

LEADERSHIP PRACTICES AND CHALLENGES OF PUBLIC SCHOOL SPORTS COORDINATORS: BASIS FOR A SPORTS DEVELOPMENT FRAMEWORK

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Abstract

This study examined the leadership practices, job demands, job resources, and challenges encountered by public school sports coordinators in Tanauan City, Batangas, using an explanatory-sequential approach.

The total of eighty-four (84) sports coordinators and MAPEH Coordinators from the sixty-one (61) public elementary and secondary schools in Tanauan City during the school year 2025-2026 served as the respondents in this study.

Quantitative findings, supported by qualitative data, revealed that coordinators demonstrate a very high level of leadership practices, particularly in democratic, transformational, and transactional styles, emphasizing collaboration and motivation. Despite this, sports coordinators experience high job demands, including heavy workload, time pressure, administrative tasks, and limited access to facilities and equipment. Job resources such as administrative support, training, and community involvement are moderately available but inconsistent. Key challenges identified include shortages of qualified coaches, inadequate facilities and equipment, and difficulty balancing teaching and coordination roles. Results showed no significant direct relationship between leadership practices and challenges encountered, indicating that these issues are largely structural. However, job resources significantly enhance leadership effectiveness, while job demands intensify challenges. While qualitative findings highlighted resilience, intrinsic motivation, and adaptability among coordinators despite constraints.

The study concludes that while leadership is strong, systemic limitations hinder program effectiveness. It recommends strengthening institutional support, improving resource allocation, and implementing sustainable development strategies to enhance school sports programs.

Keywords – leadership practices, job demands, job resources, sports coordinators

INTRODUCTION

Leadership plays a vital role in the success and sustainability of school sports programs. Effective leaders influence

organizational performance by motivating members, coordinating activities, and

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creating environments that foster collaboration and development. In educational institutions, sports coordinators function not only as organizers of athletic activities but also as leaders responsible for athlete development, program implementation, and the promotion of holistic education through sports participation. Their leadership practices significantly affect the quality of sports programs, athlete engagement, and school representation in local and regional competitions.

In the Philippine educational system, sports coordinators in public schools commonly perform multiple responsibilities beyond athletic program management. Aside from organizing school sports activities and competitions, they are often assigned teaching duties, administrative work, documentation tasks, and event coordination responsibilities. Such overlapping functions create heavy job demands that may influence their leadership effectiveness and the overall implementation of sports programs. The challenge becomes more evident in resource-constrained public schools where inadequate facilities, lack of equipment, insufficient coaching personnel, and limited institutional support hinder sports development.

Recent literature highlights the importance of leadership styles in educational and sports administration. Democratic leadership encourages collaboration and participative decision-making, thereby improving motivation and organizational commitment (Wang, 2022). Transformational leadership, on the other hand, inspires followers to transcend self-interest and pursue collective goals through vision, motivation, and individualized support (Bass & Riggio, 2006). Transactional leadership focuses on structure, accountability, and reward systems to ensure compliance and performance, while autocratic leadership emphasizes authority, discipline, and centralized decision-making (Faraz, 2023). These leadership styles influence the management of sports programs differently depending on the organizational context and available resources.

The present study is anchored on the Job Demands-Resources (JD-R) Model developed by Bakker and Demerouti (2007), which explains how job demands and job resources influence employee well-being and work performance. Job demands refer to physical, psychological, organizational, or social aspects of work requiring sustained effort and may lead to stress and burnout. These include workload, time

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pressure, administrative responsibilities, limited facilities, and organizational challenges. Conversely, job resources include administrative support, training opportunities, recognition, and community involvement that help employees accomplish work goals, reduce stress, and improve motivation.

In the context of school sports coordination, public school sports coordinators experience increasing demands due to extensive documentation, preparation for athletic competitions, coaching responsibilities, and compliance with Department of Education policies. Studies in the Philippines revealed that teacher-coaches and sports coordinators frequently struggle with balancing instructional duties and athletic program management (Gudelos & Mabitad, 2025). Moreover, inadequate sports facilities and equipment continue to challenge the effective implementation of school sports programs (Salino et al., 2024).

The problem is particularly evident in Tanauan City, Batangas, where sports performance in regional athletic competitions has remained relatively low compared to neighboring divisions. Despite existing sports initiatives and policies such as Republic Act No. 10588 or the Palarong Pambansa Act, sports coordinators

continue to face limitations in funding, training opportunities, equipment availability, and coaching personnel. Such realities indicate a need to examine how leadership practices interact with job demands and resources in influencing sports program implementation.

