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E-Board Sports Management Information System with SMS Support: Usability, Maintainability, Accuracy

Charmine Rose R. Peñasales[1], Kristine T. Soberano[2], Rolan O. Algara[3]
[1,2,3]Northern Negros State College of Science and Technology, Old Sagay, Sagay City, Negros Occidental, Philippines

ABSTRACT: The current stage of development of the student sports movement is characterized by the emergence of new tasks of physical education in universities. In the conditions of professionalization of sports and commercialization, universities that provide an opportunity to receive higher professional education are the guarantors not only of securing highly qualified athletes in the region but also of maintaining the system of sports training. The researchers created an E-Board Sports Management Information System with SMS Support: Usability, Maintainability, Accuracy to manage the sports that the school offers. Researchers use Rapid Application Development Model (RAD) in the Software Development Life Cycle (SDLC). Both developmental and descriptive research approaches were employed in this study. This system is intended to assess the system's usability in terms of understandability and operability. Determine the level of maintainability in terms of analyzability and testability. Finally, assess the developed system's accuracy. The finding implied was very good in terms of usability, maintainability, and accuracy.

KEYWORDS: E-Board, Sports, Management Information System, SMS Support, RAD Model

I. INTRODUCTION

Our nation’s emphasis on family stability and youth education is expanding. Increasing young people's interest in sports requires utilizing this social framework’s beneficial aspects [1].

With the main goals of promoting peace, high standards of living, and the economic impact of sport on the nation, sport development faces obstacles in the areas of sports policy, sports funding, and sports infrastructure. The complete long-term, integrated sports subsystem for accomplishing national sporting objectives is known as the sports system [2].

Even in the institution, the current stage of development of the student sports movement is characterized by the emergence of new tasks of physical education in universities. The organization of sports training of students in the conditions of universities is not properly scientifically developed and not systematized. In the conditions of professionalization of sports and commercialization, universities that provide an opportunity to receive higher professional education are the guarantors not only of securing highly qualified athletes in the region but also of maintaining the system of sports training [3].

The lack of centralized and easily accessible information, and difficulty in tracking and analyzing data related to sports programs, are significant challenges in sports management. Outdated and manual processes, like paper-based forms, spreadsheets, and email communication, lead to information silos, miscommunication, and difficulty in coordinating and managing sports programs effectively. A centralized database and sports management system can help administrators understand trends, make informed decisions, and measure the effectiveness of sports programs.

A sports management system can help address these gaps by providing a centralized platform for managing all aspects of sports programs, from scheduling and roster management to equipment tracking and reporting. An Eboard sports management system specifically can provide additional benefits such as real-time updates, mobile accessibility, and the ability to integrate with other systems and software. This can improve efficiency, transparency, and collaboration among coaches, administrators, and athletes, ultimately leading to better sports programs and experiences for everyone involved [4].

It is important to have a sports management system in every institution. The main goal of management information systems is to provide administrators with the data they need to make decisions and comprehend problems. Management information systems are supported by corporate databases, which include information generated through exchange preparation [5].

Data that is suitable for a particular application in terms of form and substance is called information. Another way to state this is that knowledge may be used right away to take action or make a judgment without additional modification. The need to go beyond information and add context to the information in order to gain a competitive advantage, however, necessitates creating an informed understanding of the whole competitive reality. Due to the vastness of the available data, information, and expertise, a manager requires assistance in gathering the crucial facts and presenting it via a precise, comprehensive understanding of the competitive environment [6].

The Global System for Mobile Communications (GSM) is a cellular standard for mobile phone communications that supports voice services and data transmission utilizing digital modulation, where short messaging service (SMS) has a significant social impact. There are several applications for using GSM to wirelessly communicate SMS to LCD notice boards. It is feasible to decode the received SMS on the mobile phone utilizing GSM networks in order for it to work in the required manner [7] [8].

That is why the researchers aimed to develop an E-Board Sports Management Information System with SMS Support that can be able to determine its level of Usability, Accuracy, and Maintainability of it. The sports coordinators, sports officials, and players may all receive an immediate and practical outcome of the game with the aid of this technology.

