Digitalization of Martial Arts' Competition Management System: Varsity Combat Sport System 2025

Panneer Selvem Indiran[1], Mohd Fauzi Derani[2], Ahmad Aftas Azman[3]

[1]Department of Mathematics, Science and Computer, Politeknik Sultan Salahuddin Abdul Aziz Shah, Selangor, Malaysia

[2]Mechanical Engineering Department, Politeknik Sultan Salahuddin Abdul Aziz Shah, Selangor, Malaysia

[3]Electrical Engineering Department, Politeknik Sultan Salahuddin Abdul Aziz Shah, Selangor, Malaysia

***Corresponding Author**

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ABSTRACT

University-level athletic events frequently depend on fragmented manual administrative procedures, resulting in inefficiencies, data errors, and operational delays. This article highlights the design, development, and usability assessment of the Varsity Combat Sport (VCS) 2025 System, a comprehensive web-based digital platform created to oversee Malaysia's first national varsity combat sport tournament. The Ministry of Higher Education Malaysia (KPT), in conjunction with MASUM, MSP, MASISWA, and MASKOM, orchestrated VCS 2025, which had 838 athletes from 46 contingents around Malaysia, participating in disciplines including as silat, taekwondo, and karate. The system replaced traditional paper-based methods with a centralized digital solution that includes registration, medical documentation, accreditation, scheduling, real-time results, medal tally calculation, reporting, and multimedia preservation. The platform, built on WordPress as the primary content management system and connected with the proprietary M Taekwondo Form System, automates athlete registration, division mapping, and data processing. A usability assessment was performed experimentally, including five dimensions: ease of use, interface and design quality, functionality, learnability, and user satisfaction. Results include elevated overall usability, increased administrative efficiency, less human mistake, and augmented transparency. The research illustrates the feasibility of scalable digital transformation in the organization of university sporting events.

Keywords: Combat sports, Digital transformation, Sports management system, Usability evaluation, Web-based platform

INTRODUCTION

The advent of digital transformation has brought about a huge revolution in event management across a variety of sectors, including sport administration and higher education. Sports have been incorporated into the evolution of science and technology. In the present day, the sports industry must transition to digitalization, and the necessity of digital transformation is a universal phenomenon (Wang, 2024). A significant number of athletic competitions held at the university level continue to depend on manual procedures, such as the use of printed registration forms, physical medical documentation, and automatic calculation of results. Errors caused by humans, inefficiency, and fragmentation of data are risks associated with these systems.

According to Giblin, Tor and Parrington (2016), the usage of technology applications is now prevalent around the globe by all sports fans, teams, sponsors, organizations, coaches, and players. Furthermore, the use of these tools to obtain a "competitive advantage" is becoming an increasingly crucial aspect of sports. Now more than ever, technological advancements are prepared to provide all parties involved with novel approaches to the

management and enjoyment of sporting events. There are numerous digital, technical, and social aspects of the current sports marketing environment that have served as a contextual frame for this chapter on the emergence of new mobile applications (apps), the Internet of things (IoT), Immersive technologies (XR), 5G, hardware, and software (Glebova, Gerke, Book, Glebova, Gerke, Book, & Transformational, 2024).

In spite of these developments, a significant number of athletic events held at the university level continue to rely significantly on old manual methods, which provide a variety of operational issues. When printed registration forms are subsequently digitized, they are subject to loss, damage, and mistakes in data input. On the other hand, physical medical paperwork might be difficult to check promptly in the event of an emergency. Particularly in large-scale tournaments that include several teams and categories, manual compilation of results not only costs time but also raises the probability of discrepancies, delays, and conflicts. This is particularly true in situations when there are multiple teams and categories.

Furthermore, the capacity to do thorough analysis or produce relevant insights for future planning is hindered by fragmented data storage, which comprises information that is dispersed among paper files, spreadsheets, and specific departments. As a result of this lack of integration, transparency is eventually hindered, decision-making is slowed down, and organizers are placed under undue pressure. This highlights the critical need for university sports administration systems to embrace coherent digital solutions. Thus, in this paper, Varsity Combat Sport 2025 System is introduced as a specialized web-based platform tailored specifically for martial arts tournaments. Combat sports such as taekwondo, karate, silat, and other disciplines require precise coordination, strict adherence to weight categories, accurate match scheduling, and reliable recording of results. This paper focuses on the architecture and development framework of the system, along with the modules that have been implemented, the experimental usability assessment, and the influence that the system has on operational efficiency and governance.

LITERATURE REVIEW

Digital Transformation in Sports Event Management

The use of digital platforms in event management brings about improvements in operational efficiency, data transparency, and communication with stakeholders. According to Christodimitropoulou, Choustoulakisi and Antonopoulou (2025), integrated sports management systems are able to lessen the amount of labor that is required for administrative tasks while simultaneously enhancing the accuracy of information. Online technologies are rapidly being used by universities in order to handle academic, administrative, and extracurricular activities. This trend of digital transformation in higher education has become a worldwide phenomenon (Ashmel, Hashim, Tlemsani, & Matthews, 2022). These digitization initiatives contribute to management that is more effective, decision-making that is driven by data, and enhanced service delivery across all institutions. By integrating digital platforms for athlete management, scheduling, and performance monitoring, universities and governing bodies are aligning themselves with larger digital governance principle.

