' table and the 'purchasing journal' table.

3.2 Re-engineering AIS aksyaa.com to AIS Implement Sharia Perspective

The aksyaa.com system that has been developed in the beginning has just implemented the IFRS principle. Furthermore, aksyaa.com will be developed by adding the concept of authorization of XACML access control system as shown in Fig. 4 as the implementation of IFPS standards. If the IFPS standard is applied to the Islamic financial process, it will relate to the authority holding responsibility for the financial institution or company, the customer as a partner and the type of cooperation agreement that will be carried out by both parties.

The aksyaa.com AIS system will then implement the XACML authorization design so that it becomes an AIS that implements the Islamic finance perspective in accordance

Fig. 4. XACML policy authorization elements (conceptual diagram) [8].

with the XACML design in Fig. 4. Still in Fig. 4 shows the XACML authorization elements including: Policy components, policy sets, policies, policy administration points, rules, targets, actions, resources, subjects, and environments.

3.3 XACML Access Control Policy

Access control policy with a review of IFPS implementation in small and medium enterprise (SME) activities is described in Fig. 4. Several types of transaction contracts that may occur and their relation to SME business activities include;

1. *Murabaha* or cost plus: Allows buying and selling transactions with this contract between SME companies and suppliers, and between SME companies and consumers in a non-cash manner (including an agreement on the payment due date) and an agreed payment value (including the nominal profit to be paid) obtained by SME companies or suppliers)
2. mosharaka or joint venture: If the company gets capital from an external party, it goes in the company's treasury and is recorded as a transaction, it can use this agreement.
3. modharaba or profit sharing: This contract is similar to mosharaka, which is related to capital. The difference is that 100% of the capital in this contract comes entirely from investors, and the percentage of profit sharing is in accordance with the agreement.
4. wadeea'a or save keeping: In this contract, it is possible the company save keeping funds into other financial company.
5. Al-ijaratul mumtahiya bil tamlik or leasing that ends with ownership: In this contract, it is possible that transactions that occur between service companies after the lease agreement with the customer is completed, can be continued with the sale and purchase agreement of the previously rented goods.

Fig. 5. Web interface of *purchasing* form *aksyaa.com.*

6. Sokook or Islamic bonds: In this contract, it is possible for the company to record its financial transaction records for purchasing investment activities in the form of securities.
7. Bai-Assalam: In this contract, the company can receive transaction funds in advance from the purchase of goods in cash, and the goods will be sent later to consumers according to what was ordered.
8. Ijar or Rent: This contract can be used in the type of business engaged in services/leasing.

3.4 Web Interface of aksyaa.com

In general, the AIS system interface page can be accessed at http://www.aksyaa.com. The page is divided into two parts. The left side is the menu selection and the right side is the menu content section. Menu options include: 'dashboard' page, 'Account list', 'product data', 'customer data', 'supplier data', 'unit product', 'purchasing journal', 'purchasing returns', 'sales journal', 'sales returns', 'general journal', 'ledger', 'income statement' and 'balance report'.

Figure 5 is a web interface that display a form for filling in data from product purchase transactions. Filling in the data can be done at the time after the purchase of the product by the company using the aksyaa.com system at the product supplier accompanied by proof of the transaction.

on Fig. 6 is a web interface for the company's product sales formula filling page. Figure 6 also shows the sales data entry page on the sales journal form. Transaction data inputted includes sales transactions that are cash and non-cash (payments in installments or debt).

Filling out the form includes selecting the product item for sale (adjusting the product item sold by the SME company), filling in the sales transaction code, general additional information, transaction date, due date (if purchased by way of debt), the number of product items purchased and others.
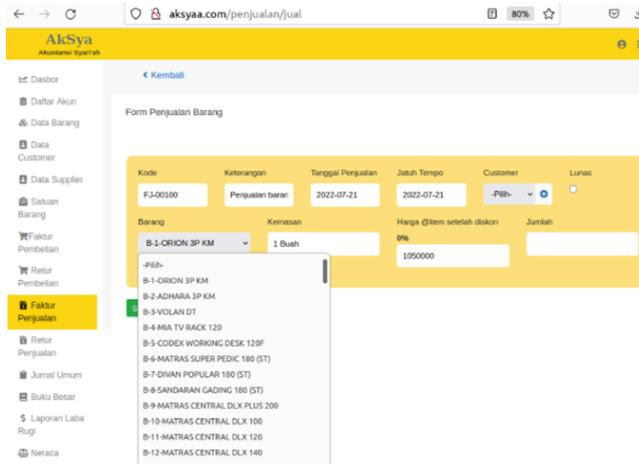
Fig. 6. Web interface of sales form *aksyaa.com.*
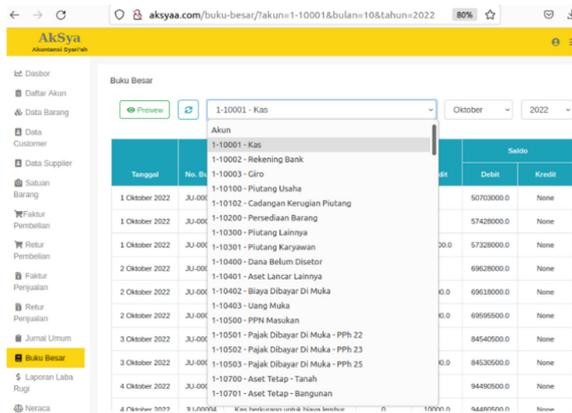
Fig. 7. Web interface of general ledger form aksyaa.com.