It may help with improved event administration by automatically producing match schedules while taking important factors into account, such as player availability, timeslots that include precise facility scheduling, watching of game outcomes, and viewing of ranking.

There are some studies that can help the researchers improve the developed system. First, Sports Information Systems: A systematic review, a study that used to integrate data from different information and measurement systems [9]. Next, Management Information Systems: Managing the Digital Firm, this explains information systems organizations and strategy [10]. Another one is Information Technology in Sport Management Curricula; it caters the scheduling system [11]. Additionally, the Game Information System, wherein combining.

Information System and game is breakthrough to achieve organizations' performance [12]. Web-Based Information System Portal with SMS Support for Aklan State University-Kalibo Campus, a test case was used to test the functionality of the development of SMS [13]. Lastly, SMS: The short message service, a widely used communication mechanism for cell phone users, SMS is far more than just a technology [14].

1.1 Conceptual Framework

This study conceptualized and developed E-Board Sports Management Information System with SMS Support: Usability, Maintainability, Accuracy comprising of input phase, process, output phase and outcome. As such, the input of the study is team information, player's personal information, schedule of games, results and its ranking.

The process involves the system analysis, design, testing, deployment and maintenance of the developed system. The output is the development of the developed E-Board Sports Management Information System with SMS Support. The benefits on the outcome of the developed system are as follows:

- Improved communication: With SMS integration, EMSIS can provide real-time communication to coaches, athletes, and parents, enhancing communication channels between them. It can also help send reminders about upcoming events or games, schedule changes, and other important updates.
- Efficient scheduling: EMSIS can automate scheduling tasks, making it easy to manage different events, practices, and games across multiple teams. Coaches can quickly update schedules, which will automatically notify the relevant parties, reducing the chances of scheduling conflicts.
- Streamlined registration: EMSIS can provide an online registration process that allows athletes to sign up for events, teams, or clubs easily. It eliminates the need for manual registration processes, reducing paperwork and saving time.
- Enhanced data management: EMSIS can manage all data related to teams, athletes, events, and games, making it easy to track performance and manage the progress of individual athletes or teams. This can help coaches and managers make informed decisions based on accurate data.
- Improved reporting: EMSIS can generate reports on various aspects of the sports program, including performance, attendance, and finances. This helps coaches and managers get a complete view of their program and make data-driven decisions.

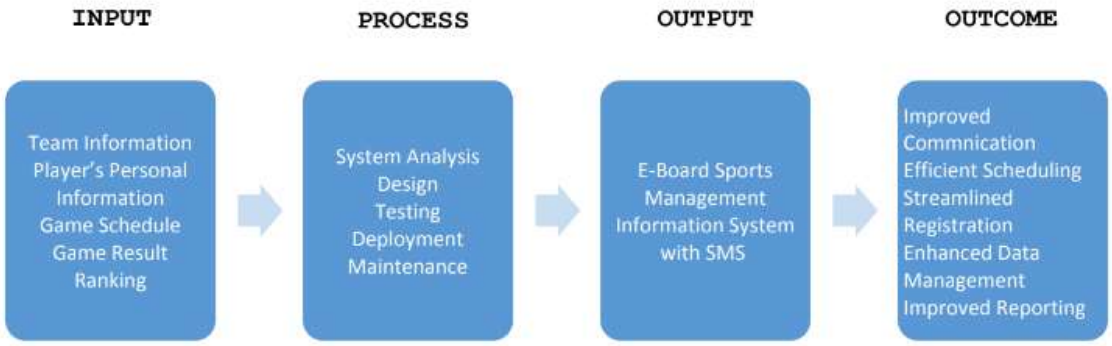

Figure 1. The Conceptual Framework of the Study.

II. METHODOLOGY

This covers the study design, respondent selection, research instrument, data gathering process, and statistical analysis.

2.1 Research Design

A researcher's thoughts are reflected in the research design. By tying the study together through a structural plan that demonstrates how all of the key components of the research attempt to solve the research questions jointly, it reduces dissatisfaction [15].