Nevertheless, digital transformation presents several challenges, albeit its various benefits (Mahmood, Khan, & Khan, 2019). These hurdles include elevated implementation expenses, technological limitations, and opposition to organizational transformation. Nonetheless, these patterns indicate that university sporting events are part of a broader digital transformation initiative. This approach is defined by the use of integrated digital technologies, essential for improving overall administration, efficiency, and transparency. These new advances show that university athletic competitions are not isolated incidents but rather are a part of a larger digital transformation movement. This trend is characterized by the use of integrated digital technologies, which is necessary for the administration of events that are contemporary, efficient, and responsible.

Sports Event Management Systems

Sports event administration has historically depended on manual procedures, especially in tournament contexts where organizers used paper-based registration forms, handwritten score sheets, and physical documents for athlete verification. These traditional approaches often led to inefficiencies, including data redundancy, delays in result processing, and heightened risk of human mistake. In some instances, tournament brackets and match

schedules were generated and revised manually, complicating the incorporation of last-minute alterations or the assurance of real-time precision. Research indicates that fragmented workflows impede event operations and obstruct efficient communication among stakeholders, particularly in large-scale or multi-category contests (Channabasappa, 2021; Lee & Schmidt, 2025). With the progression of digital technologies, sports event administration has progressively shifted from paper-based systems to web-based and cloud-supported platforms. Initial digital systems concentrated on digitizing registration and fundamental scheduling; nevertheless, contemporary platforms provide extensive solutions that amalgamate various tasks, including athlete databases, automated scheduling algorithms, real-time scoring, and analytical dashboards.

Numerous current competition management systems illustrate the progression towards integrated platforms. For instance, systems used in international and professional arenas, such as those utilized by the International Olympic Committee and Fédération Internationale de Football Association, using FIFA Connect and Competition Management System (CMS) provide comprehensive solutions including accreditation, scheduling, real-time results, and performance analytics. Commercial solutions such as Sportdata and Tournament Software are extensively used for tournament management, providing functionalities like online registration, automatic drawings, and live scoring. Although these systems are very efficient, they are often tailored for single-sport or professional contests, using predetermined frameworks that may not readily accommodate the dynamic and varied needs of university-level tournaments.

A fundamental factor in the development of these systems is the contrast between multi-sport and single-sport platforms. Single-sport systems are often tailored to certain regulations, scoring mechanisms, and competition structures, making them extremely efficient within their scope but less adaptable for wider applications. Conversely, multi-sport systems seek to provide a cohesive framework that accommodates diverse sports, classifications, and event forms inside a single platform. Research demonstrates that the development of such systems is intricate owing to the need for customisation and scalability (Aldoseri, Al-khalifa, & Hamouda, 2024; Paul, Dennis, Kacprzak, Curtis, Kunz, Liu, Petit, & Tyagi, 2024). Consequently, the majority of current solutions mostly focus on professional leagues or international tournaments, where criteria are uniform and resources are abundantly accessible.

Notwithstanding these developments, a significant gap persists in both the research and practice. Most current systems and research concentrate on professional or elite sports contexts, with little emphasis on university-level competitions, especially those including various combat sports disciplines like taekwondo, karate, and silat. These events provide distinct issues, including varied rule sets, weight classes, and rapid match rotations, which remain inadequately handled by existing systems. Thus, there is a need for customized, integrated systems that precisely address the operational and administrative needs of university-level multi-combat sports events, connecting current technology with actual institutional requirements.

Usability in Information Systems

Although digital sports event management systems have advanced rapidly, their efficacy is not only dictated by the complexity of their features or the extent of their integration. The actual effectiveness of a system is significantly determined by the ease and efficiency of human interaction. This factor is especially crucial in collegiate sports settings, where organizers, officials, and competitors may possess significantly differing degrees of technical proficiency. Professional or international systems often presume the presence of highly skilled workers, while university competitions usually function with constrained resources and staff who may lack familiarity with intricate digital platforms. A technically sophisticated system that is tedious, unintuitive, or challenging to understand might compromise operational efficiency, induce user irritation, and eventually diminish system adoption and efficacy (Nielsen, 1993; Nielsen & Phillips, 1993). This highlights a vital insight: for digital systems to effectively improve university-level multi-combat sports events, they must prioritize usability, enabling all stakeholders to easily access information, execute important activities, and make prompt judgments.

Usability in information systems is acknowledged as a crucial factor influencing system success, acceptance, and enduring sustainability. User experience is often defined by five fundamental dimensions: simplicity of use, interface and design quality, utility, learnability, and user pleasure (Nielsen, 1993). Ease of use refers to the

system's simplicity and intuitiveness, enabling users to achieve their objectives with little effort and without superfluous complexity. Interface and design quality emphasize visual clarity, consistency, and navigation logic, which help users quickly locate features and understand system workflows. Functionality assesses the extent and pertinence of features, guaranteeing that the system fulfills the actual requirements of its intended users. Learnability evaluates the speed at which new users attain proficiency, a factor of particular significance in university sports settings where volunteers and temporary personnel often aid in event administration. User satisfaction ultimately encompasses the whole experience, including views of dependability, efficiency, and value (Deng, Turner, Gehling, & Prince, 2010; Vaezi, 2013).

Elevated usability in these areas is significantly associated with system acceptability, decreased mistakes, and enhanced operational performance. In university-level sporting events, an effective platform not only streamlines registration, scheduling, and results administration but also instills user trust and promotes sustained use (Anju, Kishore, Swaroopa, & Sharma, 2025). Integrating usability concepts into the design of event management systems enables developers to create digital platforms that are functionally robust, practical, intuitive, and sustainable in real-world applications. The correlation between usability and system efficacy underscores that effective digital transformation in university sports administration relies equally on human-centered design and technical proficiency.