This study aimed to explore the leadership practices and challenges encountered by public school sports coordinators in Tanauan City, Batangas. Specifically, it investigated the extent of leadership practices, the level of job demands, the availability of job resources, and the challenges experienced by sports coordinators. Furthermore, the study examined the relationship between leadership practices and challenges encountered, as well as the moderating effects of job demands and job resources. The findings served as the basis for developing a sports development framework that may strengthen leadership practices and improve sports program implementation in public schools.

The significance of this study lies in its contribution to educational leadership and sports management literature in the Philippine context. The findings may assist school administrators, policymakers, sports coordinators, and stakeholders in designing interventions that enhance leadership

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capacity, improve institutional support, and promote sustainable sports development programs in public schools.

OBJECTIVES OF THE STUDY

The study aimed to examine the leadership practices and challenges encountered by public school sports coordinators in Tanauan City, Batangas.

Specifically, it sought to:

1. determine the extent of leadership practices exhibited by sports coordinators;
2. identify the level of job demands experienced by sports coordinators;
3. determine the availability of job resources;
4. identify the challenges encountered by sports coordinators;
5. determine whether there is a significant relationship between leadership practices and challenges encountered by sports coordinators;
6. determine whether job demands and job resources significantly moderate leadership practices and challenges encountered; and
7. propose a sports development framework based on the findings of the study.

METHODOLOGY

The study employed an explanatory-sequential mixed methods research design, which involved the collection and analysis of quantitative data in the first phase, followed by qualitative data in the second phase to further explain and validate the quantitative findings. According to Creswell and Creswell (2023), explanatory-sequential design is appropriate when quantitative

results require deeper interpretation through participants' lived experiences and contextual explanations. This design was deemed suitable because the study sought not only to determine the statistical relationships among leadership practices, job demands, job resources, and challenges encountered by sports coordinators, but also to understand how these variables were experienced and interpreted within the context of public-school sports management.

In the quantitative phase, numerical data were gathered to determine the extent of leadership practices, level of job demands, availability of job resources, and challenges encountered by public-school sports coordinators and MAPEH coordinators in the Division of Tanauan City, Batangas during School Year 2025–2026. Statistical analyses were conducted to identify significant relationships and moderating effects among the variables. The quantitative findings served as the basis for the second phase of the study. Specifically, the results guided the identification and selection of interview participants who demonstrated varied leadership practices, levels of job demands and resources, and differing experiences regarding challenges encountered in sports coordination.

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The qualitative phase followed after the quantitative analysis to provide a deeper explanation of the statistical findings. Purposive sampling was utilized in selecting seven sports coordinators who exhibited relevant characteristics based on the quantitative results, such as coordinators with high and low perceptions of challenges, varying leadership styles, and different levels of access to job resources. These participants were considered capable of providing rich and meaningful insights regarding the quantitative trends identified during the first phase. Through semi-structured interviews, participants described their experiences, leadership approaches, coping mechanisms, and perceptions regarding the realities of managing sports programs in public schools.

Integration of the quantitative and qualitative phases occurred at two points of the research process. First, integration occurred during participant selection, wherein the quantitative findings informed the purposive selection of qualitative participants. Second, integration took place during the interpretation and discussion stage through the comparison and connection of statistical results with emerging qualitative themes. The qualitative findings were used to explain,

support, and clarify the quantitative results. For example, statistical findings related to the influence of transformational leadership and the moderating effects of job resources were further illuminated through participants' narratives describing how administrative support, collaboration, and professional development opportunities helped them manage sports-related responsibilities and challenges effectively. According to Feters and Molina-Azorin (2020), integration in mixed methods research strengthens the validity and comprehensiveness of findings by connecting numerical trends with contextual explanations.

The respondents of the quantitative phase consisted of public-school sports coordinators and MAPEH coordinators from elementary and secondary schools in the Division of Tanauan City, Batangas. Out of the target population of 86 coordinators from 61 public schools, a total of 84 respondents participated in the study. Complete enumeration was employed because the population was manageable and accessible, allowing the inclusion of all qualified respondents and ensuring adequate representation of coordinators within the division.