Both developmental and descriptive research approaches were employed in this study. Developmental research is viewed as a research approach that a researcher adopts with the goal of providing an empirical foundation for the development of new or improved models that regulate development as well as instructional and non-instructional goods and resources [16].

Descriptive research is one that is designed to describe the distribution of one or more variables, without regard to any causal or other hypothesis [17].

2.2 Software Development Life Cycle

The Software Development Life Cycle (SDLC) is the period of time needed for tasks including specifying, creating, testing, deploying, utilizing, and maintaining a system or piece of software. The success of establishing and assessing the software process metrics across the SDLC determines the productivity of the development team and the quality of the program [18]. In this study, the researcher used the Rapid Application Development (RAD). With the help of the RAD paradigm, novice programmers may take use of high-performance computing while seasoned programmers can fully exploit the underlying technology. This makes it possible to quickly prototype, retarget, and reuse existing software while still permitting, if necessary, hardware-specific optimization [19].

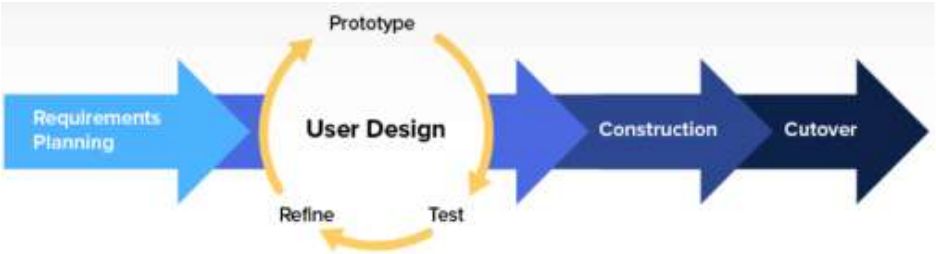

Figure 2. The Rapid ApplicationDevelopment Model

2.3 Entity-Relationship Diagram

An entity-relationship (ER) model, one of the first data-modeling tools, is frequently used to illustrate the stated data structure. ER models may be used to define entity classes, properties, and relationships [20].

This study comprises of four entities. These are the Announcement, Coach, Players, and SMS Support. Thus, the relationships were defined: there was one-to-many relationship between announcement and SMS Support. The announcement have one or more SMS Support coming from the admin. There was many-to-many relationship between announcement and coach. The announcement can provide multiple information to the coach. There was one-to-many relationship between announcement and players. The players can also receive announcements. There was one and only one relationship between the coach and the team.

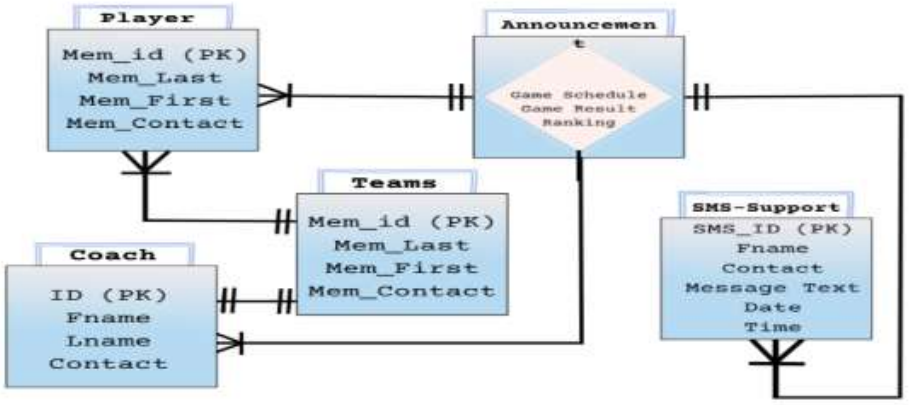

Figure 3. Entity Relationship Diagram of the Developed System.

2.4 Data Flow Diagram

Graphical diagrams known as DFD are used to design, build, and visualize system models. DFD is used to graphically define the requirements. We concentrate on DFD and its guidelines for creating and specifying the diagrams in this study [21].