Building on the literature, this study concentrates on the development and assessment of the Varsity Combat Sport 2025 System, a web-based platform that is incorporated and tailored to university-level martial arts tournaments, in accordance with the existing literature. A centralized, digital environment that is intuitive, flexible, and accessible to all users is the objective of the system, which is designed to replace manual processes such as paper-based registration, physical medical documentation, and manual result compilation. The platform ensures that its users can efficiently perform administrative and operational tasks by emphasizing simplicity of use, clear interface design, functional completeness, learnability, and user satisfaction through the integration of usability principles into its design.

METHOD

The methodology of this research is based on an organized and sequential approach that is comprised of four primary phases: system creation, prototype deployment, testing in the real world, and usability assessment. Figure 1 shows the methodology processes of this study.

Figure 1: Methodology processes

System Development Phase

The Varsity Combat Sport 2025 System is a web-based integrated platform that was built to handle the whole lifecycle of a university-level multi-combat sports competition. The System Development Phase focuses on the

thorough design and implementation of the system in its entirety. Paper-based registration, fragmented data storage, delayed result processing, and restricted transparency are some of the inefficiencies that are inherent in old manual operations. This phase is motivated by the desire to solve these inefficiencies. The system is meant to make all tournament operations centralized into a uniform digital environment, which improves efficiency, accuracy, and the overall user experience. This is accomplished by the use of a structured development strategy.

The development process starts with a comprehensive requirements study to ascertain the deficiencies of current manual systems and delineate the functional and non-functional specifications of the platform. Identified key concerns include redundancy in data input, elevated risk of human mistake, absence of real-time updates, and challenges in concurrently handling numerous combat sports categories. The requirements of stakeholders, including event organizers, referees, players, and administrative personnel, are also assessed. This guarantees that the system is structured to accommodate various user roles while preserving simplicity and usability.

Subsequent to requirement analysis, the system architecture is created to provide scalability, modularity, and centralized data administration. The platform has a web-based design, facilitating access from many devices and places. The database is designed to systematically manage athlete information, match scheduling, results, and ancillary papers. User interface (UI) and user experience (UX) design are critical factors at this stage, guaranteeing straightforward navigation, clear data visualization, and a small learning curve. Design choices are informed by usability considerations like simplicity of use, interface clarity, consistency, and accessibility, which are essential for fostering adoption across users with diverse technical expertise.

WordPress, which was selected for its adaptability, scalability, and cost-effectiveness, serves as the application's primary content management system (CMS) throughout the development process. Figure 2 (a), 2(b), 2(c) and 2(d) show the interfaces of the VCS system.

Figure 2(a): VCS System Landing page

Figure 2(b): VCS System Athletes Documents uploading page

Figure 2(c): VCS System schedule page

Figure 2(d): VCS System result tally

In order to expand functionality beyond the limitations of a basic content management system (CMS), customized page templates and plugins that have been optimized are employed. A variety of user groups, including administrators, referees, and participants, are provided with the proper access rights via the implementation of role-based access control systems. A proprietary module that was developed expressly for the purpose of administering taekwondo contests, the M Taekwondo Form System, is included into the system, which is an essential component of the system. The registration of athletes, the assignment of divisions based on weight categories, the monitoring of payments, and the storing of structured data are all automated because of this module. The integration guarantees that there is a continuous flow of data across modules, which leads to a reduction in duplication and an overall improvement in the efficiency of the system.

The Varsity Combat Sport 2025 System is developed as a modular platform, where each module performs a specific function while remaining fully integrated within the system. The main modules include:

Participant and Contingent Registration Module

Enables online registration of athletes, team officials, and contingents, including category selection, document submission, and validation.

Medical and Accreditation Module

Facilitates the upload and verification of medical forms and participation approvals, ensuring compliance with safety regulations.

Competition Scheduling Module

Generates and manages match schedules, including general event timelines, sport-specific schedules, and official programs.

Results and Medal Tally Module

Allows real-time input of match outcomes and automatically calculates medal standings, ensuring transparency and accuracy.

Reports and Statistics Module

Produces detailed reports, participation summaries, and historical performance data for analysis and documentation.

Gallery and Daily Activity Module

Provides a centralized platform for uploading and displaying images and highlights from daily tournament activities.

Prototype Development

Upon completion of the system's development, the platform is then deployed as a functional prototype in a controlled environment. This prototype exemplifies a fully integrated version of the system, with all required modules for tournament management. The deployment is conducted on a live web server to ensure accessibility, system responsiveness, and compatibility across all devices.

The system is configured to replicate authentic tournament processes, including the simulation of participant registration, workflow scheduling, and result management. The objective of the prototype deployment is to verify the system's functionality, ensure operational continuity between modules, and confirm that the platform operates reliably under expected conditions of use. This phase serves as a vital transition between the development phase and the real-world implementation phase. The objective is to ensure that the Varsity Combat Sport 2025 System is dependable, readily available, and primed for deployment during the event.

Real-World Testing during VCS 2025

The third phase consisted of the full-scale deployment of the Varsity Combat Sport 2025 System in a real operational environment during the Varsity Combat Sport 2025 event, which took place from November 12th to November 16th, 2025. Taekwondo, karate, and silat were the three main combat sports that were represented during this phase of the implementation of the system. Each of these venues hosted a different combat sport. This resulted in the creation of a testing environment that included many sites and various disciplines, which was a reflection of the complexity of actual tournaments held at the university level. These tournaments often involve numerous events being held concurrently and need coordinated supervision across multiple locations.

