Library Progress International
Vol.44 No.3, Jul-Dec 2024: P.4743-4751

Print version ISSN 0970 1052
Online version ISSN 2320 317X

Original Article

Available online at www.bpasjournals.com

Evaluation Of Smart Campus Driveway And Vehicle Asset Management System

Reina T. Payongayong[1], Thelma D. Palaoag[2]

[1] Baliwag Polytechnic College
Baliwag, Bulacareinapayongayong@gmail.com
[2] University of the Cordilleras
Baguio Citytdpalaoag@uc-bcf.edu.ph

How to cite this article: Reina T. Payongayong, Thelma D. Palaoag (2024). Evaluation Of Smart Campus Driveway And Vehicle Asset Management System. *Library Progress International,* 44(3), 4743-4751.

ABSTRACT

Campus security gates and vehicle asset management are crucial components in ensuring the safety, efficiency, and optimal utilization of resources on campus. Innovative campus utilizes modern technologies like IoT, blockchain, and GPS to enhance campus safety and operational efficiency. This study used the ISO/IEC 25010:2011 to evaluate the acceptability of smart campus security gates and vehicle asset management. It identifies the strengths and weaknesses of the system for further improvements. It emphasizes the importance of implementing comprehensive technological solutions to address challenges, improve the innovative driveway security systems, and manage the vehicle assets within the campus environment. The researchers used quantitative analysis to gather the needed data to evaluate the system. The questionnaire used for the assessment is ISO/IEC 25010:2011 based standards with the following characteristics with its applicable sub-characteristics for functional suitability, compatibility, performance efficiency, interaction capability, reliability, security, maintainability, flexibility, and safety. The respondents consisted of clients, employees, students, and IT experts. The evaluation result is highly acceptable in terms of functionality, interaction capability, reliability, security, and maintainability. The evaluations' findings have broad implications for educational institutions, urban planning, and innovative city initiatives. By understanding the effectiveness and benefits of such systems, campuses can significantly enhance their security, operational efficiency, and environmental sustainability.

Keywords: Asset management, Campus security, GPS tracking, Security Gates, Smart Campus Driveway, Vehicle Management

1. INTRODUCTION

Smart campus security gates and vehicle management systems are innovative technological solutions specifically developed to improve safety, security, and operational effectiveness. These systems incorporate diverse technologies to oversee and regulate entry, oversee vehicle operations, and guarantee a safe setting for students, employees, and visitors. To ensure the security and efficiency of daily operations, colleges and universities increasingly need to include current technology as they transform into smart campuses of transportation. Implementing modern innovations such as IoT, blockchain, cloud computing, and artificial intelligence has revolutionized campus security [1] [2]. In the context of educational establishments, campus asset management is a vital undertaking requiring careful planning and effective implementation. This study examines the significance, obstacles, issues, and academic discussions related to the creation and execution of a framework with these characteristics. Additionally, GPS technology enables the monitoring and trace the vehicles owned by the campus, identifying their movement and tracking their previous actions. GPS monitors the vehicles in real-time, efficiently improving fleet management and overall security of the campus and evaluating the system's acceptability based on multiple standards, including functionality, dependability, and efficiency [3], [4].

Even though campus asset administration has inherent benefits, educational institutions frequently struggle with inconsistent systems, labor-intensive procedures, and data barriers that make it challenging to oversee

assets and make decisions effectively. Lack of a consistent architectural framework makes data integrity vulnerable, hinders scalability, and exacerbates inefficiencies. Furthermore, real-time visibility into asset location, status, and utilization patterns is impossible with traditional asset-tracking solutions that rely on manual inventory checks or static databases. This results in inefficient resource allocation and an increased risk of asset loss or mismanagement.