In this study, the context data flow diagram was used. There are two external factors: The system admin and Users. The System Admin as the Sports Coordinator. The primary user of the developed system and also has the authority in controlling the system. The user can only view the game records provide by the admin and sports coordinator.

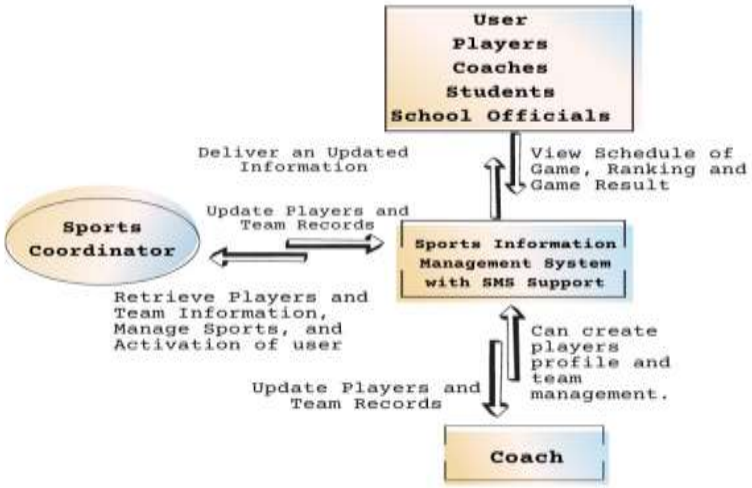

Figure 4. Data Flow Diagram Depicting the Process Model of the Developed System.

2.5 Logical Architecture Design

It is generally acknowledged that architecture design is crucial for the creation of complex software, and that software architecture may be seen from a variety of perspectives. Given that it influences the latter stages of architectural design and subsequent development, the logical perspective is the first and most important view that software engineers should take into account [22].

Figure 5 shows the logical architecture design of the developed system. The N-tier architectural paradigm is a multilayered client-server architecture in which the tasks of data processing, display, and storage are segregated into tiers that are both conceptually and physically distinct. Each of these functions runs on a different physical machine because of their physical separation.

The presentation layer was added for: compression of data and definition of universal data formats [23].

The system's clients would receive real-time information via an SMS-based interface, which was constructed as part of the presentation layer component. As the system had a server version, the actual application layer ran on the server. Users and servers communicate with one another. The presentation and business layer of the server version are made available for local hosting at the web browser. The layer responsible for data manipulation carried out the system's record management procedure. It gives users access to data that was stored inside the system's perimeter. The Structured Query Language was employed in its implementation.

The database layer, which is the actual repository for player and document entries, is the fourth tier. It verified that the table, fields, and attributes were correct. This layer maintains data neutrality and independence from business logic or application functions. Providing data to its layer also enhances performance and scalability. To facilitate resource sharing, it also has components for data access.