The system served as the primary platform for managing all tournament activities at each location. These operations included the registration of athletes, the verification of medical and accreditation certificates, the assignment of divisions, the scheduling of matches, and the recording of results in real time. All of the data was synced via a single database, which ensured that any modifications from taekwondo, karate, and silat tournaments were immediately reflected throughout the system. This was accomplished despite the fact that the venues were physically disconnected from one another. At the same time as this made it possible for the organizers to keep a single picture of the whole tournament, it also made it possible for each location to function autonomously within its own particular discipline.

The system was also able to be evaluated under circumstances of dispersed use and concurrent data processing since it was operating across three different locations. There were several users who connected with the system concurrently. These users included referees, technical officials, and administrators. They entered results, updated timetables, and managed participant data in real time. This environment allowed for a thorough evaluation of the system's dependability, which ensured that it would perform consistently and without interruptions. Additionally, the system's scalability was evaluated in terms of its ability to manage high numbers of participants and matches across a variety of sports. Additionally, it analyzed the effectiveness of the network, especially with regard to the maintenance of consistent access and synchronization across venues.

As an additional point of interest, the deployment brought to light the system's capacity to provide cooperation across several venues and centralized governance. A single dashboard allowed the organizers to monitor progress across all three sports, compare medal rankings, and assure uniformity in data management and reporting. Additionally, the dashboard allowed them to compare medal standings. While this was going on, each venue

benefitted from having localized control, which made it possible to handle sport-specific needs in an effective manner. These requirements included match forms, scoring systems, and scheduling structures.

The resilience and flexibility of the Varsity Combat Sport 2025 System was proved during this phase by the effective operation of the system in an environment that included many venues and multiple sports. It proved the system's appropriateness as a scalable digital solution for organizing university-level combat sports competitions that include various disciplines and locations, and it demonstrated the system's efficacy in addressing the complexity that are encountered in the real world.

Usability Evaluation

The final phase of the study was centered on determining the usability of the system by analyzing the user experience that occurred during the Real-World Testing of the Varsity Combat Sport 2025 event. During this phase, the objective was to evaluate the system's ability to support tournament operations and to determine how well it fits the requirements of its varied user base. This user base included organizers, referees, technical officials, athletes, and team managers. In order to investigate both the functional performance and the quality of user interaction under operational settings, the researchers were able to evaluate usability in a context that was representative of the real-world experience.

Throughout the course of the competition, data was gathered via the use of Google Forms, which were then sent to the participants immediately after their interaction with the system. The use of this technique enabled the collecting of feedback in a timely and organized manner, while also guaranteeing that replies were connected to real usage experiences. Both quantitative and qualitative information, such as assessments of system usability, open-ended recommendations, and observations about workflow efficiency, were intended to be collected via the use of the forms. Since the system is fully utilized for the first time in an official tournament, it has been widely introduced to all users in the tournament including (1) university officers/coordinators, (2) organizer committee, (3) athletes, (4) team managers, (5) coaches, (6) spectators and (6) volunteers. The link of the forms was distributed right after the tournament ended through every WhatsApp group that consists of all categories of users.

This study uses purposive sampling which targets users who have been interacting with the system throughout the tournament. It was requested by each participant that they evaluate a number of different dimensions of usability, including: (1) Design and Layout, (2) Ease of Use, (3) Usefulness, (4) Learnability, (5) Functionality and (6) Satisfaction. Each dimension was measured using multiple items to ensure adequate coverage of the construct. Specifically, Interface and Design consisted of nine items, Ease of Use included four items, Usefulness comprised four items, Learnability contained three items, Functionality included three items, and Satisfaction was measured using four items. All items were assessed using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing respondents to indicate their level of agreement with each statement. This assessment was conducted with the intention of providing a comprehensive picture of how the system operated from the point of view of all of the users by concentrating on these dimensions.

The incorporation of numerous roles made it possible for the research to discover potential usability concerns that were unique to each user group, in addition to identifying obstacles that were shared by all of the participants together. In addition, the collection of input from a variety of institutions assisted in determining whether or not the system was capable of accommodating a wide range of organizational practices, technological settings, and competition procedures. After the responses were collected, data analysis was conducted. The demographic characteristics of the respondents, including their roles, types of martial arts practiced, and years of experience, were analyzed using descriptive statistics. In addition, each usability dimension was analyzed using measures of standard deviation and overall percentage distributions to assess the level of agreement and consistency among respondents. The use of standard deviation provided insight into the variability of responses, while percentage analysis helped illustrate the overall trends for each dimension. The findings of these analyses are presented and discussed in the following section.

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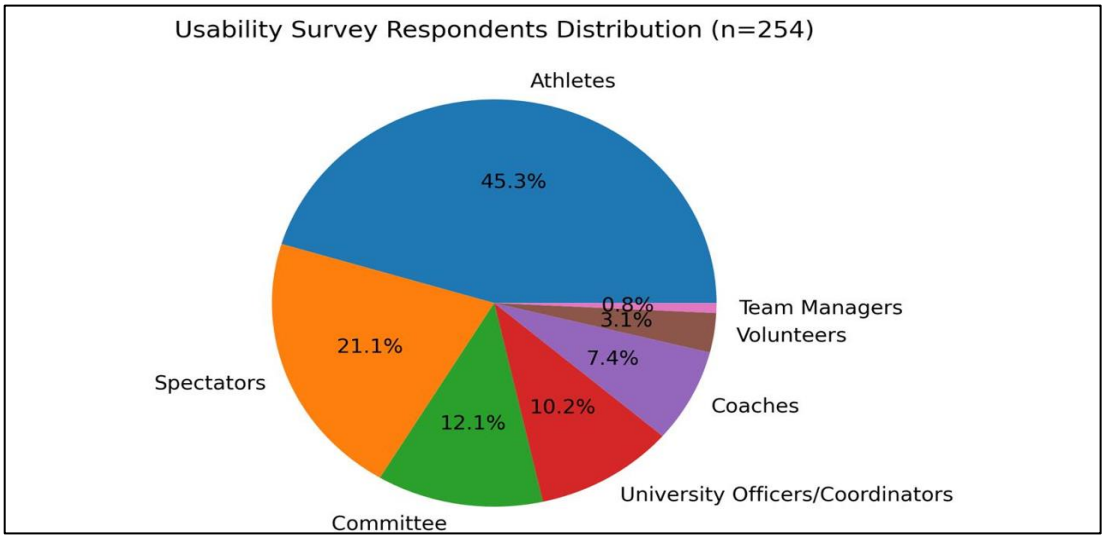
RESULTS

