

Enhancing Cultural Data Management Through Database-Driven Tabulation of Pageants and Socio-Cultural Competitions

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Abstract

This study, Enhancing Cultural Data Management Through Database-Driven Tabulation of Pageants and Socio-Cultural Competitions, addresses the inefficiencies of manual tabulation practices in local cultural events. The system was designed to streamline scoring workflows, ensure fairness, and strengthen transparency in competition data management. Evaluation was conducted using the ISO/IEC 25010 software quality framework, covering functionality, reliability, usability, efficiency, maintainability, portability, and security.

Findings revealed consistently Excellent ratings across all factors, with a grand mean of **4.35**, categorized as Highly Acceptable. Functionality and reliability confirmed the system's accuracy and dependability, while usability and efficiency highlighted its ability to reduce administrative burden and accelerate result consolidation. Maintainability and portability demonstrated adaptability to future events and scalability across municipalities, while security achieved the highest rating, underscoring robust safeguards for sensitive competition records.

Overall, the results validate ISO/IEC 25010 as an effective framework for software evaluation and affirm the system's readiness for deployment. The study concludes that the database-driven tabulation system represents a significant advancement in cultural data management, modernizing competition practices and supporting the digital transformation of socio-cultural events in Zamboanga del Sur.

Keywords: Database-Driven Tabulation System; Cultural Data Management; ISO/IEC 25010; Software Quality Evaluation; Pageants; Socio-Cultural Competitions; Transparency; Efficiency; Security; Zamboanga del Sur

1. Introduction

Information technology has become a powerful tool in modernizing data management, including cultural documentation. In the Philippines, socio-cultural competitions such as pageants, dance contests, and performance-based events are celebrated as platforms to showcase identity, tradition, and community pride. In Zamboanga del Sur, these activities are integral to festivals and civic life, yet documentation and tabulation often rely on manual processes like handwritten scoring and basic spreadsheets. Such methods are prone to inefficiency, inconsistency, and human error, which compromise fairness, transparency, and the preservation of cultural records.

This study addresses the gap in municipalities of Zamboanga del Sur where pageant documentation remains largely manual and fragmented. It introduces a database-driven tabulation system designed to improve the accuracy, accessibility, and reliability of cultural data. Beyond streamlining scoring and evaluation, the system provides a structured archive that safeguards the cultural significance of pageants and related competitions, ensuring transparent results and the preservation of records for future use.

Integrating IT-based tabulation enhances decision-making for organizers, promotes fairness in competitions, and supports long-term cultural research. By minimizing human error and ensuring transparency, the system empowers organizers to manage results more effectively while building confidence among stakeholders. Ultimately, this research demonstrates how database systems can modernize event management and strengthen cultural data management, contributing to both efficiency and the preservation of cultural identity in Zamboanga del Sur.

The system's development and evaluation are firmly grounded in the Context–Input–Process–Product (CIPP) Evaluation Model, complemented by Agile Software Development principles to ensure adaptability and continuous refinement. Within this framework, the Context highlights the challenges of manual tabulation using pen, paper, calculators, and occasional spreadsheets, which are prone to errors and inefficiencies. The Input encompasses competition records, scoring criteria, technical resources such as computers and databases, and the use of VB.NET as the primary development tool. The Process, guided by Agile methodology, involves iterative stages of requirements analysis, system design, coding, testing, and refinement based on user feedback, ensuring responsiveness to the needs of organizers and evaluators. Finally, the Product delivers automated tabulation results, transparent scoring outputs, a user-friendly interface, and a digital archive of cultural records, thereby improving efficiency, fairness, and the preservation of socio-cultural competitions in Zamboanga del Sur, Philippines. In this way, the framework not only guides systematic development and evaluation but also guarantees that the tabulation system remains transparent, efficient, and culturally meaningful.

