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QUALITY EVALUATION OF PEC 2017-COMPLIANT ELECTRICAL WIRING SOFTWARE: ISO/IEC 25010-BASED APPROACH

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Abstract: The growing accessibility of simulation systems, applications, and software for electrical wiring has been especially noticeable in recent years. These digital solutions are frequently created to address increasing demands for efficiency and reliability in performance. Nevertheless, when electrical materials are calculated by hand, errors can arise—frequently going unnoticed because of the intricate and accuracy-focused nature of these computations, which are prone to human mistakes. The rise of numerous simulation tools has made evaluating their quality a significant issue. This research assesses the quality of an electrical wiring software adhering to PEC 2017 standards, utilizing specific objective metrics grounded in the ISO/IEC 25010 software product quality framework. Four essential quality attributes—functional appropriateness, performance effectiveness, interaction ability, and dependability—were evaluated. Fifty evaluators, including experts, students, academics, electrical engineers, and technologists, took part in the assessment. The findings indicated that the software garnered outstanding ratings in all four categories, with reliability obtaining the top score. The results show that the electrical wiring software is effective and dependable. It is advised that the software undergo frequent updates to stay in accordance with the progressing standards of the Philippine Electrical Code (PEC) and be broadly embraced in both educational and industrial environments to enhance awareness and utilization of dependable digital tools in electrical system design.

Keywords: electrical wiring software, simulation, standards compliance, electrical system design

I. INTRODUCTION

The application of Quality Characteristics and Sub-Characteristics could promote efficiency in methodologies since this kind of assessment enhances both the understanding of strengths and weaknesses of approaches [8]. Competency is essential in the engineering profession, particularly in electrical installation and maintenance, to guarantee safety, dependability, and efficiency in commercial, industrial, and residential infrastructures. To prevent fire hazards, mishaps, and system failures, electrical systems must be installed in compliance with safety regulations. This conformance is governed in the Philippines by the Philippine Electrical Code (PEC) 2017, which is the official standard for electrical work in the nation and conforms to international standards [20].

The PEC 2017 serves as the foundation for training and education in addition to regulating installation procedures. It offers an operational and legal framework that is essential for both students and teachers. The need for efficient and consistent training resources is increased by the rising demand for qualified electricians and technicians due to expanding infrastructure development. However, problems including equipment availability, safety hazards, and limited student engagement time limit the use of traditional teaching approaches, like hands-on workshops [13]; [4]. As a result, simulation software has surfaced as a means of bridging the knowledge gap between theory and practice. Without the dangers of real electrical systems, virtual tools offer learners safe, repeatable, and affordable platforms for practicing wiring, circuit design, and troubleshooting [3]. According to studies, students who use digital simulation tools outperform those who just use traditional approaches in terms of learning outcomes, comprehension, and confidence when it comes to technical tasks [23].

The Philippines has particular difficulties, such as poor funding for laboratory supplies and restricted access to modern training equipment. In order to guarantee that students acquire pertinent, useful, and secure technical knowledge, software that is rooted in the local context—more especially, in line with PEC 2017—is crucial [11]. PEC 2017-specific simulation software increases employability and professional preparedness by democratizing training access and promoting code-compliant behaviors. In addition to accessibility and security, simulation tools have major benefits in terms of price, scalability, and customization. Software does not deteriorate over time like physical equipment does, and

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its virtual environment is accessible from anywhere, enabling asynchronous learning and customized pace. These qualities facilitate the pedagogical transition to competency-based, flexible, and learner-centered educational models [29].

Despite these benefits, many available simulation tools lack localization and functional depth. Internationally designed software often omits Philippine-specific standards, and many existing tools are generic, offering limited interactivity and user engagement. These deficiencies reduce their effectiveness in promoting real-world skills or meeting national training objectives [11]. To address these gaps, a PEC 2017-compliant electrical wiring software was developed, aiming to provide students and educators with a pedagogically robust and contextually appropriate learning tool. This software integrates PEC 2017 requirements directly into its functionality, allowing users to perform code-compliant tasks such as circuit design, calculation, and troubleshooting. This ensures that what is learned in the software environment translates seamlessly into real-world application. This study aimed to conduct quality evaluation on the innovated electrical wiring software. Specifically, it sought to determine the quality evaluation of the software in terms of functional suitability, performance efficiency, interaction capability, and reliability.