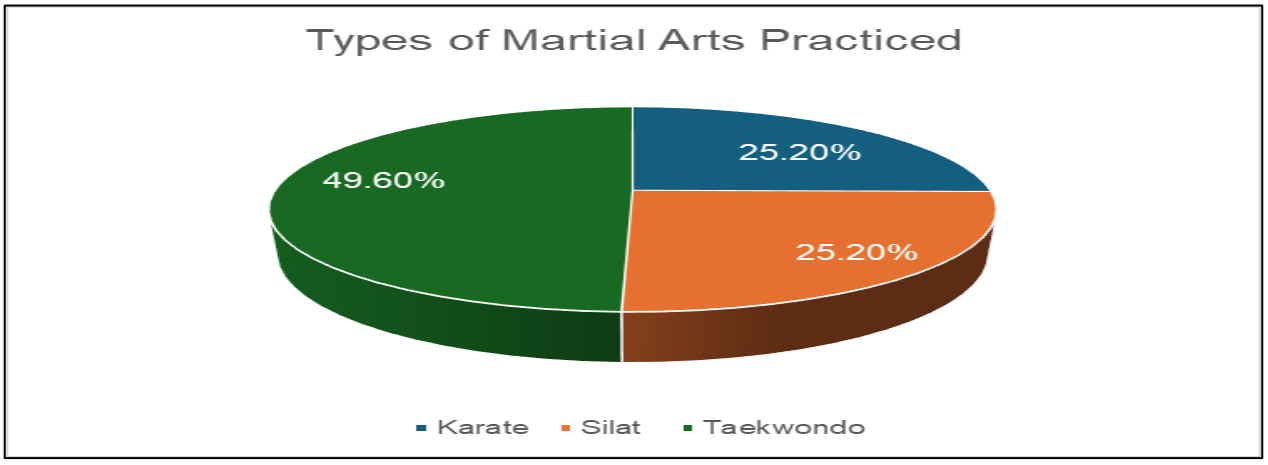
A total of 254 participants responded to the usability survey. The majority of respondents were athletes, accounting for 116 participants (45.7%). Spectators made up 54 participants (21.3%), while event committee members represented 31 participants (12.2%). University officers or coordinators comprised 26 participants (10.2%), and coaches accounted for 19 participants (7.5%). Smaller groups included volunteers with 8 participants (3.1%) and team managers with 2 participants (0.8%). The distribution of the roles is as shown in Figure 3.

Figure 3: Distribution of respondents' roles



Respondents represented a diverse range of institutions, with participants coming from over 40 universities and colleges across Malaysia. This ensured that feedback captured a wide variety of organizational practices and perspectives on system usability. Regarding combat sport disciplines, the largest group of respondents were involved in taekwondo (126 participants, 49.6%), followed by karate (64 participants, 25.2%) and silat (64 participants, 25.2%), reflecting the distribution of athletes and officials across the three event venues. Figure 4 depicts the distribution of the types of martial arts practiced among respondents.