According to Sensor [5], effective asset management on campus is essential to guaranteeing maximum resource use, improving operational effectiveness, and creating a favorable learning environment. An all-inclusive architectural structure for campus asset management acts as a guide for coordinating asset lifetime operations, including procurement, distribution, use, maintenance, and disposal. Such a framework enables educational institutions to optimize asset management workflows, reduce resource waste, and allocate resources wisely to meet changing administrative and academic needs by outlining system features, requirements, and user roles. One dependable way to monitor and confirm the use of campus personnel's vehicles is to employ GPS tracking. It might improve transparency, reduce harm, and guarantee that rules and regulations on campus adhere to the system's features and functionality in relation to its level of acceptance.

The ISO/IEC 25010:2011 standard, also known as the Systems and Software Quality Requirements and Evaluation (SQuaRE) standard, is essential for assessing software quality. This standard includes a comprehensive product quality model with key characteristics such as functional suitability, performance efficiency, compatibility, interaction capability, reliability, security, maintainability, flexibility, and safety[6] [7]. Organizations can use the ISO/IEC 25010 standard to evaluate and ensure that their software products meet these essential quality attributes [8] [9] [10].

Evaluating the effectiveness of RFID-enabled gates in restricting access to authorized personnel and vehicles sheds light on the practical implementation of smart security solutions on campuses. It is critical to consider user feedback and perceptions when assessing the impact of smart campus security gates on the campus community. Student perception studies on smart campuses offer insights into how users perceive and interact with smart security systems. By considering user perspectives, institutions can tailor security measures to the needs and expectations of the campus community, ultimately improving overall safety and security [11].

This study emphasizes the importance of implementing comprehensive technological solutions to address the inherent challenges and improve the security gate transportation systems within the campus environment. The effectiveness efforts have focused on conceptualizing architectural frameworks encompassing system features, requirements, and user roles specifically tailored to the distinctive setting of educational institutions, rendering them more practical. Furthermore, research has underscored the transformative potential of GPS technology in facilitating real-time tracking of assets, thereby enhancing visibility, accountability, and traceability throughout campus environments. Additionally, inquiries into the acceptability of asset management systems have stressed the significance of functionality, reliability, usability, security, performance efficiency, and maintainability as pivotal criteria for evaluating the effectiveness of systems and ensuring user satisfaction.

2. METHODOLOGY

The researcher gathers the needed data using quantitative analysis to evaluate the system and achieve the study's objectives. The Likert scale survey questionnaire was distributed to evaluators, and a purposive sampling technique was used to collect data. This rating system is a psychometric instrument commonly employed in questionnaires, particularly in survey research, including descriptive survey research [12]. The standard for evaluating system acceptability is based on the International Organization for Standardization ISO/IEC 25010:2011 Systems and Software Quality Requirements and Evaluation (SQuaRE), specifically the Software Product Quality Model [6], as shown in Table 1. The quality model has the following characteristics: performance efficiency, functional suitability, compatibility, reliability, interaction capability, security, maintainability, flexibility, and safety. Several studies have applied this standard to assess software quality in various domains. For instance, Koepp et al. evaluated mobile apps for identifying pressure ulcers using the standard, focusing on functionality, efficiency, and reliability [13]. Furthermore, other studies used ISO/IEC 25010 to evaluate website portals and application tests to assess acceptability, usability, and performance

efficiency and to identify the strengths and weaknesses of software to improve it[14] [9] [15] [16].