II. REVIEW OF RELATED LITERATURE

Utilizing Quality Characteristics and Sub-Characteristics may enhance efficiency in methodologies, as this type of evaluation improves the comprehension of the strengths and weaknesses of different approaches [8]. Proficiency is vital in the engineering field, especially in electrical setup and upkeep, to ensure safety, reliability, and effectiveness in commercial, industrial, and residential systems. To avoid fire risks, accidents, and system malfunctions, electrical systems should be installed according to safety standards. In the Philippines, this compliance is regulated by the Philippine Electrical Code (PEC) 2017, which serves as the official standard for electrical work in the country and aligns with international standards [21].

The PEC 2017 acts as the basis for training and education while also governing installation practices. It provides an operational and legal structure that is crucial for students as well as teachers. The growing infrastructure development has heightened the necessity for effective and uniform training materials as the demand for skilled electricians and technicians rises. Nonetheless, challenges such as equipment accessibility, safety risks, and restricted student interaction restrict the implementation of conventional teaching methods, such as practical workshops [13];[4]. Consequently, simulation software has emerged as a tool for closing the knowledge gap between theory and practice. Virtual tools provide learners with safe, repeatable, and cost-effective platforms for practicing wiring, circuit design, and troubleshooting without the risks associated with actual electrical systems [3]. Research indicates that learners who utilize digital simulation tools achieve better results in learning outcomes, comprehension, and confidence in technical tasks compared to those who rely solely on traditional methods [23].

The Philippines faces specific challenges, including inadequate funding for lab materials and limited access to contemporary training tools. To ensure that students obtain relevant, practical, and safe technical skills, software grounded in the local context—specifically, consistent with PEC 2017—is essential [9]. Simulation software tailored for PEC 2017 enhances employability and professional readiness by making training accessible to all and encouraging adherence to code standards. Aside from accessibility and security, simulation tools offer significant advantages regarding cost, scalability, and personalization. Software does not degrade over time as physical equipment does, and its virtual setting is reachable from any location, allowing for asynchronous learning and individualized pacing. These traits aid in the pedagogical shift toward competency-based, adaptable, and learner-focused educational frameworks that would be beneficial for future professionals and practitioners in the field of electrical engineering and other related fields [29].

Despite these advantages, numerous existing simulation tools are deficient in localization and functional complexity. Software designed for international use frequently neglects Philippine-specific standards, and many available tools are generic, providing minimal interactivity and user involvement. These shortcomings diminish their ability to foster practical skills or fulfill national training goals [11]. However, for such software to be effectively integrated into technical education, its quality must be rigorously evaluated. Software used for instructional purposes must not only function correctly but also be efficient, user-friendly, and dependable. The ISO/IEC 25010 Software Product Quality Model offers a comprehensive framework for this evaluation. It assesses software across eight quality dimensions, including functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability [16]. For this study, four key dimensions were selected: functional suitability, performance efficiency, interaction capability (a subdomain of usability), and reliability.

Functional suitability measures the extent to which software fulfills the needs of users by providing correct and complete functions. In the context of PEC 2017-based wiring software, this refers to whether the application accurately simulates real-world electrical tasks and supports the achievement of instructional goals [12]. For example, the software must allow correct wire sizing, code-compliant installation, and logical circuit behavior.

Performance efficiency assesses the software's use of system resources and its ability to deliver outcomes within acceptable timeframes. Smooth operation is critical for maintaining user engagement and instructional continuity,

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especially in settings with varying hardware capacities. Lag, crashes, or long loading times can disrupt learning and deter users [1].

Interaction capability—closely tied to usability—refers to how easily and intuitively users can operate the software. Educational users come from diverse backgrounds, and not all possess advanced digital literacy. A clear, logical interface and helpful feedback are necessary to reduce cognitive load and promote exploration and learning [23].

Reliability involves the system's ability to function consistently and recover from errors. Educational software must deliver accurate feedback, store user progress, and remain operational during repeated use. Unreliable tools can distort understanding and erode trust in the training process [4].

Despite the increasing development of PEC 2017-aligned tools in the Philippines, most software products have not undergone formal quality evaluations using internationally recognized standards. Some rely solely on anecdotal feedback or satisfaction surveys. There remains a lack of rigorous studies that evaluate educational simulation tools through the ISO/IEC 25010 model [10]. This gap presents a challenge to educators and decision-makers who must select tools based on their effectiveness, efficiency, and contextual relevance.