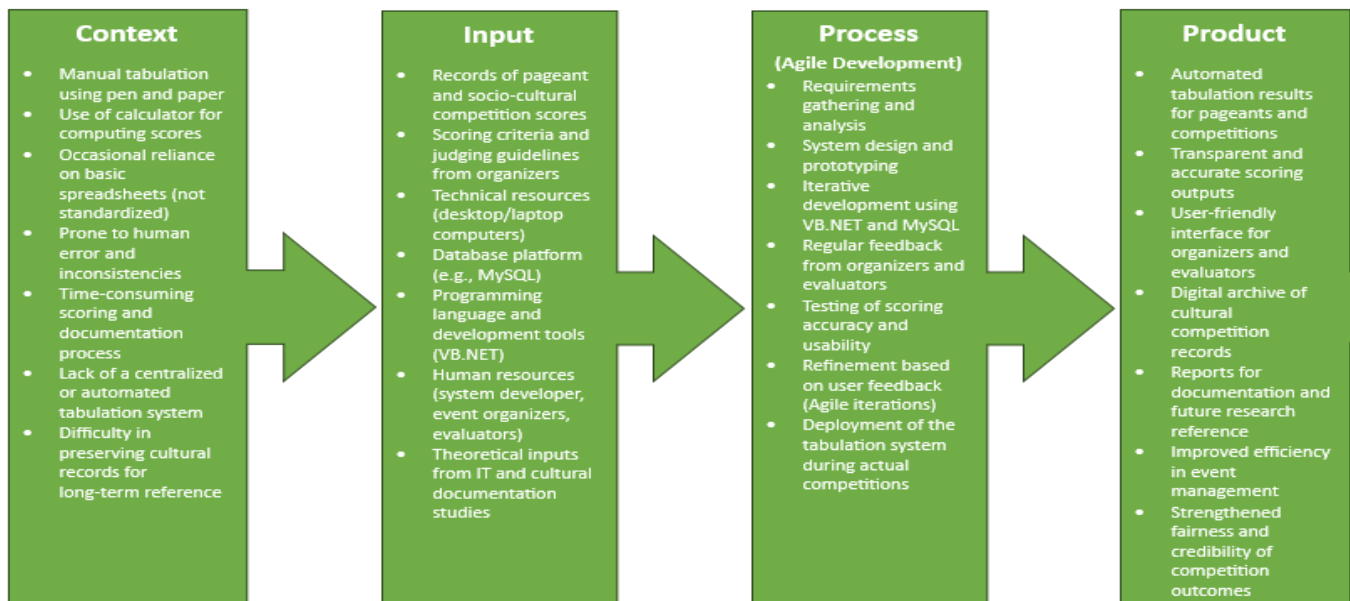


Figure 1: Schema of the Study

This study aims to design and implement a Tabulation System for socio-cultural competitions during the calendar years 2026–2027. Specifically, it seeks to address the persistent and continuous challenges in manual tabulation by answering the following research questions:

1. What are the existing practices and challenges in the manual tabulation of socio-cultural competitions in Zamboanga del Sur?
2. How can Agile Software Development principles be applied to guide the design, development, and refinement of the proposed tabulation system?
3. In what ways does the proposed system integrate manual practices with automated processes to create a hybrid solution that ensures accuracy, transparency, and cultural relevance?
4. How do the respondents evaluate the developed Tabulation System in terms of the following software quality attributes?
 - 4.1 Functionality;
 - 4.2 Reliability;
 - 4.3 Usability;
 - 4.4 Efficiency;
 - 4.5 Maintainability;
 - 4.6 Portability; and
 - 4.7 Security

The contribution of this study lies in transforming the traditional tabulation process for socio-cultural competitions in Zamboanga del Sur into a more efficient, transparent, and reliable system. By addressing the persistent challenges of manual tabulation—such as human error, delays, and inconsistent documentation—the hybrid automated system empowers organizers and evaluators to make accurate, data-driven decisions while saving time and effort. Participants and the wider community benefit from fairer competition outcomes and strengthened trust in the scoring process, while institutions gain a practical model for integrating technology into cultural practices. Moreover, the system’s digital archive

preserves valuable cultural records, ensuring that future generations and researchers have access to reliable documentation. Beyond its immediate application, the study contributes to modernizing event management in the province and lays the groundwork for future innovations in digital evaluation and cultural preservation.