Table 1. ISO/IEC 25010:2011 Software Product Quality Model

SOFTWARE PRODUCT QUALITY								
FUNCTIONAL SUITABILITY	PERFORMANCE EFFICIENCY	COMPATIBILITY	INTERACTION CAPABILITY	RELIABILITY	SECURITY	MAINTAINABILITY	FLEXIBILITY	SAFETY
FUNCTIONAL COMPLETENESS FUNCTIONAL CORRECTNESS FUNCTIONAL APPROPRIATENESS iso25000.com	TIME BEHAVIOUR RESOURCE UTILIZATION CAPACITY	CO-EXISTENCE INTEROPERABILITY	APPROPRIATENESS RECOGNIZABILITY LEARNABILITY OPERABILITY USER ERROR PROTECTION USER ENGAGEMENT INCLUSIVITY USER ASSISTANCE SELF-DESCRIPTIVENESS	FAULTLESSNESS AVAILABILITY FAULT TOLERANCE RECOVERABILITY	CONFIDENTIALITY INTEGRITY NON-REPUDIATION ACCOUNTABILITY AUTHENTICITY RESISTANCE	MODULARITY REUSABILITY ANALYSABILITY MODIFIABILITY TESTABILITY	ADAPTABILITY SCALABILITY INSTALLABILITY REPLACEABILITY	OPERATIONAL CONSTRAINT RISK IDENTIFICATION FAIL SAFE HAZARD WARNING SAFE INTEGRATION

Software evaluation is essential in assessing software products' quality, performance, and effectiveness [17]. The intended participants for this evaluation are the clients, specifically the General Services, Security, and Transportation Unit (GSSTU) personnel, students, and employees as users and IT experts. Evaluating a system's software is essential because it provides a comprehensive and structured framework for assessing software quality. It ensures a thorough, reliable, standardized approach to evaluating software quality, leading to better software products and more successful software projects.

3. RESULT AND DISCUSSIONS

Based on the evaluation of the system using ISO/IEC 25010:2011, the system assessment result shown in Table 2 focuses on functional suitability. The completeness of the system has the highest mean value, with an average of 4.86, which is interpreted as highly acceptable. The Likert scale interpretations used in this study have also been applied in evaluating mobile applications on Android operating systems, and the range of scores from 4.51 to 5.0 is very acceptable in verbal interpretations [18], [19]. It implies that the function required to meet all defined tasks and user objectives has been met [12]. The overall weighted mean of the system based on functional suitability is 4.83, which is interpreted as highly acceptable.

Table 2. Assessment of the Functional Suitability of the System

Sub-Characteristics	Descriptions	AWM	Interpretations
Completeness	Degree to which the set of functions covers all the specified tasks and intended users' objectives.	4.86	Highly Acceptable
Correctness	Degree to which a product or system provides accurate results when used by intended users.	4.89	Highly Acceptable
Appropriateness	Degree to which the functions facilitate the accomplishment of specified tasks and objectives.	4.84	Highly Acceptable
Overall Weighted Mean		**4.83**	**Highly Acceptable**

The assessment result for performance efficiency in Table 3 shows that capacity has the highest mean of 4.79, a little higher than time behavior, with an average mean of 4.74. Both of these are interpreted as highly acceptable. The system parameters meet the maximum limit requirements, and the response time and throughput rates are also met when performing its functions. The overall weighted mean for the system's performance efficiency is 4.77, interpreted as highly acceptable.

Sub-Characteristics	Descriptions	AWM	Interpretations
Time behaviour	Degree to which a product or system's response time and throughput rates meet requirements when performing its functions.	4.74	Highly Acceptable
Capacity	Degree to which the maximum limits of a product or system parameter meet requirements.	4.79	Highly Acceptable
Overall Weighted Mean		**4.77**	**Highly**

		Acceptable

Table 3. Assessment of Performance Efficiency of the System

Table 4 shows the result of the system assessment on system compatibility. Based on the result, interoperability has the highest mean value of 4.40, and co-existence has a mean value of 4.33, both interpreted as very acceptable. The overall weighted mean for system compatibility is 4.37, interpreted as very acceptable. It indicates that a system component can communicate with other products and utilize the transferred information. The system can effectively execute its necessary operations while co-existing in a shared environment and utilizing shared resources with other systems without causing harm or disruption to them. [20].