Figure 4: Distribution of types of martial arts practiced

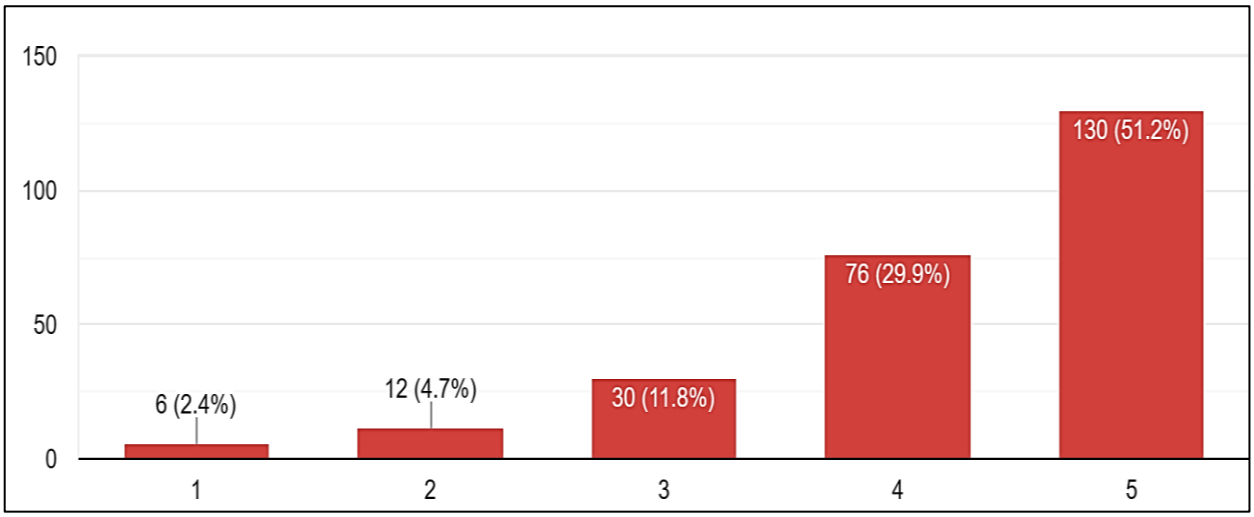


The majority of participants in martial arts had over 10 years of experience (64 participants, 25.2%), closely followed by those with 1–3 years of experience (57 participants, 22.4%). Participants with under 1 year of experience constituted 54 responses (21.3%), whilst those with 5–7 years of experience were 31 participants (12.2%). There were 29 participants with 3–5 years of experience (11.4%), and 19 participants with 7–10 years of experience (7.5%). This distribution illustrates that the results of the survey received feedback from a diverse array of ability levels, spanning from novices to highly proficient martial artists.

Dimensions of Design and Layout Analysis

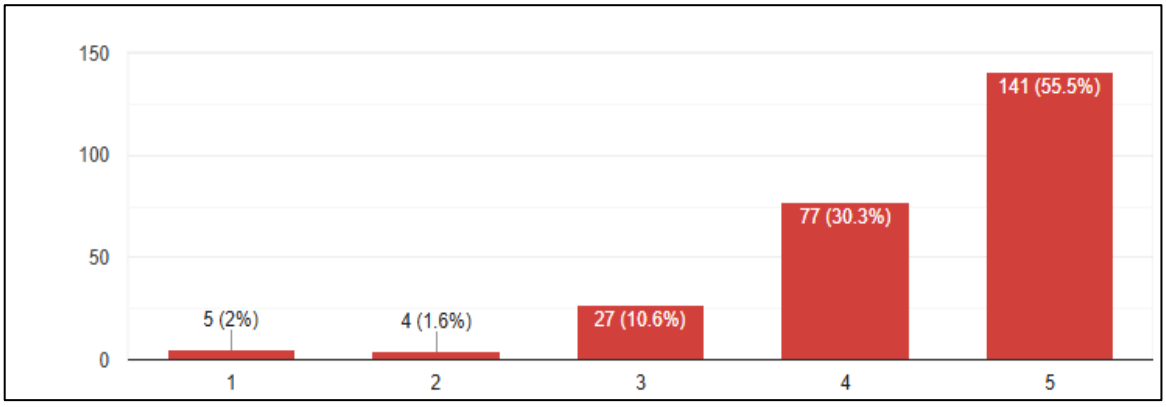
The usability evaluation of the Design and Layout dimension for the Varsity Combat Sport 2025 system indicates that users mostly perceived the interface as pleasant and user-friendly. Specifically, 51.2% of respondents strongly agreed and 29.9% concurred that the system interface was very pleasant, showing that over 80% of users had a favorable engagement with the platform. A mere 4.7% expressed disagreement, while 2.4% strongly disagreed, indicating that a minuscule fraction encountered discomfort, perhaps linked to personal device preferences or expectations for interface aesthetics. Figure 5 illustrates the result for item 1 in design and layout dimension.

Figure 5: Item 1: The system interface is very comfortable.



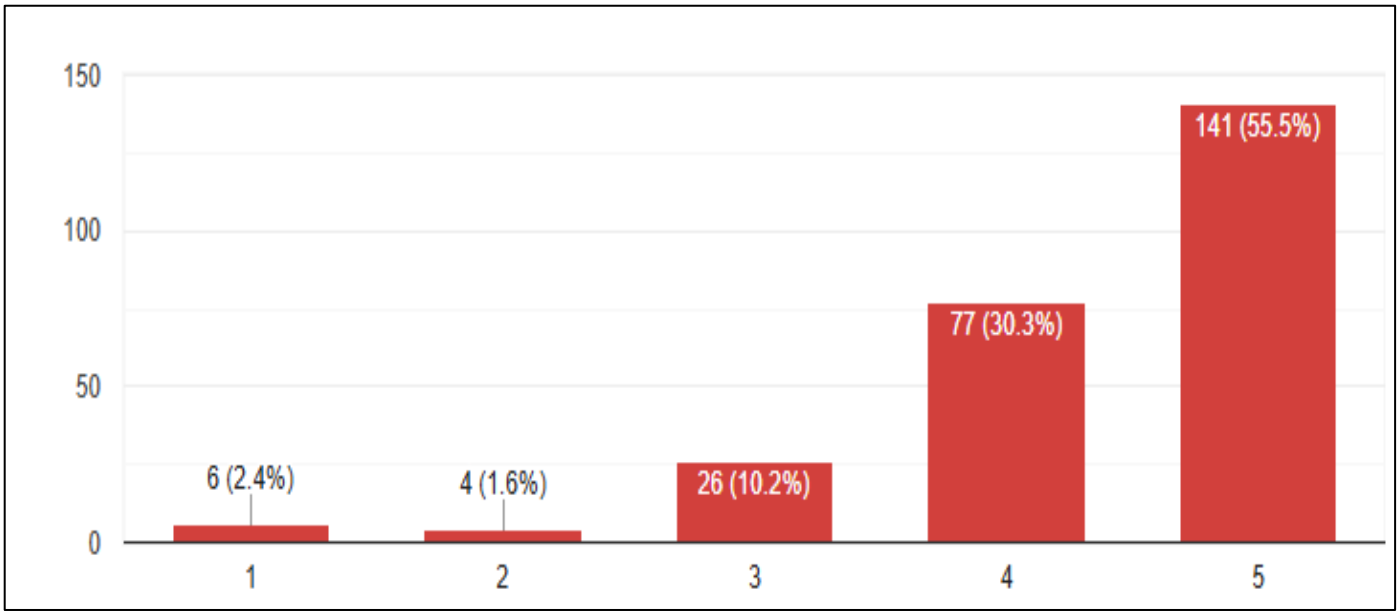
As for the arrangement of interface elements, a greater proportion (55.5%) strongly agreed that the layout was organized and comprehensible, whereas 30.3% expressed agreement. This indicates users saw the interface as systematically arranged and readily scannable. A clear organization minimizes confusion and facilitates users in swiftly locating essential information or services. A mere 3.6% expressed disagreement, possibly indicating isolated concerns such as cluttering certain displays or irregular space. The summary of item 2 is shown in Figure 6.

