Accounting and Smart System: Functional Evaluation of ISO/IEC 25010:2011 Quality Model (a Case Study)

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Abstract. Agile, flexible, and adaptable are important elements in the era of industrial 4.0, and vastly become new objectives by all entrepreneurs in developing their business information systems. As the most productive market in the global economy, Small and Medium Enterprises (SME) plays a vital role in developing countries. An ideal SME must have a standardized in the planning system and have an optimal quality of data model to run the business process and its operation. In the accounting system, all transaction data must be integrated to become a source of data for further processes such as recording sales or purchases, financial reporting, and generating invoices. The absence of technology and automated system in the accounting processes of SMEs, frequently waste both time, assets, and resources to be finished. Open-source ERP system implementation is often to be the initial step for SMEs to create a smart system that automating the business processes and operation’s needs. However, accurate parameters are needed to achieve an optimal system and data quality. The objective of this study is to evaluate the functional suitability level of smart ERP in the SME sector based on ISO 25010: 2011 standardization, and to produce good quality systems, as a result of the success of smart ERP systems implementation in automating business processes and integrating data across departments.

1. Introduction

In the light of industrial revolution 4.0, all companies from the small and medium to the enterprise-level business, are required to work quickly and efficiently to follow the basic companies’ goals of survival, growth, and profitability in their entire business lifetime [1]. Companies are also observant to monitor the inter-functional coordination, development of market needs, customer orientation and competition among competitors and prevent them from becoming obsolete, especially in the field of ICT and automation [2]. Implementation of business management tools and information systems will be a strength for a company in supporting business needs and long-term investment. The integrated digital automation system is an important technology to improve the quality and efficiency of a company’s work in running business processes and offers more value to control the demands of competitive advantage in global market [3]. SMEs intends to use information technology as a solution to bring significant growth opportunity, to increase the efficiency of its performance in information and data availability, business communication, outsourcing cost, and complete flexibility [4]. With the need of SMEs to have an agile and adaptive system for an affordable cost, open-source ERP system is chosen by the SMEs, to facilitate the flow of information across internal department, manage the connection to the stakeholders, and become supportive tools in decision making, operational waiting time and increase
work productivity [5,6]. In a survey conducted by the PricewaterhouseCoopers (PwC) 2017, 33% of companies is use ERP system as automated analytical tools in accounting modules to generate ledger and financial statement, but only 8% of the companies systems are fully integrated with ERP to the entire divisions.[7] In 2020, 48% of the leading enterprise is in progress to move toward ERP and cloud system, to initiate the smart system as the objective of digital transformation, innovation, vibrant new business models and strategies [8]. To facilitate the automation and competitiveness to run the business, SMEs need to have an agile, and flexible smart system to facilitate most department’ operational, especially in the field of accounting and invoice management. [9]. OpenERP (Now, Odoo) is chosen by the researchers in developing the Smart SMEs information system. As the references, author use ISO 25010: 2011 standardization of quality assessment, to test the qualitative specifications related to software functional suitability and evaluate the system in supporting business and other operation needs [10]. The result of this study research is a prototype standardization of smart ERP system design, in accounting and invoice management for SMEs and meets ISO 25010: 2011 quality standards, especially in the functional suitability.

2. Literature Review

2.1. Quality

According to Oakland, quality is a degree to which a set of inherent characteristics that fulfill the requirement (ISO 9000:2000). Quality is also defined as a product or service that bears on its ability to satisfy the user's needs (ISO 8402,1986) [11] Quality of product or system will provide the user satisfaction [12]. System quality can be assessed by its intrinsic characteristics consisting of functionality, device compatibility and product efficiency.

2.2. Enterprises

Enterprises is a legal entity of business that possesses the right to conduct business and economic activities, contract, employees, properties, incur the liabilities that establish bank accounts on their own [13]. Enterprises are divided into different categories based on the number of employees and its annual turnover [14].

| Table 1. Type of Enterprises divided by Employee |
| ----------------------------------------------- |
| Business Size | Employee(s) |
| Micro Enterprises | < 10 |
| Small Enterprises | 10 to 49 |
| Medium Enterprises | 50 to 249 |
| Large Enterprises | >250 |

Based on the table 1, it can be divided which following:

1. Micro Enterprise is a company that has an average annual income / revenue of less than $10,000,000 with a minimum less to 10 employees.
2. Small Enterprise is a company that has an average annual income / revenue of $10,000,000 - $1,000,000,000 with number of workers between 10 and 49 employees.
3. Medium Enterprise is a company that has an average annual income / revenue of $1,000,000,000 - $10,000,000,000 with number of employees between 50 and 249 employees.
4. Large Enterprise is a company that has an annual income / revenue an average of more than $10,000,000,000 with number of employees of more than 250 employees.
2.3. Small and Medium Enterprises (SMEs)

Small and Medium Enterprises (SMEs) is a trading business that is managed by individuals or enterprise entities that refer to productive economic ventures, with the total of personnel numbers falling below certain limits [15]. Small and Medium Enterprises are the most productive market in the global economy, which represents approximately 90% of business and more than 50% of global employment [16] SMEs employ less than 250 person and has turnover up to EUR 50 million (equivalent to USD 60 million) and balance sheet no more than EUR 43 million (equivalent to USD 50.35 million) [17]. SMEs play a major role in most economies particularly in developing countries, where labor is abundant, and capital is scarce [18].

2.4. Smart System

According to the GTS, definition of system is a set of interconnected elements or parts with a mass of properties, that are richer than the sum of the properties of those parts.[19] Moreover, system is a group of elements that working together for the same objective. In another discussion, a smart system is defined as an intelligent automated system that provides services and can be utilized by the user to the maximum without wasting a lot of resource and energy [20]. There are several domains representing different types of a smart system based on the objective [21].

1. Smart Industry/Enterprise is a developing industry which is driven by technology or digital devices that allow the system to automate the business processes and operation. Smart Industry/enterprises are categorized by the size, including Smart Small and Medium Enterprises (Smart SMEs).

2. Smart service systems are a composed element of people, information, organization, and technologies which integrate resources and activities of the involved actors for mutual benefit.

3. Smart home defined as a residence that uses a digital control system to integrate the various function of a home.

2.5. Odoo

Odoo (previously TinyERP, or OpenERP) is an open-source Enterprise Resource Planning System, that serves many features in modular such as human resources, sales, accounting, manufacturing, inventory, project management, and customer relationship management, that supports business needs by integrating the information and data communication within the enterprise [22]. Odoo is using three-tier architecture with Python programming language and consists of three main components: Database layer (PostgreSQL), Odoo Application Server (Middle Layer), and Client Layer [23].

2.6. Accounting Information System

Accounting Information systems is a framework for coordinating the resources (data, materials, equipment, suppliers, personnel, and funds) to convert the input in the form of economic data into the output of financial information that is used to carry out the activities of an entity and to provide accounting information for any department concerned [24]. Accounting information system in ERP modules allows the user as an accountant to track income and expenses transactions of financial activities into a financial statement [25]. The area of accounting information system is a module in the ERP that can be used by certain parties in decision making [24]. According to the study, author conduct the accounting system design invented by Panduwiyasa (2020), as the case study of this functional suitability research, following are the system design that can be seen below [26].
Figure 1. System design

2.7. ISO 25010:2011/SQuaRE (System and software Quality Requirements and Evaluation)

ISO / IEC 25010 is an international standard used to assess the quality model of software released by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) [27]. ISO/IEC 25010:2011 included in the scope of SQuaRE (System and software Quality Requirements and Evaluation). This International Standard is derived from ISO/IEC 9126:1991, Software engineering product quality, which was developed to support these needs [10,27,28]. The quality model proposed in the ISO / IEC 25010 standard is made up of eight intrinsic quality characteristics (include functional suitability, reliability, operability, performance efficiency, security, compatibility, maintainability, and transferability) [28].

3. Methodology

3.1. Model of Functional Suitability Testing in ISO25010:2011

Figure 2. Functional Suitability Model of ISO 25010:2011
In this research methodology, the authors limit the testing characteristic only to the functional suitability. Based on ISO/IEC 25010: 2011 SQuaRE (System and software Quality Requirements and Evaluation), functional suitability is defined as the degree of a product (application) or system that provides functions that meet user needs when used under certain conditions [29]. Functional testing does not require the program structure to be assessed, it only the function of the feature that is displayed by the system will be concerned [30].