III. METHODOLOGY

This research utilized a quantitative assessment approach to evaluate the quality of a PEC 2017-compliant electrical wiring software application. The assessment framework was informed by the ISO/IEC 25010:2015 software product quality model, which recognizes four quality traits as evaluation standards: functional suitability, performance efficiency, interaction capability, and reliability. A systematic assessment tool consisting of 16 questions addressing the sub-characteristics of all four evaluation criteria was created following the ISO/IEC 25010 definitions and measurement standards for each quality attribute. Each criterion was translated into particular indicators, and evaluators were requested to assess the software on a five-point Likert scale that ranged from 1 (very poor) to 5 (excellent). A purposive sampling method was employed to choose fifty (50) evaluators possessing relevant knowledge and experience in electrical wiring and software systems. The group consisted of certified electrical engineers, electrical technologists, and academic faculty in engineering and technology disciplines. Prior to the evaluation, participants received a standardized briefing on the software's features, intended purposes, and applicable use-case scenarios. They were subsequently instructed to autonomously investigate and utilize the software within simulated design scenarios relevant to typical electrical wiring tasks in accordance with the PEC 2017 standards. The evaluators' data were analyzed through descriptive statistical techniques. Average scores were calculated for each of the four quality traits to assess the perceived performance level of the software. Furthermore, qualitative feedback from participants was gathered to offer contextual understanding of their ratings and to pinpoint areas for possible enhancement. Ethical factors were taken into account during the study. Participation was voluntary, informed consent was acquired from all participants, and data privacy was meticulously upheld.

IV. RESULTS AND DISCUSSION

The performance of the electrical wiring software based on the ISO/IEC 25010 Software Product Quality Criteria was determined in terms of functional stability, performance efficiency, interaction capability and reliability.

A. Functional Suitability.

The first criterion was functional suitability specifically sub-characterized into functional completeness, functional correctness, and functional appropriateness. Table 5 presents the results of the responses of fifty (50) evaluators to three (3) statements in relation to functional suitability of the software. Thirty-six (36) responded "Highly Acceptable" that the software provides all the options necessary for calculation while fourteen (14) responded that it was "Moderately Acceptable". It was verbally interpreted as "Excellent" with a mean of 4.72 thereby indicating that the functional completeness of the electrical wiring software is excellent. In the statement where the software provided correct calculation and accurate results, thirty-four (34) responded "Highly Acceptable", fifteen (15) responded "Moderately Acceptable" and one (1) responded "Acceptable". It was verbally interpreted as "Excellent" with the mean of 4.66 thereby indicating that the functional correctness of the electrical wiring software is excellent. In the statement where the software accomplishes the specified tasks.

TABLE I FUNCTIONAL SUITABILITY

Statement	Mean	Verbal Interpretation
The software provides all the options necessary for calculation.	4.72	Excellent
The software provides correct calculation and accurate results.	4.66	Excellent
The software accomplishes the specified tasks /objectives in terms of classification of loads.	4.76	Excellent
Overall Mean	4.72	Excellent

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Note: Interpretation is based on the following scale:
4.21 – 5.00 (Excellent)
3.41 – 4.20 (Very good)
2.61 – 3.40 (Good)
1.81 – 2.60 (Fair)
1.00 – 1.80 (Poor)

or objectives, thirty-eight (38) responded "Highly Acceptable", twelve (12) responded "Moderately Acceptable". It was verbally interpreted as "Excellent" with a mean of 4.76 thereby indicating that the functional appropriateness of the electrical wiring software is excellent. On the whole, functional suitability gained an overall mean score of 4.72, verbally interpreted as "Excellent" thereby indicating that functional suitability of the electrical wiring software is excellent. This conforms to the criterion of ISO/EIC 25010 product quality model on functional suitability which represents the degree to which the electrical wiring software provides functions that meet stated and implied needs when used under specified conditions. This characteristic is composed of the following three sub-characteristics, namely, functional completeness, functional correctness and functional appropriateness. First, functional completeness is the degree to which the set of functions of the electrical wiring software covers all the specified tasks and intended users' objectives. Secondly, functional correctness is the degree to which the electrical wiring software provides accurate results when used by intended users. Thirdly, functional appropriateness which is the degree to which the functions facilitate the accomplishment of specified tasks and objectives [17]. Similarly, this was supported by [7] who developed an assistant tool to evaluate software product quality characteristics defined by the ISO/IEC 25010 standard, utilizing the Goal Question Metric (GQM) approach. The methodology involved defining a set of targeted questions whose combined responses yield logical metrics applicable to the quality characteristics outlined in ISO/IEC 25010. To demonstrate the effectiveness of this approach, the study focused on the security characteristic as a case study, defining relevant metrics and applying them across three software projects. The results illustrated the practical application of the tool and highlighted its potential in systematically assessing specific quality attributes within software products.