Table 4. Assessment of the Compatibility of the system

Sub-Characteristics	Descriptions	AWM	Interpretations
Co-existence	Degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products without detrimental impact on any other product.	4.33	Very Acceptable
Interoperability	Degree to which a system, product, or component can exchange information with other products and mutually use the information that has been exchanged.	4.40	Very Acceptable
Overall Weighted Mean		**4.37**	**Very Acceptable**

The assessment of interaction capability, as shown in Table 5, shows that user engagement has the highest value mean of 4.98, which is considered highly acceptable. The findings show that users interact with the system regularly and derive significant value from those interactions. The user interface features and content are appealing and motivating, promoting further engagement. The weighted mean of interaction capability is 4.86, indicating a high level of acceptability. It reflects positive user experiences, satisfaction, and a strong alignment between the system's functionalities and requirements.

Table 5. Assessment of the Interaction Capability of the system

Sub-Characteristics	Descriptions	AWM	Interpretations
Learnability	Degree to which the functions of a product or system can be learnt to be used by specified users within a specified amount of time.	4.79	Highly Acceptable
Operability	Degree to which a product or system has attributes that make it easy to operate and control.	4.86	Highly Acceptable
User error protection	Degree to which a system prevents users against operation errors.	4.86	Highly Acceptable
User engagement	Degree to which a user interface presents functions and information in an inviting and motivating manner, encouraging continued interaction.	4.98	Highly Acceptable
User assistance	Degree to which a product can be used by people with the widest range of characteristics and capabilities to achieve specified goals in a specified context of use.	4.81	Highly Acceptable
Overall Weighted Mean		**4.86**	**Highly Acceptable**

Table 6 displays the assessment results for system reliability. Based on the findings, recoverability has an average mean value of 4.86 and 4.84, both considered highly acceptable. The results show that the system is operational and accessible when needed and capable of recovering data and resuming operations following a failure. The overall weighted mean of the system reliability is 4.85, interpreted as highly acceptable. It demonstrates the system's reliability in terms of availability and immediate recovery from disruptions, leading to enhanced user satisfaction and operational efficiency.

Table 6. Assessment of the Reliability of the System

Sub-Characteristics	Descriptions	AWM	Interpretations
Availability	Degree to which a system, product, or component is operational and accessible when required for use	4.86	Highly Acceptable
Recoverability	Degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system	4.84	Highly Acceptable
Overall Weighted Mean		**4.85**	**Highly Acceptable**

Table 7 displays the system security assessment results. The results show remarkable uniformity in the average mean values of almost all reliability sub-characteristics, indicating the system's overall security. In particular, integrity has the highest mean value of 4.86, while the others maintain a consistent mean of 4.84, all interpreted as highly acceptable. The overall weighted mean of the system security is 4.85, which is highly acceptable. It indicates that the system excels in protecting information from unauthorized data access, disclosure, alteration, and destruction.

Table 7. Assessment of the Security of the System

Sub-Characteristics	Descriptions	AWM	Interpretations
Confidentiality	Degree to which a product or system ensures that data are accessible only to those authorized to have access.	4.84	Highly Acceptable
Integrity	Degree to which a system, product, or component ensures that the state of its system and data are protected from unauthorized modification or deletion either by malicious action or computer error.	4.86	Highly Acceptable
Accountability	Degree to which the actions of an entity can be traced uniquely to the entity.	4.84	Highly Acceptable
Authenticity	Degree to which the identity of a subject or resource can be proved to be the one claimed.	4.84	Highly Acceptable
Overall Weighted Mean		**4.85**	**Highly Acceptable**

Based on the results in Table 8, the system's modularity has the highest weighted mean value of 4.91, which is interpreted as highly acceptable. It indicates that the system has been designed and implemented so that it is simple to maintain, adapt, and improve. The system comprises discrete components, so changing one minimally impacts the others. The overall weighted mean for system maintainability is 4.87, interpreted as highly acceptable. The system can be updated effectively and efficiently, ensuring defect-free implementation and maintaining high product quality. The system's components and interactions can be thoroughly and efficiently tested to detect and correct flaws.