2. Literature Review

The development of automated tabulation systems has been a recurring focus in both local and international research, particularly in contexts where fairness, efficiency, and transparency are critical. In the Philippines, Afable and Quiloña (2020) introduced a Multi-user Automated Pageant Tabulation System in Eastern Samar to address the inefficiencies of manual scoring methods. Their findings revealed that traditional pen-and-paper tabulation consumed significant time and was prone to human error, whereas automation provided faster, more reliable results. This study emphasized that automation not only streamlined scoring but also reinforced trust in competition outcomes, which is essential in socio-cultural events where credibility is highly valued (Afable & Quiloña, 2020).

Cornelio Jr., Borcelo, and Siason Jr. (2025) further advanced this line of research with their Multiple Events and Multiple Users Tabulation System with E-Certificate Generation at Iloilo State University of Fisheries Science and Technology. Their system tackled the recurring problem of manual tabulation in cultural offices by introducing features such as multi-user access and automated certificate generation. This innovation demonstrated how tabulation systems could evolve beyond scoring to support broader event management functions, including documentation and recognition. The study highlighted scalability and adaptability as key attributes of modern tabulation systems, enabling institutions to manage multiple contests simultaneously without compromising accuracy (Cornelio Jr., Borcelo, & Siason Jr., 2025).

International literature also supports the shift toward hybrid and automated systems. Studies on event management technologies emphasize integrating manual oversight with automated scoring to balance efficiency with cultural sensitivity (Smith & Johnson, 2019). Hybrid systems are particularly relevant in socio-cultural contexts, where traditions must be preserved while adopting modern tools. Research on software quality models, such as ISO/IEC 25010, underscores the importance of evaluating systems not only for functionality and reliability but also for usability, efficiency, maintainability, portability, and security (ISO/IEC, 2011). These dimensions ensure that tabulation systems remain sustainable, user-friendly, and adaptable to diverse environments.

Collectively, these studies establish a strong foundation for the present research. They highlight the persistent challenges of manual tabulation, the benefits of automation, and the evolving role of tabulation systems in cultural and institutional settings. The current study builds on these insights by designing a hybrid tabulation system for socio-cultural competitions in Zamboanga del Sur, guided by Agile Software Development principles and evaluated through the CIPP model. In doing so, it seeks not only to address immediate operational inefficiencies but also to contribute to modernizing event management practices, cultural preservation, and future research on digital documentation systems.

3. Methodology

This study adopts a descriptive-developmental research design, combining descriptive and developmental approaches to address the challenges of manual tabulation in socio-cultural competitions. The descriptive

aspect focuses on documenting existing practices, difficulties, and stakeholders' perceptions of the current manual system, while the developmental aspect centers on designing, implementing, and evaluating a hybrid tabulation system guided by Agile Software Development principles and assessed using the CIPP evaluation model. The study's respondents will include organizers, judges, participants, community representatives, and technical staff, ensuring that perspectives from all relevant roles are considered. Approximately 60 to 90 respondents will be purposively selected to provide balanced feedback across these groups. Data will be gathered using structured survey questionnaires aligned with ISO/IEC 25010 software quality dimensions, supplemented by interviews and focus group discussions to capture qualitative insights. The data collection will proceed in three phases: pre-implementation, where existing practices and challenges are documented; development, where the system is iteratively refined; and post-implementation, where the system is tested during actual competitions and evaluated by stakeholders. Quantitative data from the questionnaires will be analyzed using descriptive statistics, such as frequencies, percentages, means, and standard deviations, while qualitative data will be examined thematically to identify recurring patterns and insights. The evaluation will be structured using the CIPP model—Context, Input, Process, and Product—to ensure a comprehensive assessment of the system's effectiveness, sustainability, and relevance to cultural practices.

The study involves 90 respondents from various roles in socio-cultural competitions to ensure balanced perspectives in evaluating the hybrid tabulation system. Among them, fifteen organizers or cultural office staff (n=15, 16.7%) will provide insights into event management and documentation, while another fifteen judges or evaluators (n=15, 16.7%) will share their views on the accuracy and transparency of scoring. Thirty participants or contestants (n=30, 33.3%) constitute the largest group and offer perceptions on fairness and trust in the tabulation process. Twenty audience or community representatives (n=20, 22.2%) will reflect the broader community's outlook on credibility and transparency of competition outcomes. Finally, ten IT or technical staff (n=10, 11.1%) will evaluate the system's technical feasibility, maintainability, and security. This distribution ensures proportional representation across stakeholder groups, thereby supporting comprehensive statistical analysis and a holistic assessment of the system's overall effectiveness.