B. Performance Efficiency

The second criterion was performance efficiency specifically sub characterized into time behavior, resource utilization, and capacity. Table 6 presents the results of the responses in performance efficiency of the fifty (50) evaluators to three (3) statements in relation to functional suitability of the software. Thirty-six (37) responded "Highly Acceptable" stating that the software responded without delays after executing the command while twelve (12) responded that it is "Moderately Acceptable" and one (1) responded acceptable. It was verbally interpreted as "Excellent" with a mean of 4.72 thereby indicating that the time behavior of the electrical wiring software was excellent. In the statement where the software requires a minimum system requirement in Windows 7 to run the program, thirty-eight (38) responded "Highly Acceptable", ten (10) responded "Moderately Acceptable", and two (2) responded "Acceptable". It was verbally interpreted as "Excellent" with a mean of 4.72 thereby indicating that the resource utilization of the electrical wiring software is excellent. In the statement where software covers the specified types of loads available in the options, forty responded "Highly Acceptable", nine (9) responded "Moderately Acceptable", and one (1) responded "Acceptable". It was verbally interpreted as "Excellent" with a mean score of 4.78 thereby indicating that the capacity of the electrical wiring software is excellent. On the whole, performance efficiency gained an overall mean score of 4.74, verbally interpreted as "Excellent" thereby indicating that the performance efficiency of the electrical wiring software was excellent. This conforms to the criterion of ISO/IEC 25010 product quality model on performance efficiency which represents the degree to which the electrical wiring software performs its functions within specified time and throughput parameters and is efficient in the use of resources such as central processing unit (CPU), memory, storage, network devices, energy, and materials under specified conditions. This characteristic was composed of the following three sub-characteristics, namely, time behavior, resource utilization, and capacity. Firstly, time behavior which was the degree to which the response time and throughput rates of the electrical wiring software, when performing its functions, meet requirements. Secondly, resource utilization which was the degree to which the amounts and types of resources used by the electrical wiring software, when performing its functions, meet requirements. Thirdly, capacity which was the degree to which the maximum limits of the electrical wiring software parameter meet requirement [17]. Furthermore, this conforms with Peters & Aggrey (2020) [27] who investigated the adoption and implementation of Enterprise Resource Planning (ERP) systems in Higher Education Institutions (HEIs) have significantly increased in response to government initiatives aimed at streamlining institutional processes and practices. This prominent framework used in evaluating software and system quality is the ISO/IEC 25010 international standard. The model comprised eight primary quality factors—functional suitability, reliability, usability, performance efficiency, compatibility, security, maintainability, and portability—each further divided into a total of thirty-four sub-factors. In line with this, recent studies have proposed an enhanced quality evaluation model for ERP systems in HEIs based on the ISO/IEC 25010 framework. Along that line, Paduwiyasa et al. 2023, [25] responded to the shift toward Society 5.0 and the growing need for post-pandemic resilience among small and medium-sized enterprises (SMEs), where an increasing emphasis on aligning system and technology development with business requirements through the implementation of Enterprise Resource Planning (ERP) applications

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was observed. The study utilized the ISO/IEC 25010:2011 standard, detailing the characteristics essential for assessing software quality. These standards include on performance evaluation procedures, including stress testing, are necessary to determine a system's ability to manage concurrent data and multiple user requests effectively. Specifically, the reliability sub-characteristics—such as system capacity and time behavior—are measured through metrics like connection success rate, average response time, and data handling efficiency. Key quality characteristics such as functional compatibility and performance efficiency had emerged as critical factors for evaluating digital systems used by SMEs.