Sub-Characteristics	Descriptions	AWM	Interpretations
Modularity	Degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.	4.91	Highly Acceptable
Modifiability	Degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.	4.84	Highly Acceptable
Testability	Degree of effectiveness and efficiency with which test criteria can be established for a system, product, or component, and tests can be performed to determine whether those criteria have been met.	4.86	Highly Acceptable
Overall Weighted Mean		**4.87**	**Highly**

		Acceptable

Table 8. Assessment of the Maintainability of the system

The users evaluated the system flexibility as very acceptable, with an overall weighted mean of 4.43, as shown in Table 9. The results show that installability has the highest mean value of 4.53, interpreted as highly acceptable. It indicates that the system is simple to install and configure correctly and that users can quickly and easily set up the system without encountering significant problems. However, replaceability received the lowest score with an average mean of 4.33, which is still interpreted as very acceptable. It indicates that the system intends to accommodate changes and enhancements efficiently.

Table 9. Assessment of the Flexibility of the System

Sub-Characteristics	Descriptions	AWM	Interpretations
Adaptability	Degree to which a product or system can effectively and efficiently be adapted for or transferred to different hardware, software, or other operational or usage environments.	4.49	Very Acceptable
Scalability	Degree to which a product can handle growing or shrinking workloads or to adapt its capacity to handle variability.	4.35	Very Acceptable
Installability	Degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.	4.53	Highly Acceptable
Replaceability	Degree to which a product can replace another specified software product for the same purpose in the same environment.	4.33	Very Acceptable
Overall Weighted Mean		**4.43**	**Very Acceptable**

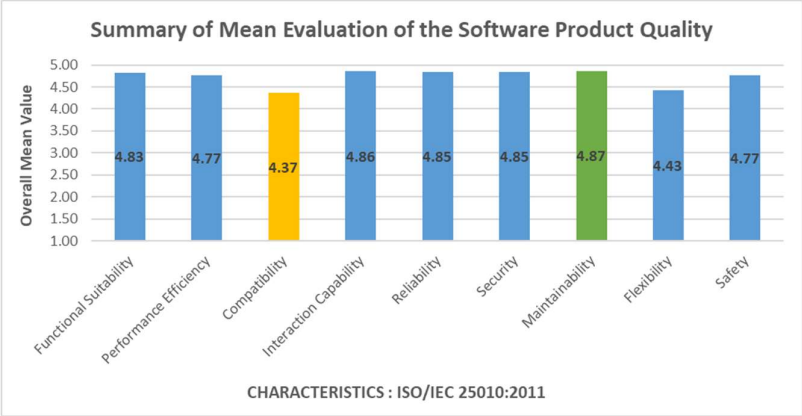
The results of users' assessments on system safety in Table 10 show an overall mean value of 4.77, which is interpreted as highly acceptable. The system maintains safety during and after integration with one or more components.

Table 10. Assessment of the Safety of the System

Sub-Characteristics	Descriptions	AWM	Interpretations
Safe integration	Degree to which a product can maintain safety during and after integration with one or more components**.**	4.77	Very Acceptable
Overall Weighted Mean		**4.77**	**Very Acceptable**

The evaluation summary results in Table 11 show that maintainability has the highest rating of 4.87, interpreted as highly acceptable, indicating that the software product is exceptionally well-designed and implemented to facilitate easy maintenance, adaptation, and enhancement. While system compatibility got the lowest score of the overall mean value of 4.37, it is still interpreted and considered very acceptable, which signifies that the software product is proficient in co-existing and interoperating with other software products and systems. The overall system performance is evaluated using the ISO/IEC 25010:2011 standard, which assesses the quality of software products.