The study utilized a researcher-made questionnaire adapted from established

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leadership and organizational assessment tools, particularly the Multifactor Leadership Questionnaire developed by Bass and Avolio (1994). The instrument consisted of four major areas: leadership practices, job demands, job resources, and challenges encountered. Leadership practices measured autocratic, democratic, transformational, and transactional leadership styles using a four-point Likert scale. Job demands included workload, time pressure, facilities, equipment, and administrative responsibilities. Job resources covered administrative support, training opportunities, community involvement, and recognition of work. Challenges encountered focused on issues related to qualified coaches, facilities, equipment, financial constraints, and balance between teaching and sports responsibilities.

The constructs for job demands and job resources were anchored on the Job Demands–Resources Model proposed by Bakker and Demerouti (2007), which explains how organizational demands and available resources influence employee performance and well-being. This framework provided a suitable basis for examining the working conditions and challenges experienced by sports coordinators in public schools.

To establish content validity, the instrument was reviewed by experts in educational leadership, sports management, and research methodology. Their comments and suggestions were incorporated in revising the questionnaire. A pilot test was subsequently conducted among coordinators outside the target locale. Reliability testing using Cronbach’s alpha yielded acceptable coefficients, indicating satisfactory internal consistency of the instrument.

Prior to data gathering, the researcher secured approval from the Schools Division Superintendent and the school heads of participating schools. Respondents were informed about the objectives, significance, and procedures of the study. Participation was voluntary, and informed consent was obtained before the administration of questionnaires and conduct of interviews. Survey questionnaires were personally distributed and retrieved by the researcher to ensure a high retrieval rate and accurate data collection.

For the qualitative phase, semi-structured interviews were conducted with the selected participants. Interview questions focused on elaborating the quantitative findings, particularly regarding leadership practices, work demands,

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support systems, and coping strategies in sports coordination. With participants' permission, interviews were audio-recorded and later transcribed verbatim to ensure accuracy of responses.

Quantitative data were analyzed using descriptive and inferential statistics. Weighted Mean and Standard Deviation were used to determine the extent of leadership practices, level of job demands, availability of job resources, and challenges encountered. Pearson Product-Moment Correlation Coefficient was utilized to determine the significant relationship between leadership practices and challenges encountered. According to Field (2018), correlation analysis is appropriate for determining the strength and direction of relationships among variables. Moderation analysis through multiple regression was employed to examine the moderating effects of job demands and job resources on the relationship between leadership practices and challenges encountered. Hayes (2022) explained that moderation analysis determines whether the relationship between variables changes depending on the level of another variable. Qualitative data were analyzed using thematic analysis following the framework of Braun and Clarke (2006, 2019). The analysis involved several stages:

familiarization with the data through repeated reading of transcripts; generation of initial codes; categorization of related codes; identification and review of recurring themes; definition and naming of themes; and interpretation of findings. The researcher carefully examined patterns and relationships among participants' responses to identify themes that explained or expanded the quantitative findings. Verbatim statements were incorporated to support the interpretation of themes and enhance the trustworthiness of the analysis.

Methodological rigor in the qualitative phase was strengthened through careful transcription, consistent coding procedures, and member validation of selected responses to ensure accuracy and credibility. According to Nowell et al. (2017), trustworthiness in thematic analysis is strengthened through systematic coding, transparency of procedures, and accurate representation of participants' narratives. The integration of qualitative themes with quantitative results enabled the development of meta-inferences that provided a more holistic understanding of the leadership practices and challenges of public-school sports coordinators. Creswell and Plano Clark (2018) emphasized that integrating quantitative and qualitative

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findings enhances the depth and completeness of mixed methods studies.

Ethical standards were strictly observed throughout the conduct of the study. Participants were informed about the objectives and procedures of the research, and their participation remained voluntary. Confidentiality and anonymity of responses were ensured through the use of codes instead of participants' names. Participants were informed of their right to withdraw from the study at any stage without penalty. All collected data were treated with utmost confidentiality and were used solely for academic and research purposes in compliance with the provisions of the Data Privacy Act of 2012.

RESULTS AND DISCUSSION**Table 1**

Extent of Leadership Practices of Sports Coordinators

Leadership Practices	Weighted Mean	Verbal Interpretation
Autocratic Leadership	3.21	High Extent
Democratic Leadership	3.68	Very High Extent
Transformational Leadership	3.65	Very High Extent
Transactional Leadership	3.44	High Extent
Composite Mean	3.50	Very High Extent

The findings revealed that public school sports coordinators demonstrated a very high extent of leadership practices

across the four dimensions. Democratic leadership obtained the highest weighted mean, followed by transformational leadership, indicating that coordinators commonly practiced collaboration, participative decision-making, motivation, and teamwork in implementing sports programs. Transactional leadership was also evident through the monitoring of athlete performance and implementation of rules and rewards. Meanwhile, autocratic leadership received the lowest mean, although respondents still manifested directive leadership behaviors when necessary.