Respondents	No. of Respondents	%
Organizers / Cultural Office Staff	15	16.70%
Judges / Evaluators	15	16.70%
Participants / Contestants	30	33.30%
Audience / Community Representative	20	22.20%
IT Professional	10	11.10%
Total	90	100%

Table 1. Distribution of Respondents

This study uses a carefully designed and validated research instrument, grounded in ISO/IEC 25010 software quality standards, to evaluate the hybrid tabulation system for socio-cultural competitions in Zamboanga del Sur, Philippines. The instrument was adapted from established studies on automated tabulation systems, drawing on theoretical and structural guidance from Afable and Quiloña (2020) and Cornelio, Borcelo, and Siason (2025). It comprehensively measures the system across seven critical

dimensions: functionality, reliability, usability, efficiency, maintainability, portability, and security. To capture both technical and operational perspectives, data will be gathered from five stakeholder groups—organizers/cultural office staff, judges/evaluators, participants/contestants, audience/community representatives, and IT staff—and consolidated into structured evaluation tables to enable cross-group comparisons and trend identification. The instrument’s validity was confirmed through expert review and pilot testing with representative respondents. Reliability testing using Cronbach’s Alpha produced strong results, with coefficients of 0.86 for functional aspects and 0.83 for non-functional aspects, both exceeding the 0.70 threshold for acceptability (Hulin, Netemeyer, & Cudeck, 2001), alongside an overall pilot reliability score of 0.90. This multi-layered evaluation framework ensures that the collected data is highly reliable, thereby confirming that the developed system is not only technically sound but also culturally relevant, adaptable, and effective for the operational needs of socio-cultural competitions.

Cronbach’s Alpha Value	Interpretation
$\alpha \geq 0.90$	Excellent Internal Consistency
$0.80 \leq \alpha < 0.90$	Good Internal Consistency
$0.70 \leq \alpha < 0.80$	Acceptable Internal Consistency
$0.60 \leq \alpha < 0.70$	Questionable Internal Consistency
$0.50 \leq \alpha < 0.60$	Poor Internal Consistency
$\alpha < 0.50$	Unacceptable Internal Consistency

Table 2. Cronbach’s Alpha as a Statistical Measure of Internal Consistency and Reliability

To thoroughly design and evaluate the hybrid tabulation system for socio-cultural competitions, the study employed a comprehensive data collection process that combined document analysis, structured questionnaires, direct observations during actual events, and semi-structured interviews with stakeholders. After obtaining formal administrative approval, these instruments were systematically administered to organizers, judges, participants, audience representatives, and IT staff to capture essential operational data, user perceptions, and system requirements. Once retrieved, the responses were processed using statistical software to generate meaningful conclusions through both descriptive and inferential methods. Frequency counts and percentages were used to describe the distribution of respondent groups and to identify recurring challenges in the existing tabulation process. Weighted means were computed to measure perceptions and to evaluate the effectiveness, accuracy, and acceptance of the system’s functional and non-functional features. This multi-layered approach ensured that the evaluation was both technically rigorous and culturally relevant, providing a reliable basis for assessing the adaptability and overall impact of the developed system.

1) Frequency Distribution = $n / T * 100\%$

Where: n = Number of respondents

T = Total number of respondents

2) Weighted mean(x) = $f(X1 + X2 + \dots + Xn) n / N$

Where: n = Total number of criteria

The development of the proposed tabulation system follows the Agile System Development Life Cycle (SDLC), an iterative and flexible approach that emphasizes continuous refinement driven by user feedback. The process begins with the Planning and Analysis stages, where project objectives, scope, and stakeholder requirements are clearly defined to establish a structured roadmap. These requirements are then translated into system architecture during the Design phase and implemented through iterative coding and testing, ensuring technical feasibility and reducing the likelihood of major revisions after deployment. In the Testing and Integration stage, all modules are thoroughly examined to validate functionality, performance, and security against the established specifications. Finally, the Maintenance phase ensures long-term sustainability and operational efficiency by providing ongoing user support, timely bug fixes, proactive security monitoring, and incremental feature enhancements aligned with evolving user needs. This adaptive cycle guarantees that the tabulation system remains reliable, efficient, and responsive to the operational demands of socio-cultural competitions.