Figure 7 shows the 'ledger' page where details of transactions that have occurred are posted to be grouped based on the list of Accounts.

Figure 8 shows the page for filling out transaction data as a whole and stored in the 'general journal'. This journal serves to record or store all transaction items that occur.

Figure 9 shows the recapitulation page of all types of accounts in the form of an 'income statement' report from the company related to all its business transaction activities. Usually companies review this page on a certain period, such as 3 months, 6 months or every year.

Figure 10 shows the 'balance report' page of all transaction accounts. From this data, the company can perform analysis and projections regarding the sustainability of its business.
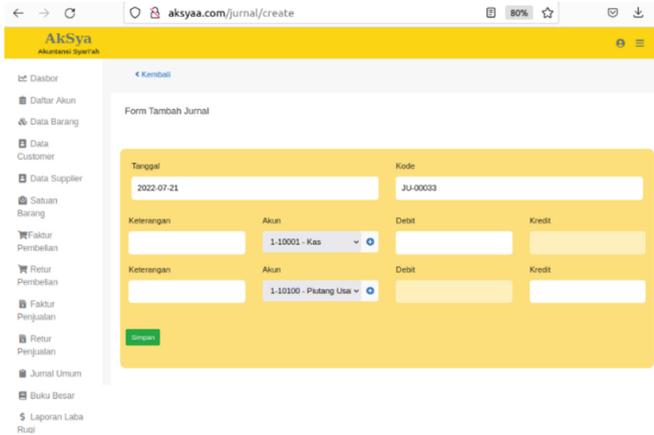
Fig. 8. Web interface of general transaction (journal) form *aksyaa.com*.
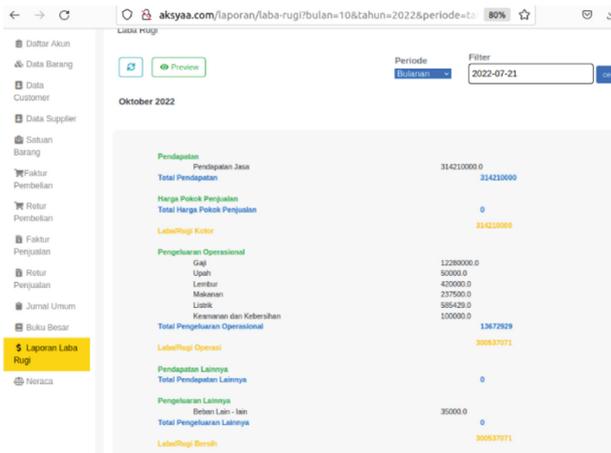
Fig. 9. Web interface of income statement form *aksyaa.com*.

4   Conclusion

Aksyaa.com is a web-based AIS application for recording, grouping, processing, and presenting transaction data regarding finance. The data then becomes information that can be used as material for making a decision.

Aksyaa has an admin page to manage every important data, both master data and data in the form of transactions. It also provides an application programming interface (API) web service, which is access that can be used by external developers who require data access so that they can connect with aksyaa.com. The available API serves as an intermediary between akysaa.com as the main data provider software system with external developers, where developers develop aksyaa.com applications with different platforms such as web-based or mobile-based.

Fig. 10. Web interface of balance report form *aksyaa.com.*

The aksyaa.com system provides a private-API type, where access is not given openly so that external developers who want to have access to the API must get authorized from the aksyaa.com system. This is related to the authentication and authorization system of aksyaa.com, where to perform proper and correct authentication and authorization, external parties are required to send a valid Json Web Tokens (JWT) type token. Valid tokens can only be obtained from the service provider aksyaa.com. The token given is in the form of a static token which is only created once and can be used repeatedly without any new token creation process so that the token is highly confidential.

Furthermore, the aksyaa.com system will implement the sharia perspective into the system that is currently running referring to the XACML-based API design, so that as a whole, in recording transactions, the financial transaction recording service on the aksyaa.com system will be sharia-based.

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