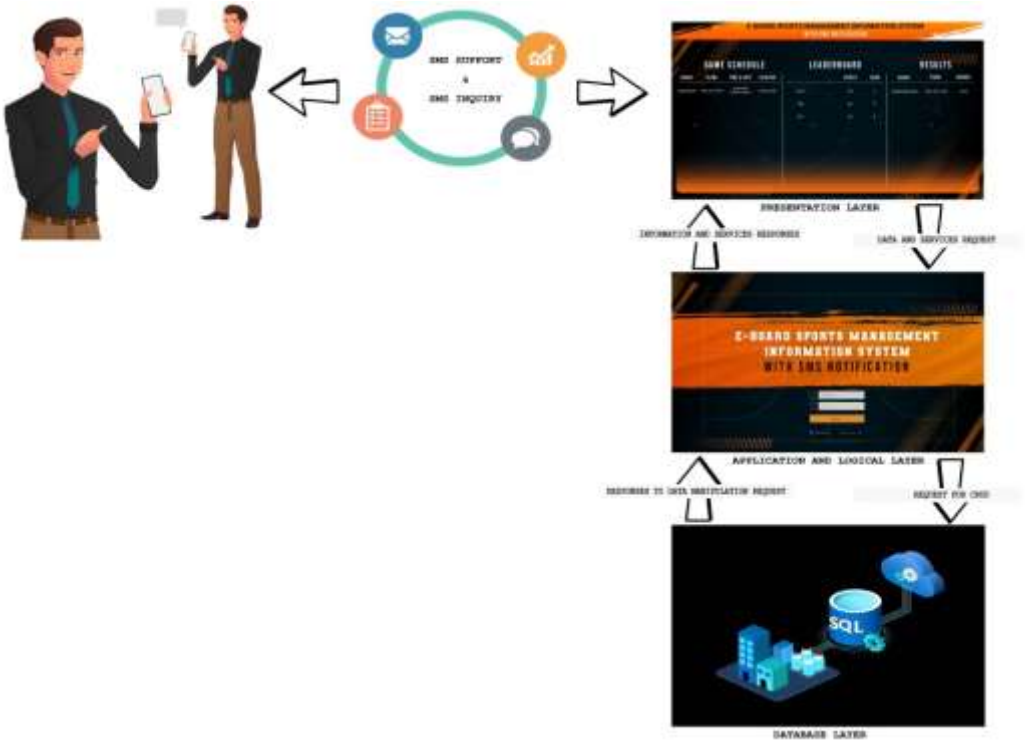

Figure 5. Logical architecture of the Developed System

2.6 Physical Network Topology

The arrangement of the computers or nodes in a computer network is known as its physical topology. It is the configuration of different components (links, nodes, etc.), including the positioning of devices and the installation of software in a computer network. In other terms, we may say that it is the actual configuration of the network's nodes, computers, and connections.

Physical network topology describes the interactions between elements in a communication network in terms of their physical connectivity. Many crucial network administration tasks, such as proactive and reactive resource management, server sitting, event correlation, and root-cause investigation, require first learning the physical layout and relationships of network parts. The system can be accessed via a web browser using an allocated Internet Protocol (IP) Address of the server where the developed system resides because it is a web-based system. It can run on one or more devices in a network. The developed system can be accessed using multiple platforms because it was built using an n-tier design, which makes it easier to scale the network based on users. The Physical Network Topology is depicted in Figure 6.

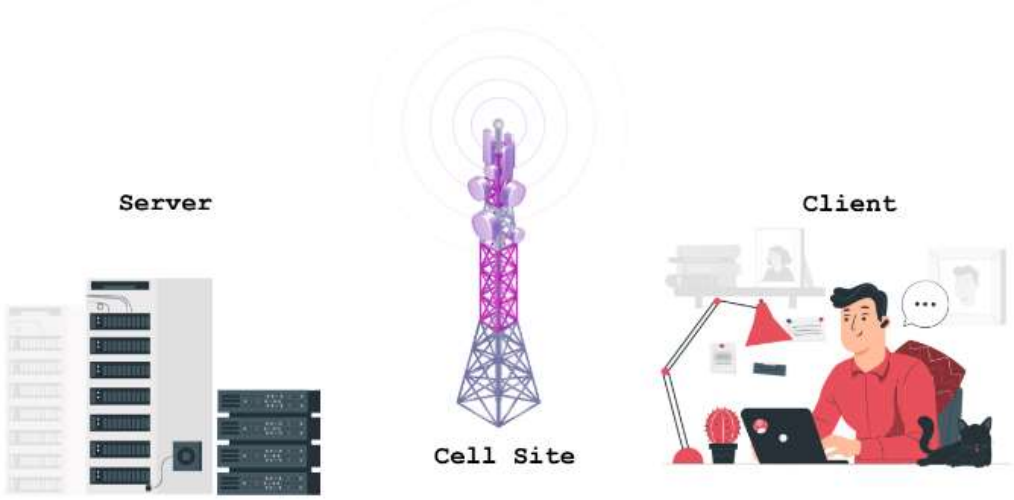

Figure 6. Physical Network Topology of the Developed System

2.7 Testing and Evaluation

The development of the system prototype would not be finished without testing the level of usability, level of maintainability and level of accuracy of the various modules to meet user requirements. As such, it was important that testing it should be almost identical to the real data.