The findings suggest that sports coordinators preferred leadership approaches that encourage collaboration and motivation. This supports the study of Bass and Riggio (2006), which emphasized that transformational leadership improves organizational commitment and performance. Likewise, democratic leadership promotes teamwork and stronger participation among stakeholders in educational organizations.

Table 2

Level of Job Demands Experienced by Sports Coordinators

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Job Resources	Weighted Mean	Verbal Interpretation
Administrative Support	3.20	Moderately Available
Training and Professional Development	3.16	Moderately Available
Community and Parental Involvement	3.11	Moderately Available
Recognition of Work	3.05	Moderately Available
Composite Mean	3.13	Moderately Available

Results showed that sports coordinators experienced high job demands, particularly in workload, administrative responsibilities, and time pressure. Respondents reported difficulty balancing classroom instruction, coaching, event preparation, and documentation tasks. Limited facilities and accessibility of sports equipment also contributed to increased work pressure.

The findings align with the Job Demands-Resources Model of Bakker and Demerouti (2007), which explains that excessive job demands may increase stress and negatively affect employee performance. Similar studies noted that teacher-coaches and sports coordinators often experience workload imbalance because of overlapping teaching and sports responsibilities.

Table 3.

Availability of Job Resources

Job Demands	Weighted Mean	Verbal Interpretation
Workload	3.63	High Level
Time Pressure	3.58	High Level
Availability of Facilities	3.49	High Level
Accessibility of Equipment	3.46	High Level
Administrative Responsibilities	3.61	High Level
Composite Mean	3.55	High Level

The study further revealed that job resources available to sports coordinators were moderately available. Administrative support obtained the highest rating, followed by training opportunities and community involvement. Recognition of work received the lowest rating, indicating limited appreciation and incentives for sports coordinators.

The findings indicate that while sports coordinators receive institutional support, available resources remain insufficient to fully address the demands of sports program implementation. According to Schaufeli and Taris (2014), adequate job resources improve motivation, leadership effectiveness, and work engagement.

Challenges Encountered by Sports Coordinators

Table 4

Challenges Encountered by Sports Coordinators

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Job Resources	Weighted Mean	Verbal Interpretation
Availability of Qualified Coaches	3.71	Highly Challenging
Facilities	3.66	Highly Challenging
Equipment	3.62	Highly Challenging
Teaching Load and Coordination Balance	3.68	Highly Challenging
Composite Mean	3.67	Highly Challenging

The respondents identified several major challenges in managing school sports programs. The shortage of qualified coaches emerged as the most serious concern, followed by inadequate facilities, insufficient equipment, and difficulty balancing teaching and coordination responsibilities.

These findings indicate that structural and organizational limitations continue to affect the implementation of sports programs in public schools. Insufficient facilities and personnel hinder the ability of sports coordinators to effectively train athletes and manage competitions.

Table 5

Relationship Between Leadership Practices and Challenges Encountered

Variables	r-value	p-value	Interpretation
Leadership Practices and Challenges Encountered	0.112	0.241	Not Significant

The results of the correlation analysis revealed no significant direct relationship between leadership practices and challenges encountered by sports coordinators. This indicates that effective leadership alone may not completely address challenges caused by inadequate resources and organizational constraints.

However, moderation analysis showed that job demands intensified the challenges experienced by sports coordinators, while job resources enhanced leadership effectiveness and reduced the negative effects of workload and pressure. These findings support the Job Demands-Resources theory, which highlights the importance of institutional support and resources in improving employee performance and well-being.

Qualitative Findings

This section presents the qualitative findings derived from in-depth interviews with seven public school sports coordinators identified as P1 to P7. The findings provided contextual explanations of the quantitative results by describing

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participants’ experiences in managing school sports programs.

The participants commonly practiced collaborative and participative leadership through consultation, teamwork, and shared decision-making. The Filipino concept of “*pakikiusap*” emerged as an important leadership approach emphasizing cooperation and interpersonal relationships. These findings support Kim and Cruz (2024) and Navarro et al. (2024), who emphasized that participative leadership enhances organizational cohesion and program effectiveness. However, participants also acknowledged the need for directive leadership during urgent situations and competitions, indicating the use of adaptive leadership strategies.