3.2. Functional Suitability Testing in ISO25010:2011

Functional suitability testing or also called black-box testing is a kind of testing in which the behaviour and working of the software is tested by checking the inputs and outputs of the software [31]. In the functional suitability test, there are three sub characters of assessment, namely: [32]

3.2.1. Functionality Completeness.

Defined as the system's ability to provide complete functions according to what it displayed in the system features and meets the user’s objectives. There are two properties of functional completeness:

- **Functional Implementation Completeness.** The completeness of the functional implementation considering the specific task that the software product can perform.
- **Functionally Completeness Testing.** The completeness of functional test studies about the requirements that have been explained and obtained from the requirement specification have passed a process of testing.

3.2.2. Functionality Correctness.

Defined as the ability of the system to provide correct results, on the orders given by the user. Functional Correctness is understood as false and error testing because of the results generated must be the expected. There is a property of functional correctness:

- **Functional Implementation Correctness.** The functional implementation correctness studies about the evaluation of correctness level in system implementation requirements.

3.2.3. Functionality Appropriateness.

Defined as the capability in which the system functions to facilitate the completion of predetermined tasks and goals as ability of the system to carry out the requirements to specified objectives. There is a property in functional appropriateness:

- **Functional Adequacy.** The functional adequacy studies about the objective of software product can fulfils the requirements of each type of user, this also called ‘usage objective’.

4. Analysis and Testing

4.1. Functional Suitability Success Parameter

In this research test, the authors made the success parameters with the ISO 25010: 2011 standard, based to the ASQLab assessment, and classify the assessment with the following categories [29]:

| No. | Functional Score (%) | Quality Value | Predicate |
|-----|-----------------------|---------------|-----------|
| 1   | 0-25                  | 1             | Not ERP   |
| 2   | 25.1-50               | 2             | Poor      |
| 3   | 50.1-75               | 3             | Average   |
| 4   | 75.1-95               | 4             | Good      |
| 5   | 95.1-100              | 5             | Excellent |
Based on the table 2, it can be divided which following:

1. For functional values of 0% - 25% which mean, only quarter of the functional system meet the business automation need and is not classified as ERP or smart systems.
2. For functional values of 25.1% - 50% which mean, only quarter to half of the functional system meet the business automation need. The system is classified as Poor smart systems.
3. For functional values of 50.1% - 75% which mean, more than half of the functional system meet the business automation need. The system is classified as Average/moderate smart systems.
4. For functional values of 75.1% - 95% which mean, the three-quarter of the functional system are highly meet the business automation need. The system is classified as Good smart systems.
5. For functional values of 95.1% - 100%, which mean, almost all of the functional system are precisely meet the business automation need. The system is classified as Excellent smart systems.

4.2. Functional Suitability/Black Box Testing Result

Results of the analysis and testing in this research are to assess the functionality score of the Odoo accounting system that meets the requirement of ISO 25010:2011 functional suitability. The author separates the evaluation of accounting system into three sections namely:

- Account Receivable System
- Account Payable System
- Reporting System

The testing has several categories to find any error, including: [32].

- Result of features that are not functionally exist
- Interface appropriateness error
- Data integration and database access error
- Data reporting error

4.2.1. Account Receivable System Testing.

The account receivable system test includes several features, namely, customer invoice, sales receipt, payment, customer data, and sellable product. The followings are the test results.

| No | Odoo Features | Functional Features | Expected Result | Functional Status |
|----|---------------|---------------------|-----------------|------------------|
| 1. | Customer Invoice | Create Invoice Data | Invoice data created without error | Success |
| | | Update/Edit Data | Invoice data updated without error | Success |
| | | Delete Invoice data (in draft) | Invoice data deleted without error | Success |
| | | Refund Customer Invoice | Customer Invoice could be refund | Success |
| | | Error notification when customer invoice line is empty | Error notification/warning appear | Failure |
| | | Error notification when salesperson is empty | Error notification/warning appear | Failure |
| 2 | Sales Receipt | Create Sales Receipt | Receipt created without error | Success |
| | | Update/Edit Sales Receipt | Receipt updated without error | Success |
| | | Delete Sales Receipt (in draft) | Receipt deleted without error | Success |
| | | Error notification when sales receipt lines are incomplete/empty | Error notification/warning appear | Failure |
| 3 | Payment | Create payment | Payment created without error | Success |
| | | Update payment | Payment Updated without error | Success |
| | | Error notification if payment value incomplete | Error/warning notification appear | Success |
| 4 | Customer Data | Create Customer data | Customer data created without error | Success |
| | | Update Customer data | Customer data updated without error | Success |
| | | Delete Customer data | Customer data deleted without error | Success |
| | | Error notification if customer data (mandatory) incomplete | Error/warning notification appear | Success |
According to the test results in table 3, the author can draw an analysis that most of the customer invoices, sales receipts, payments, customer data and sellable product features along with CRUD (Create, Read, Update, Delete) operations on the Odoo system have been functionally successful. Furthermore, some of Odoo transactions that have not yet provided error/warning notifications, especially in the customer invoices, sellable product, and sales receipt features.