TABLE 2 PERFORMANCE EFFICIENCY

Statement	Mean	Verbal Interpretation
The software responded without delays after executing the command.	4.72	Excellent
The software requires a minimum system requirement in Windows 7 to run the program.	4.72	Excellent
The software covers the specified types of loads available in the options.	4.78	Excellent
Overall mean	4.74	Excellent

Note: Interpretation is based on the following scale:
4.21 – 5.00 (Excellent)
3.41 – 4.20 (Very good)
2.61 – 3.40 (Good)
1.81 – 2.60 (Fair)
1.00 – 1.80 (Poor)

C. Interaction Capability.

The third criterion was interaction capability specifically sub characterized into appropriateness recognizability, learnability, operability, user error protection, user engagement, inclusivity, user assistance, and self-descriptiveness. Table 3 presents the results of the responses of fifty (50) evaluators to six (6) statements in relation to interaction capability of the software. Forty-one (41) responded "Highly Acceptable" that thee software was considered to be appropriate for the load schedule needs of the target users while eight (8) responded that it is "Moderately Acceptable" and one (1) responded acceptable. It was verbally interpreted as "Excellent" with a mean of 4.80 thereby indicating that the appropriateness recognizability of the electrical wiring software was excellent. In the statement where the software allowed target users to learn its functions effectively within a specified timeframe, thirty-six (36) responded "Highly Acceptable", fourteen (14) responded "Moderately Acceptable. It was verbally interpreted as "Excellent" with the mean of 4.72 thereby indicating that the learnability of the electrical wiring software was excellent. In the statement where the software was easy to operate and control, thirty-eight (38) responded "Highly Acceptable", eleven (11) responded "Moderately Acceptable", and one (1) responded "Acceptable". It was verbally interpreted as "Excellent" with a mean of 4.74 thereby indicating that the operability of the electrical wiring software was excellent. In the statement where software covers the specified types of loads available in the options, forty (40) responded "Highly Acceptable", nine (9) responded "Moderately Acceptable", and one (1) responded "Acceptable". It was verbally interpreted as "Excellent" with a mean score of 4.78 thereby indicating that the user error protection of the electrical wiring software is excellent. In the statement that the software was equipped with a feature that prevents users against operation errors, thirty-one (31) responded "Highly Acceptable", fifteen (15) responded "Moderately Acceptable", and four (4) responded "Moderately Acceptable. It was verbally interpreted as excellent with a mean score of 4.76 thereby indicating that the user engagement of the electrical wiring software is excellent. In the statement that the software is equipped with a feature that prevents users against operation errors, forty (40) responded "Highly Acceptable", eight (8) responded "Moderately Acceptable", and two (20 responded "Moderately Acceptable". In the statement that the software can be used by individuals even without an electrical field background, thirty (30) responded "Highly Acceptable", seventeen (17) responded "Moderately Acceptable", and three (3) responded "Moderately Acceptable". It was verbally interpreted as "Excellent" with a mean score of 4.54 thereby indicating that the inclusivity of the electrical wiring software was excellent. On the whole, interaction capability gained an overall mean score of 4.68, verbally interpreted as "Excellent" thereby indicating that the interaction capability of the electrical wiring software is excellent. This conforms with the criterion of ISO/IEC 25010 product quality model which represents the degree to which the electrical wiring software performs its functions within specified time and throughput parameters and is efficient in the use of resources such as central processing unit (CPU), memory, storage, network devices, energy, and materials under specified conditions. This characteristic was composed of the following three sub-characteristics, namely, time behavior, resource utilization, and capacity. Firstly, time behaviour which was the degree to which the response time and throughput rates of the electrical wiring software, when performing its functions, meet requirements. Secondly, resource utilization which is the degree to which the amounts and types of resources used by the electrical wiring software, when performing its functions, meet requirements. Thirdly, capacity which was the degree to which the maximum limits of the electrical wiring software parameter meet requirement [17]. In like manner, this was supported by Nuzula and Rochimah (2023) [22] who investigated the

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utilization of information systems playing a vital role in enhancing the effectiveness and efficiency of service processes. In this context, Surabaya State University implemented a Human Resource Information System (HRIS) to streamline online service delivery and monitoring within its human resources department. Given the critical role of the HRIS, Nuzula and Rochimah (2023) [22] conducted an evaluation of the system's quality focusing on functional suitability and usability, aiming to identify both strengths and weaknesses from the user experience perspective.