Workload and role strain also emerged as major concerns. Participants reported balancing teaching responsibilities, administrative work, coaching supervision, and sports management tasks, often extending work beyond school hours. These findings align with Lyle et al. (2022) and Reyes (2023), who identified excessive workload and role conflict as common challenges among teacher-coaches.

Participants further identified inadequate sports facilities, limited training

spaces, and shortages in equipment and resources as significant barriers to effective sports program implementation. Shared courts, outdated equipment, delayed procurement, and dependence on fundraising activities affected athlete preparation and program quality. These findings support Santos and Mercado (2025), Bautista and Cruz (2024), and Kim et al. (2023), who emphasized that inadequate infrastructure and resources negatively affect athlete development and program sustainability.

The shortage of qualified coaches likewise emerged as a major challenge due to limited incentives, heavy workloads, and insufficient institutional recognition. Garcia and Torres (2021) similarly noted that inadequate support discourages teachers from assuming coaching responsibilities.

Participants also reported administrative inefficiencies, limited professional development opportunities, and inconsistent stakeholder support. Delays in approval processes, limited access to seminars and coaching education, and dependence on informal community partnerships hindered effective program implementation. These findings align with Bautista (2024), Cruz et al. (2022), Kim and Park (2023), and Hoye et al. (2023), who emphasized the importance of

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administrative support, stakeholder collaboration, and continuous professional development in sustaining sports programs. Despite these challenges, participants consistently demonstrated strong intrinsic motivation, resilience, and commitment to sports development. Their passion for supporting student-athletes reflected the principles of Self-Determination Theory proposed by Ryan and Deci (2021), which highlights the role of intrinsic motivation in sustaining commitment despite external constraints.

Overall, the findings revealed that public school sports coordinators demonstrate adaptive leadership and resilience despite facing significant challenges related to workload, infrastructure, staffing, administrative processes, and resource limitations. The findings underscore the need for stronger institutional support systems to sustain effective school sports programs.

Corroboration of Quantitative and Qualitative Results

The integration of quantitative and qualitative findings revealed strong convergence regarding leadership practices, workload demands, resource limitations, and institutional challenges encountered by public school sports coordinators. According to Creswell and Plano Clark

(2021), integrating datasets strengthens the credibility and comprehensiveness of mixed methods research.

Quantitative findings showed that democratic, transformational, and transactional leadership practices were manifested to a very great extent. These results converged with the qualitative findings, where participants emphasized collaborative leadership, teamwork, and shared decision-making. The findings support Kim and Cruz (2024), Navarro et al. (2024), Reyes (2024), and De Jesus (2025), who emphasized the positive effects of participative and transformational leadership on organizational effectiveness.

High levels of job demands identified in the quantitative phase were likewise supported by the qualitative findings on workload and role strain. Participants described excessive responsibilities, extended working hours, and difficulties balancing teaching, administrative, and sports coordination duties. These findings align with the Job Demands–Resources Model of Bakker and Demerouti (2021), as well as the studies of Lyle et al. (2022) and Reyes (2023).

Both datasets also confirmed that inadequate facilities, limited training spaces, equipment shortages, and insufficient resources significantly hinder sports program implementation.

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Participants described shared venues, outdated equipment, and reliance on fundraising activities, which negatively affected athlete preparation and program sustainability. These findings support Santos and Mercado (2025), Bautista and Cruz (2024), and Kim et al. (2023).

Similarly, both quantitative and qualitative findings identified shortages of qualified coaches, administrative inefficiencies, limited professional development opportunities, and inconsistent stakeholder support as persistent challenges. These findings are consistent with Garcia and Torres (2021), Bautista (2024), Cruz et al. (2022), Kim and Park (2023), and Hoye et al. (2023).

Despite limited institutional support, qualitative findings revealed strong intrinsic motivation, resilience, and commitment among sports coordinators, complementing the quantitative findings regarding leadership practices and recognition. These findings support Self-Determination Theory proposed by Ryan and Deci (2021), which emphasizes the importance of intrinsic motivation in sustaining commitment and performance.

Overall, the corroboration of findings revealed that public school sports coordinators demonstrate strong leadership commitment and adaptive leadership

practices despite experiencing significant structural, administrative, and resource-related challenges. The integrated findings highlight the need for stronger institutional support systems focusing on infrastructure development, resource allocation, staffing support, administrative efficiency, and professional development to ensure the sustainability of school sports programs.