Figure 6: Item 2: The arrangement of interface elements is neat and clear



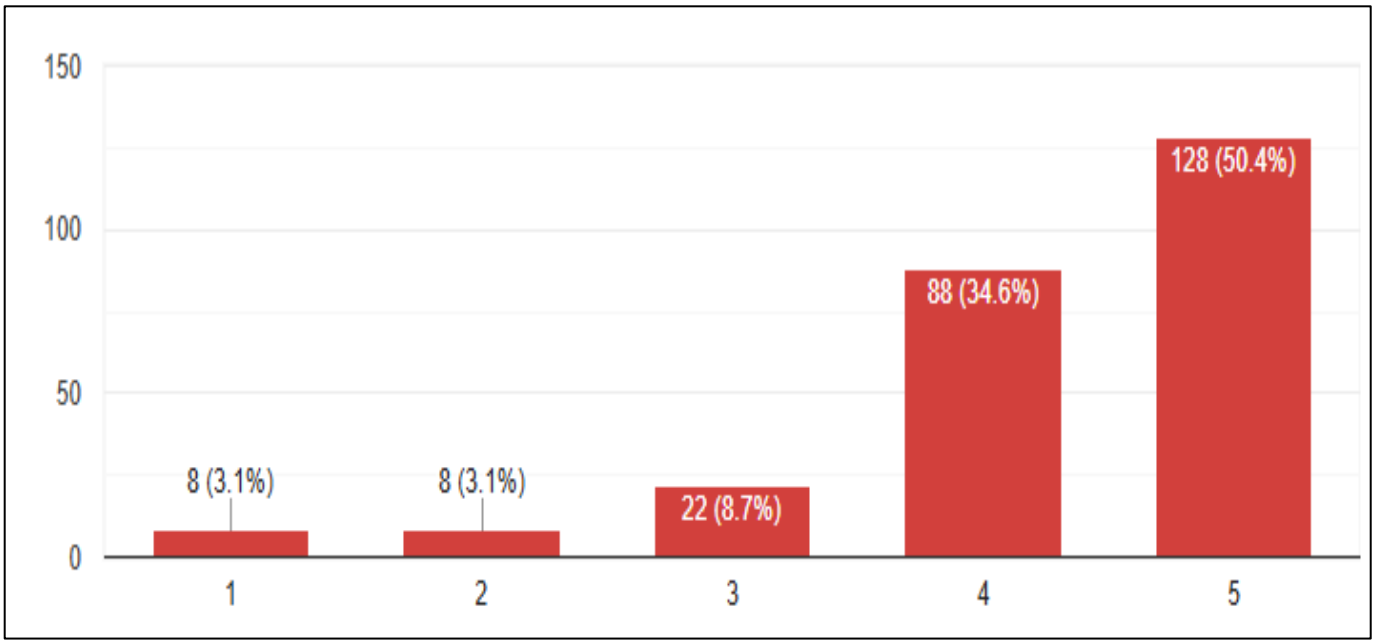
Besides, the item on information displayed had a similarly robust affirmative reaction as its predecessor, with 55.5% strongly in agreement and 30.3% in agreement as depicted in Figure 7. Effective communication of information is essential in sports event management, as prompt and precise updates are vital. The findings indicate that users comprehended the data and instructions effortlessly, hence minimizing mistakes and enhancing trust in the system. Minor disagreements may highlight infrequent concerns such as excessive technical jargon or data density that may be streamlined.

Figure 7: Item 3: The information displayed in the system is very clear.



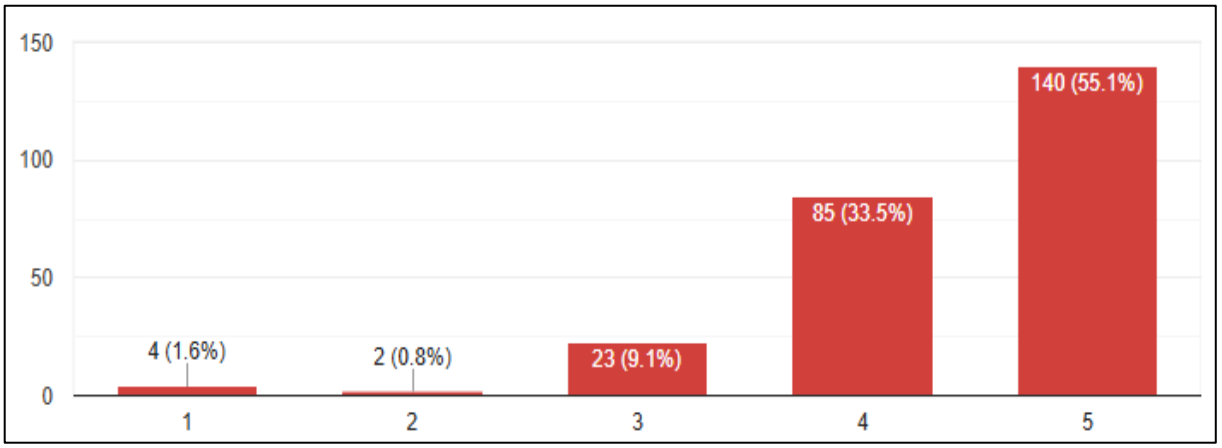
Meanwhile, Figure 8 shows the result for the interface elements. This item confirms that the elements on the interface were intuitively situated (item 4), as indicated by a total of 85% agreement, with 50.4% firmly agreeing and 34.6% agreeing. This confirms that the system was developed with user expectations and routines in mind, thereby facilitating navigation. Nevertheless, this item had a slightly higher neutral (8.7%) and disagreement rate (6.2%), suggesting that some users may have encountered difficulty in locating specific icons or found certain controls to be less predictable. These observations could serve as a foundation for future enhancements, including the addition of tooltips, the enhancement of icon labeling, or the further standardization of placement.