4.2.2. Account Payable System Testing.

For the account payable system test has several features, namely, vendor bills, purchase receipt, payment, vendor data, product (purchasable), and Chart of Account. The followings are the test results.

According to the test results in table 4, the author can draw an analysis that most of the vendor bills, purchase receipts, payments, vendor data and purchasable product features along with CRUD (Create, Read, Update, Delete) operations on the Odoo system have been functionally successful. But, as same as the receivable system that Odoo have not yet provided some error/warning notifications, especially in the Vendor bills, payable product, and sales receipt features.

| No | Odoo Features | Functional Features | Expected Result | Functional Status |
|----|----------------|---------------------|-----------------|------------------|
| 5  | Sellable Product | Create products data | Product data created without error | Success |
|    |                 | Update products data | Product data updated without error | Success |
|    |                 | Delete products data | Product data deleted without error | Success |
|    |                 | Purchasable product to be sold | Error/warning notification appear | Failure |
| Success Score | 17/21 |
| Functional Score | 80.9% |
| Quality Value | 4 |

Table 4. Account Payable System Functional Test

According to the test results in table 4, the author can draw an analysis that most of the vendor bills, purchase receipts, payments, vendor data and purchasable product features along with CRUD (Create, Read, Update, Delete) operations on the Odoo system have been functionally successful. But, as same as the receivable system that Odoo have not yet provided some error/warning notifications, especially in the Vendor bills, payable product, and sales receipt features.
4.2.3. Reporting System Testing.

After all transactions are successfully carried out and recorded by the system, the reporting system could process the data into five main features, Chart of Accounts, Journal entries, General Ledger, balance sheet and financial reports. The following table are the test results.

| No | Odoo Features             | Functional Features                                      | Expected Result                                      | Functional Status |
|----|---------------------------|----------------------------------------------------------|------------------------------------------------------|------------------|
| 1  | Chart of Account          | Create CoA data                                           | CoA data created without error                       | Success          |
|    |                           | Update/Edit CoA data                                     | CoA data updated                                      | Success          |
|    |                           | Delete CoA data                                           | CoA data deleted                                      | Success          |
| 2  | Journal Entries           | Record all data transaction that has done                | All data transaction is recorded                      | Success          |
| 3  | General Ledger            | Print General ledger into Pdf                            | All transaction in G/L printed in pdf format         | Success          |
| 4  | Balance Sheet             | Print Balance sheet into pdf                            | All Transaction in Balance sheet printed in pdf format| Success          |
| 5  | Financial Report (All Reporting) | Print Balance Sheet/Ledger/Trial Balance into pdf | All transaction (any reporting) printed in pdf format | Success          |
|    |                           | Create reporting without input start and end date        | Proceed to print whole time transaction               | Success          |
|    |                           | Create Reporting without Journal data                    | Error/warning notification will appear                | Success          |
|    |                           | Create reporting with reversed date                      | Error/warning notification will appear or Print all data| Failure          |

| Success Score | 9/10 |
| Functional Score | 90% |
| Quality Level | 4 |

The Chart of Accounts, General ledger, balance sheet, trial balance, and financial reporting features in the accounting module fulfill 90% functionality score. Where most of financial reporting function can be done properly and automatically. However, the system cannot print the report yet if the date is reversed, and there is no notification or error warning, but only display a blank report.

5. Conclusion

The implementation of open-source ERP system based on Odoo in the accounting module has an average functional quality value of 4, based on the ASQ assessment and ISO 25010:2011 standardization. Odoo precisely fulfils the function of automating the reporting system and automatically integrating transaction data between accounts receivable and accounts payable accounting systems in the form of journal entries. It can be said that Odoo has good reporting quality and is relevant to be developed for a smart SMEs ERP system. However, it requires further development and configuration of error notifications and some complex features that need to be adjusted with business needs, to be used effectively and flexibly.

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