CONCLUSION AND RECOMMENDATIONS

The study highlighted the important role of leadership and institutional support in the implementation of school sports programs. Although sports coordinators demonstrated effective leadership practices that promoted collaboration and motivation, they continued to experience challenges related to workload, limited resources, inadequate facilities, and insufficient support systems. These findings emphasize that effective sports program implementation requires both strong leadership and adequate organizational support. The study contributes to educational leadership and sports management by providing insights into how leadership practices, job demands, and available resources influence school sports programs. The findings may guide schools and policymakers in strengthening leadership training, improving resource

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allocation, and developing sustainable sports development initiatives. The study also underscores the value of collaboration among schools, stakeholders, and community partners in improving facilities, equipment, and athlete development opportunities. Future studies may explore other variables related to sports leadership, organizational support, and athlete performance in broader educational settings to further enhance sports program development.

APPENDIX

Proposed Sports Development Framework

Rationale

The study revealed that sports coordinators demonstrated strong leadership and motivation; however, challenges such as excessive workload, inadequate facilities and equipment, shortage of qualified coaches, and inconsistent administrative support affected the implementation and sustainability of sports programs.

The proposed framework was developed to address these concerns through leadership development, resource enhancement, and strengthened institutional support. Anchored on the Job Demands-Resources Model, the framework emphasizes that reducing job demands and improving organizational resources

contribute to better program effectiveness, coordinator well-being, and sustainable sports development.

Objectives

The framework aims to:

1. enhance the leadership effectiveness of sports coordinators;
2. improve access to facilities, equipment, and qualified coaches;
3. strengthen institutional and administrative support systems; and
4. promote sustainable athlete participation and sports program implementation.



Description of the Framework

The framework highlights the relationship among institutional support, leadership capacity, resource availability, and program implementation in achieving sustainable sports development.

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Institutional policy and budget serve as the foundation that influences administrative support, funding allocation, and operational priorities.

Sports coordinators act as the primary implementers of school sports programs. Their effectiveness depends on the availability of organizational support and resources. The framework consists of four major input areas: leadership empowerment, capacity building, resource enhancement, and organizational support. These components work together during program implementation through planning, coordination, and management processes. The framework ultimately leads to motivated and sustainable sports programs characterized by improved coordinator performance, stronger athlete participation, and enhanced program outcomes.

Monitoring and Evaluation

Monitoring shall include regular progress reports, athlete performance tracking, resource utilization audits, stakeholder feedback, and administrative monitoring systems.

Evaluation shall be conducted annually using quantitative indicators such as athlete participation and competition performance, and qualitative indicators including coordinator satisfaction, stakeholder collaboration, and perceived

program effectiveness. Findings shall be used for continuous improvement and sustainability of the framework.

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• Operability (4.86) • Capacity (4.86) •
Resource Utilization (4.71)

Lower scores were observed in security-related indicators, suggesting opportunities for enhancement in authentication and access control mechanisms.

To address the lower scores in security-related indicators, future system enhancements will prioritize Multi-Factor Authentication (MFA) and a Role-Based Access Control (RBAC) framework to secure sensitive geospatial data and ensure accountability.

The integration of crowdsourced flood reports provides essential supplementary validation, allowing for real-time situational awareness that bridges the gap between forecasted risks and actual ground conditions.

Usability Evaluation

End-user assessment produced an overall mean score of 3.86, indicating high usability. Participants reported that the platform was useful for planning activities and relatively easy to learn despite some interface complexity.

The use of color-coded hazard classifications, embedded help functions, and predefined typhoon scenarios contributed significantly to user acceptance.

Discussion

The findings demonstrate that dynamic integration of climate forecast data and hazard information provides more useful planning support than static hazard maps alone. Traditional flood maps represent historical conditions but cannot adapt to rapidly changing weather situations. By incorporating forecast information, the developed system enables local governments to evaluate emerging risks and make more informed decisions.

The 81% validation accuracy suggests that the rainfall-based hazard reclassification model can reasonably represent actual flood behavior at the municipal scale. While the approach does not replace hydraulic engineering models, it offers sufficient accuracy for zoning decisions, development restrictions, and disaster preparedness planning.

The crowdsourcing feature further strengthens hazard assessment by incorporating local observations into the system. Community participation supports data validation and improves public engagement in disaster risk reduction efforts.

The simulation module emerged as one of the most valuable features. Planners were able to test future scenarios, compare alternative conditions, and assess the implications of rainfall changes on land-use decisions. This capability aligns with