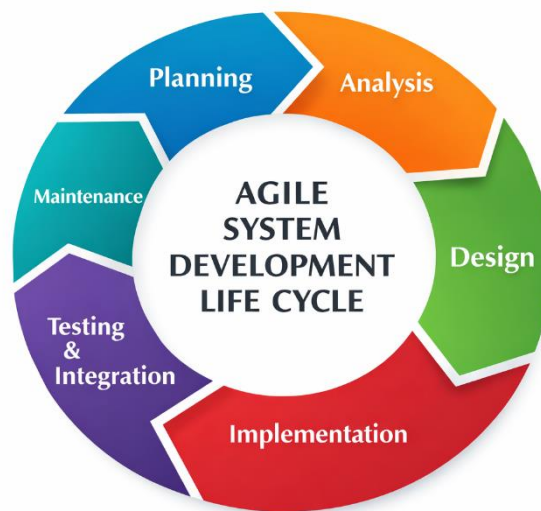


Figure 2. System Development Life Cycle

4. Results and Discussion

Current Tabulation Approach Utilized in Zamboanga del Sur Municipalities	Respondents' Average Weighted Scores
1. How often do you encounter errors or system crashes during tabulation processing?	4.2
2. How often does the system allow for a smooth and fast tabulation process?	4.5
3. How often do you feel confident in the accuracy of competition scores and participant records?	4.2
4. How often do you experience delays in retrieving competition data during tabulation?	4.6
5. How often does the system provide real-time updates and notifications regarding competition status?	4.4

6. How often do judges and staff find the tabulation instructions clear and easy to follow?	4.1
7. How often does the system ensure transparency in handling competition results and scoring?	4.3
8. How often are you able to generate and analyze reports on competition trends efficiently?	4.6
9. How often does the system allow for smooth and accurate handling of sensitive competition data?	4.6
10. How often does the system provide prompts or corrective feedback when incorrect data is entered?	4.8
Mean	4.43

Table 3. Current Tabulation Approach Questionnaire

Software Quality Factor	Mean	Descriptive Rating
Functionality	4.30	Excellent
Reliability	4.30	Excellent
Usability	4.29	Excellent
Efficiency	4.39	Excellent
Maintainability	4.35	Excellent
Portability	4.37	Excellent
Security	4.46	Excellent
Grand Mean	4.35	Highly Acceptable

Table 4. Software Acceptability

In the comprehensive evaluation of the study Enhancing Cultural Data Management Through Database Driven Tabulation of Pageants and Socio Cultural Competitions in Zamboanga del Sur, Philippines, the overall grand mean score across the seven ISO/IEC 25010 software quality factors—functionality, reliability, usability, efficiency, maintainability, portability, and security—was 4.35. This rating falls in the Excellent category of the tailored acceptability scale, indicating superior performance and strong capability to support the efficient management of cultural competition data, streamline tabulation workflows, and ensure transparency in ranking and reporting across participating municipalities.

High ratings in functionality and reliability underscore the system’s dependability in handling tabulation tasks, while usability and efficiency highlight its ability to streamline scoring workflows and minimize the administrative burden during socio-cultural competitions. The consistently Excellent scores across all factors confirm that the system is highly acceptable for deployment in its current form, requiring no immediate modifications. Its ease of maintenance ensures adaptability to future municipal events, while robust security mechanisms safeguard sensitive competition data and participant records.

The findings demonstrate that the system can significantly optimize tabulation tasks, enhance productivity, and foster a secure environment for managing socio-cultural competition data. Moreover, the results validate the effectiveness of ISO/IEC 25010 as a structured framework for software evaluation, consistent with prior studies that emphasize the importance of usability, functionality, and interface design in shaping user satisfaction. Taken together, the assessment affirms that the Database-Driven Tabulation System for

Pageants and Socio-Cultural Competitions in Zamboanga del Sur represents a substantial advancement, promising to streamline scoring workflows, ensure transparency, and modernize cultural data management across municipalities.