TABLE 3 INTERACTION CAPABILITY

Statement	Mean	Verbal Interpretation
The software is considered to be appropriate for the load schedule needs of the target users.	4.80	Excellent
The software allows target users to learn its functions effectively within a specified timeframe.	4.72	Excellent
The software is easy to operate and control.	4.74	Excellent
The software is equipped with a feature that prevents users against operation errors.	4.54	Excellent
The software presents functions and information in an inviting and motivating manner encouraging continued interaction.	4.76	Excellent
The software can be used by individuals even without an electrical field background.	4.54	Excellent
Overall Mean	4.68	Excellent

Note: Interpretation is based on the following scale:
4.21 – 5.00 (Excellent)
3.41 – 4.20 (Very good)
2.61 – 3.40 (Good)
1.81 – 2.60 (Fair)
1.00 – 1.80 (Poor)

D. Reliability. The fourth criterion was reliability specifically sub-characterized into faultlessness, availability, fault tolerance, and recoverability. Table 8 presents the results of the responses of the fifty (50) evaluators to four (4) statements in relation to reliability of the software. Thirty-seven (37) responded "Highly Acceptable" that the software can perform specific functions without fault under normal operation while eleven (11) responded that it is "Moderately Acceptable" and two (2) responded acceptable. It was verbally interpreted as "Excellent" with a mean of 4.70 thereby indicating that the faultlessness of the electrical wiring software is excellent. In the statement where the software was operational and accessible when required for use, forty (40) responded "Highly Acceptable", nine (9) responded "Moderately Acceptable", and one (1) responded "Acceptable". It was verbally interpreted as "Excellent" with the mean of 4.78 thereby indicating that the availability of the electrical wiring software was excellent. In the statement where software operates as intended despite the presence of hardware or software faults, 35 responded "Highly Acceptable", twelve (12) responded "Moderately Acceptable", and three (3) responded "Acceptable". It is verbally interpreted as "Excellent" with a mean score of 4.64 thereby indicating that the fault tolerance of the software was excellent.

TABLE 4 RELIABILITY

Statement	Mean	Verbal Interpretation
The software can perform specific functions without fault under normal operation.	4.70	Excellent
The software is operational and accessible when required for use.	4.78	Excellent
The software operates as intended despite the presence of hardware or software faults.	4.64	Excellent
The software can recover the date directly affected and reestablish the desired state of the system in the event of an interruption or failure.	4.80	Excellent
Overall Mean	4.73	Excellent

Note: Interpretation is based on the following scale:
4.21 – 5.00 (Excellent)
3.41 – 4.20 (Very good)
2.61 – 3.40 (Good)
1.81 – 2.60 (Fair)
1.00 – 1.80 (Poor)

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In the statement that software can recover the data directly affected and reestablish the desired state of the system in the event of an interruption or failure, forty-two (42) responded "Highly Acceptable", six (6) responded "Moderately Acceptable", and two (2) responded "Moderately Acceptable". It was verbally interpreted as "Excellent" with a mean score of 4.80 thereby indicating that the recoverability of the electrical wiring software was excellent. On the whole, reliability gained an overall mean score of 4.80, verbally interpreted as "Excellent" thereby indicating that the reliability of the electrical wiring software was excellent. This conforms with ISO/IEC 250 Product Quality Model criterion on reliability which was the degree to which the electrical wiring software performs specified functions under specified conditions for a specified period of time. This characteristic was composed of the following four sub-characteristics, namely, faultlessness, availability, fault tolerance, and recoverability. First was faultlessness which is the degree to which the electrical wiring software performs specific functions without fault under normal operation. Secondly is availability which is the degree to which the electrical wiring software was operational and accessible when required for use. Thirdly, is fault tolerance which is the degree to which the electrical wiring software operates as intended despite the presence of hardware or software faults. Lastly, recoverability was the degree to which, in the event of an interruption or a failure, the electrical wiring software can recover the data directly affected and re-establish the desired state of the system (iso25000.com, 2025). Along with that, Panduwiyasa et al. (2023) conforms with this in their investigation on the adoption and implementation of Enterprise Resource Planning (ERP) systems in Higher Education Institutions (HEIs) had significantly increased in response to government initiatives aimed at streamlining institutional processes and practices. The study utilized ISO/ IEC 25010 in evaluating the software and system quality. In line with this, recent studies had proposed an enhanced quality evaluation model for ERP systems in HEIs based on the ISO/IEC 25010 framework. Moreover, Karnouskos et al. (2021) validates this with his study on identifying a variety of architectural patterns for integrating agents within industrial automation systems; however, these implementations differ significantly, particularly in terms of how agents are coupled with physical components and control mechanisms. Karnouskos et al. (2021) proposed a methodology grounded in the ISO/IEC 25010 software quality model whose framework introduces a structured assessment approach that facilitates the selection of best-fit practices tailored to specific industrial use cases. By contextualizing ISO/IEC 25010 within industrial automation and conducting an expert survey, the study identified key quality characteristics that are most relevant to the integration of software agents in such environments. In line manner, Cai et al. (2020) validates this with his study on measuring the quality of B Abstract Machines with ISO/IEC 25010. The B method has been widely recognized for its role in software development, particularly through its use of abstract machines to specify designs and formally verify their correctness. The quality of these B abstract machines is crucial, as it directly influences the overall quality of the resulting software products. To address this, Cai et al. (2020) proposed a set of quality measurement criteria for B abstract machines based on the ISO/IEC 25010 international standard for software quality evaluation.