Table 11. Summary of Mean Evaluation of the Software Product Quality



4. CONCLUSION

Ensuring the safety and security of the campus is crucial for establishing a secure and favorable environment for students, employees, and the entire educational institution to engage in learning, work, and residence. This study discusses implementing and evaluating campus driveway security gates and vehicle assets management systems that integrate RFID and GPS tracking technology. RFID technology monitors people and vehicles passing through gate security and restricts entry to unauthorized individuals or vehicles, improving campus security and allowing quick identification without physical contact. GPS tracking provides efficient asset management by recording vehicle locations and movements. It monitors and tracks vehicles entering and leaving campus in real time, improving security and control. The questionnaire is based on ISO/IEC 25010:2011 standard characteristics and applicable sub-characteristics. The system results demonstrate verbal interpretations of a highly acceptable score, with maintainability getting the highest score of 4.87 overall weighted means. The results show that the system demonstrates excellence across various quality attributes. Such high scores indicate that the system is functionally reliable but also efficient, user-friendly, and secure. It improves campus security, resource management, user satisfaction, and a sustainable operational environment. Evaluating smart campus security gates is vital for ensuring the effectiveness, efficiency, and dependability of security measures in educational institutions. Institutions can optimize their security infrastructure by considering user perceptions, technological advancements, and architectures. Continuous evaluation and improvement of intelligent security systems are critical in addressing evolving security challenges and preserving the safety of individuals on intelligent campuses. However, the researcher focuses only on the smart campus security gates; future researchers may also include the evaluation of other entities that compose an intelligent campus.

5. ACKNOWLEDGMENTS

My heartfelt appreciation to Professor Thelma D. Palaoag for guiding me throughout my research and DIT journey. I am most profoundly grateful to those who supported me: my colleagues, friends, and dear family, who always showed their support and love during my studies. To God be the Glory.

6. REFERENCES

[1] T. M. Fernández-Caramés and P. Fraga-Lamas, "Towards next generation teaching, learning, and context-aware applications for higher education: A review on blockchain, IoT, Fog and edge computing enabled smart campuses and universities," *Applied Sciences (Switzerland)*, vol. 9, no. 21. MDPI AG, Nov. 01, 2019. doi: 10.3390/app9214479.

[2] X. Xu *et al.*, "Research on Key Technologies of Smart Campus Teaching Platform Based on 5G Network," *IEEE Access*, vol. 7, pp. 20664–20675, 2019, doi: 10.1109/ACCESS.2019.2894129.

[3] N. Saritha Devi, K. S. R. Raju, A. Madhu, and R. Raja Sekhar, "Safety and security for school children's vehicles using GPS and IoT technology," *International Journal of Advanced Trends in Computer Science and Engineering*, vol. 7, no. 6, pp. 91–95, 2018, doi: 10.30534/ijatcse/2018/03762018.

[4] R. T. Payongayong and T. D. Palaoag, "Building A Smart Campus: Designing An Architectural Framework For Campus Security Gates And Vehicle Asset Management With GPS Tracking Technology," *Journal of Electrical Systems*, vol. 20, no. 3s, pp. 1373–1381, Apr. 2024, doi: 10.52783/JES.1514.

[5] D. Oladimeji, K. Gupta, N. A. Kose, K. Gundogan, L. Ge, and F. Liang, "Smart Transportation: An Overview

of Technologies and Applications," *Sensors*, vol. 23, no. 8. MDPI, Apr. 01, 2023. doi: 10.3390/s23083880.

[6] "ISO 25010." Accessed: Nov. 09, 2023. [Online]. Available: https://iso25000.com/index.php/en/iso-25000-standards/iso-25010

[7] M. Al Ani, G. Garas, J. Hollingshead, D. Cheetham, T. Athanasiou, and V. Patel, "Which Electronic Health Record System Should We Use? A Systematic Review," *Medical Principles and Practice*, vol. 31, no. 4. S. Karger AG, pp. 342–351, Sep. 18, 2022. doi: 10.1159/000525135.

[8] E. Peters and G. K. Aggrey, "Evaluating the Effectiveness of ERP Systems in HEIs: A Proposed Analytic Framework", doi: 10.1109/ICCMA.2019.00014.