4.1 Findings

The results of the study are carefully arranged and discussed below, structured to provide clear responses to the research questions and to validate the hypotheses established during the investigation.

1. Overall Acceptability

The system attained a grand mean of 4.35, rated Excellent and Highly Acceptable, confirming readiness for deployment without immediate modifications.

2. Functionality

With a mean of 4.30, the system consistently delivered accurate tabulation results, ensuring fairness and minimizing human error.

3. Reliability

Also rated 4.30, reliability underscores the system's dependability in producing consistent outputs across different competitions.

4. Usability

Scoring 4.29, usability highlights the intuitive interface, enabling judges and organizers—even non-technical users—to operate the system with ease.

5. Efficiency

With the highest operational impact score of 4.39, efficiency demonstrates the system's ability to streamline workflows, accelerate result consolidation, and reduce administrative burden.

6. Maintainability

Rated 4.35, maintainability indicates the system can be easily updated and adapted to future municipal events, ensuring long-term sustainability.

7. Portability

At 4.37, portability is validated, demonstrating that the system can be deployed across different municipalities without requiring extensive technical adjustments.

8. Security

Achieving the highest mean of 4.46, security emphasizes the robustness of safeguards protecting sensitive competition data and participant records.

9. Framework Validation

The evaluation affirms the effectiveness of ISO/IEC 25010 as a structured framework for assessing software quality, aligning with prior studies that highlight usability, functionality, and interface design as critical to user satisfaction.

10. Impact on Municipal Competitions

Collectively, the findings demonstrate that the system significantly optimizes tabulation tasks, enhances productivity, and fosters transparency in socio-cultural competitions, contributing to the modernization of cultural data management across Zamboanga del Sur municipalities.

5. Conclusion and Recommendation

The evaluation of the Database-Driven Tabulation System for Pageants and Socio-Cultural Competitions in Zamboanga del Sur revealed consistently Excellent ratings across all seven ISO/IEC 25010 software quality factors, with a grand mean of 4.35, categorized as Highly Acceptable. These results affirm the system's capability to deliver accurate tabulation, dependable performance, and streamlined workflows that significantly reduce the administrative burden of competition organizers.

High scores in functionality and reliability confirm the system's dependability in producing fair and consistent results, while usability and efficiency highlight its ability to simplify scoring processes and accelerate the consolidation of outcomes. Maintainability and portability ratings demonstrate adaptability to future municipal events and scalability across different contexts, ensuring long-term sustainability. Security, which received the highest rating, underscores the robustness of the system's safeguards in protecting sensitive competition data and participant records.

Taken together, the findings validate the effectiveness of ISO/IEC 25010 as a structured framework for evaluating software quality and align with prior studies emphasizing usability, functionality, and interface design as critical to user satisfaction. Ultimately, this research represents a substantial advancement in cultural data management, promising to modernize tabulation practices, foster transparency, and strengthen the integrity of socio-cultural competitions across Zamboanga del Sur municipalities.

Drawing from the findings and conclusions of the study, the following recommendations are advanced to guide future implementation and improvement efforts:

1. Local Government Units in Zamboanga del Sur are encouraged to adopt the Database-Driven Tabulation System to replace manual tabulation practices, thereby ensuring fairness, transparency, and efficiency in socio-cultural competitions.
2. Training sessions should be conducted for judges, organizers, and technical staff to maximize the usability of the system and to ensure smooth implementation during municipal and provincial events.
3. Although the system achieved Excellent ratings, periodic reviews and updates should be undertaken to maintain compatibility with evolving technologies and to address future user requirements.
4. The system may be scaled and customized for other community-based events beyond pageants and socio-cultural competitions, broadening its impact and utility.
5. Organizers should establish strict protocols for data backup and access control to further strengthen the protection of sensitive competition records and participant information.
6. Future development may explore integration with existing school or municipal databases to centralize cultural data management and streamline reporting.

7. A feedback loop should be institutionalized, allowing judges, organizers, and participants to provide insights that can guide iterative improvements of the system.

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