With this, taking into consideration the four overall mean scores: 4.74, 4.54, 4.68, and 4.73 in all the four areas evaluated and verbally interpreted as excellent, the software is effective in terms of the evaluation based on ISO / IEC 25010 standards, namely functional suitability, performance efficiency, interaction capability, and reliability accordingly with reliability as the highest overall mean score. This conforms to Panduwiyasa et al. (2023) who responded to the shift toward Society 5.0 and the growing need for post-pandemic resilience among small and medium-sized enterprises (SMEs). Key quality characteristics such as functional compatibility and performance efficiency have emerged as critical factors for evaluating digital systems used by SMEs. According to the ISO/IEC 25010:2011 standard, these characteristics are essential for assessing software quality. Performance evaluation procedures, including stress testing, are necessary to determine a system's ability to manage concurrent data and multiple user requests effectively. Specifically, the reliability sub-characteristics—such as system capacity and time behavior—are measured through metrics like connection success rate, average response time, and data handling efficiency. Additionally, this is supported by Hussain and Mkpojiogu (2015) whose research highlights a significant increase in the number of individuals seeking health-related information online, indicating a growing reliance on web-based platforms for public health awareness. The ISO/IEC 25010 standard has been widely recognized as a comprehensive model for evaluating software quality, including usability, reliability, and user satisfaction. The ISO/IEC 25010 framework was applied to assess the quality in use of the e-Ebola Awareness System—an online portal designed to disseminate information about the Ebola virus. The evaluation provided valuable insights into the system's effectiveness, usability, and areas needing improvement. Findings revealed that while the portal met certain quality criteria, there were also notable deficiencies that adversely affected user experience. This trend underscores the importance of ensuring that online health portals meet established quality in use standards to effectively support users' needs. These results emphasized the need for continuous evaluation and enhancement of online systems to ensure their effectiveness in delivering critical health information. Furthermore, Periera et al. (2023) [26]conducted a study on client-server architecture commonly used in web-based systems that often presents a vulnerability known as the single point of failure, where the malfunction of a single server node can disrupt the entire service. To address this issue, load balancing has emerged as a widely adopted technique. Load balancing involves the distribution of user requests across multiple server nodes or clusters to enhance service availability and performance. The study utilized the efficiency dimension from the ISO/IEC 25010:2011 standard to assess the performance of different load balancing methods. All these findings contributed to the growing body of literature emphasizing the importance of performance efficiency and

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architectural resilience in systems evaluated using ISO/IEC 25010 standards and conforming to the result of the evaluation, indicating the overall excellent rating as displayed by the four criteria in the ISO/IEC product quality mode

V. CONCLUSION AND RECOMMENDATIONS

Based on evaluation results that were referenced from ISO/IEC 25010 quality requirements, the study concluded that the electrical wiring software is rated excellent. The software was rated excellent in all categories, with mean scores verbally interpreted as excellent overall throughout the evaluated areas of functional suitability, performance efficiency, interaction capability, and reliability. Reliability was notably the most highly rated feature, confirming the software's dependability and consistency in providing precise and steady performance. It is recommended that the electrical wiring software be improved and maintained, with an emphasis on maintaining its high level of performance efficiency and dependability. To further enhance the user experience, future development efforts should focus on enhancing the software's interaction capabilities. To make sure the software stays in line with industry standards, regular quality evaluations based on ISO/IEC 25010 guidelines should also be carried out.

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