[9] J. L. Llovido, M. A. D. Brogada, L. L. MacEda, and M. B. Abisado, "AppTest: Assessing the Usability and Performance Efficiency of BOSESKO for Digital Participation," *International Conference on Advanced Communication Technology, ICACT*, pp. 241–247, 2024, doi: 10.23919/ICACT60172.2024.10471927.

[10] E. Peters and G. K. Aggrey, "An ISO 25010 Based Quality Model for ERP Systems", doi: 10.25046/aj050272.

[11] M. F. Mustafa *et al.*, "Student Perception Study On Smart Campus: A Case Study On Higher Education Institution," *Malaysian Journal of Computer Science*, vol. 2021, no. Special Issue 1, pp. 1–20, 2021, doi: 10.22452/mjcs.sp2021no1.1.

[12] S. Budi, W. Gata, M. Noor, S. Pangabean, and C. Sri Rahayu, "NEWS PORTAL WEBSITE MEASUREMENT ANALYSIS USING ISO/IEC 25010 AND MCCALL METHODS."

[13] J. Koepp *et al.*, "The Quality of Mobile Apps Used for the Identification of Pressure Ulcers in Adults: Systematic Survey and Review of Apps in App Stores", doi: 10.2196/14266.

[14] J. Teknologi, A. Hussain, and E. O. C. Mkpojiogu, "AN APPLICATION OF THE ISO/IEC 25010 STANDARD IN THE QUALITY-IN-USE ASSESSMENT OF AN ONLINE HEALTH AWARENESS SYSTEM 1.0 INTRODUCTION," 2015. [Online]. Available: www.jurnalteknologi.utm.my

[15] S. Budi, W. Gata, M. Noor, S. Pangabean, and C. Sri Rahayu, "NEWS PORTAL WEBSITE MEASUREMENT ANALYSIS USING ISO/IEC 25010 AND MCCALL METHODS."

[16] A. Rivina, N. Malaya, E. A. Munar, P. Cuison, and E. G. Dacanay, "Information management system for research of Don Mariano Marcos Memorial State University–South La Union Campus," *Indonesian Journal of Electrical Engineering and Computer Science*, vol. 28, no. 3, pp. 1668–1675, Dec. 2022, doi: 10.11591/ijeecs.v28.i3.pp1668-1675.

[17] A. Mishra, R. Shatnawi, C. Catal, and A. Akbulut, "Techniques for calculating software product metrics threshold values: A systematic mapping study," *Applied Sciences (Switzerland)*, vol. 11, no. 23, Dec. 2021, doi: 10.3390/app112311377.

[18] D. M. V. Salac, "PRESENT: An Android-Based Class Attendance Monitoring System Using Face Recognition Technology," *International Journal of Computing Sciences Research*, vol. 2, no. 3, pp. 102–115, Dec. 2018, doi: 10.25147/ijcsr.2017.001.1.28.

[19] M. M. Ablaza-Cruz, "Designing a Mobile Application Framework as an Innovative IT Solution for Waste Recycling," in *IOP Conference Series: Materials Science and Engineering*, Institute of Physics Publishing, May 2020. doi: 10.1088/1757-899X/803/1/012046.

[20] P. Weichbroth, "A mixed-methods measurement and evaluation methodology for mobile application usability studies," in *Communication Papers of the 2019 Federated Conference on Computer Science and Information Systems*, PTI, Sep. 2019, pp. 101–106. doi: 10.15439/2019f299.

Author's Information

REINA TORRES-PAYONGAYONG

Institute of Information Technology and Innovation
Baliwag Polytechnic College
City of Baliwag, Bulacan, Philippines
reinapayongayong@gmail.com
https://orcid.org/0009-0006-7673-4256

THELMA D. PALAOAG

College of Information Technology & Computer Science
University of the Cordilleras Baguio City, Philippines
tdpalaoag@gmail.com
https://orcid.org/0000-0002-5474-7260

Scopus Author ID: 56904198800
ResearcherID: AAB-7727-2019