In this phase, the researchers performed an actual testing of the system with the experts, randomly selected sports coaches, players, and students.

The researchers presented the prototype of E-Board Sports Management Information System with SMS Support. The two groups were: (a) the expert group and (b) the sample population group. The purpose was to determine whether the developed system meets the user's requirements. Revisions on both the user design and the system prototype must be complimentary to produce the final product at most possible time. The findings of the experts were Very Good.

III. PRESENTATION OF DATA AND INTERPRETATION OF RESULTS

The presentation, analysis, and interpretation of outcomes in relation to the objectives of the developed system were illustrated in this chapter.

3.1 Level of Usability of E-Board Sports Management Information System with SMS Support

The results showed that the level of Usability of E-Board Sports Management Information System with SMS Support was composed with a mean of 4.67 as "Very Good". In terms of understandability M= 4.65 as "Very Good". For the operability, the computed mean score was M = 4.70 which were all interpreted as "Very Good".

Table 1. Level of Usability of E-Board Sports Management Information System with SMS Support in terms of Understandability and Operability.

Implementation Indicators	Mean	Interpretation
Level of Usability	4.67	Very Good
a. Understandability	4.65	Very Good
b. Operability	4.70	Very Good

Legend: 4.21-5.00 (Very Good); 3.41-4.20 (Good); 2.61-3.40 (Average); 1.81-2.60 (Fair); 1.00-1.80 (Poor)

3.2 Level of Maintainability of E-Board Sports Management Information System with SMS Support

Table 4 showed the result for the respondent's feedback on the level of maintainability in terms of Analyzability and Testability. The level of maintainability gives the system be restored or repaired to a specified condition within a specified period or time when maintenance is performed in accordance with prescribed procedures.The results showed that the developed system has a mean of 4.57 as "Very Good". In terms of Analyzability M = 4.56 is verbally interpreted as "Very Good". While in terms of Testability M = 4.59 is also interpreted as "Very Good".

Table 2. Level of Maintainability of E-Board Sports Management Information System with SMS Support in terms of Analyzability and Testability.

Implementation Indicators	Mean	Interpretation
Level of Maintainability	**4.57**	Very Good
a. Analyzability	**4.56**	Very Good
b. Testability	**4.59**	Very Good

Legend: 4.21-5.00 (Very Good); 3.41-4.20 (Good); 2.61-3.40 (Average); 1.81-2.60 (Fair); 1.00-1.80 (Poor)

3.3 Level of Accuracy of E-Board Sports Management Information System with SMS Support

Table 4 showed the result for the respondent's feedback on the level of accuracy. The level of accuracy relative to the number of resources used under the stated condition. The results showed that the developed system has a mean of 4.47 as "Very Good".

Table 4. Level of Accuracy of E-Board Sports Management Information System with SMS Support.

Implementation Indicators	Mean	Interpretation
Level of Accuracy	**4.57**	Very Good

Legend: 4.21-5.00 (Very Good); 3.41-4.20 (Good); 2.61-3.40 (Average); 1.81-2.60 (Fair); 1.00-1.80 (Poor)

IV. CONCLUSION

Based on the results of the study, the following conclusions were drawn:

In terms of understandability and operability, the E-Board Sports Management Information System with SMS Support was rated as Very Good. The flow of the system was easy to hold, absorb, and control, according to the respondents, and the onscreen message was unblemished. It has a high level of usability, meaning that users find the system's functionalities simple to learn and the information it provides is clear and easy to comprehend. The system was also simple because it only needed users to provide the barest amount of personal information, and the interface was straightforward and easy to learn.

The respondents said that the E-Board Sports Management Information System with SMS Support had a high level of maintainability in terms of Analyzability and Testability. This indicated that the built system had a high level of maintainability, allowing it to maintain the users' profiles and other personal information.

The E-Board Sports Management Information System with SMS Support was perceived to have a high level of accuracy wherein the system provided efficient and accurate information to the user and the system ran on servers with typical physical memory requirements, used little disk storage space, and could potentially be placed anywhere.

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