Figure 8: Item 4: The placement and layout of icons and other interface elements are intuitive and easy to interact with.



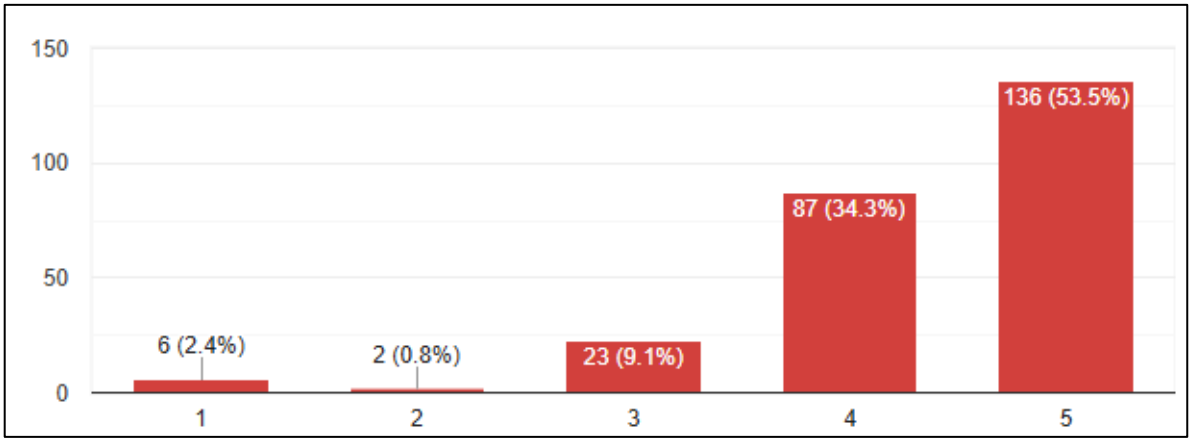
With 55.1% strongly agreeing and 33.5% agreeing, nearly 89% of users found the design consistent across the system as shown in Figure 9. Consistency in colors, fonts, button styles, and interaction patterns enhances learnability and reduces cognitive load, allowing users to predict how elements behave and focus on their tasks. The low disagreement rate (2.4%) suggests very few users experienced inconsistent issues, which is a strong indicator of thorough design standards and quality control during development.

Figure 9: Item 5: The design elements of the system are consistent.



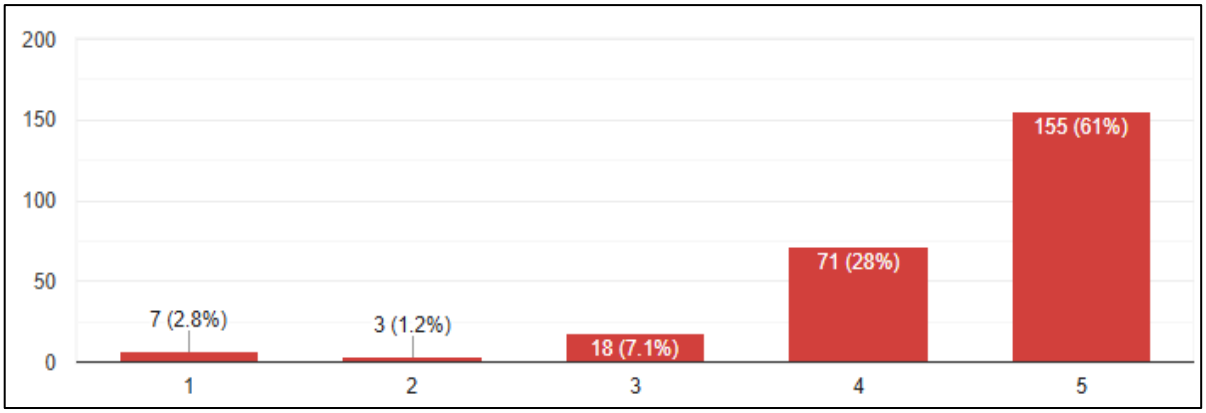
In terms of adaptation to different screen sizes and orientations, 34.3% of respondents agreed and 53.5% of respondents strongly agreed, resulting in a total of 87.8% favorable replies, while just 3.2% of respondents disapproved. It is essential for users to be able to access the platform in real time during events, and this demonstrates that the system is able to properly support a variety of devices, including desktop computers, tablets, and smartphones. Figure 10 shows the analysis result for this item.

Figure 10: Item 6: The system can adapt to various screen sizes and orientations.



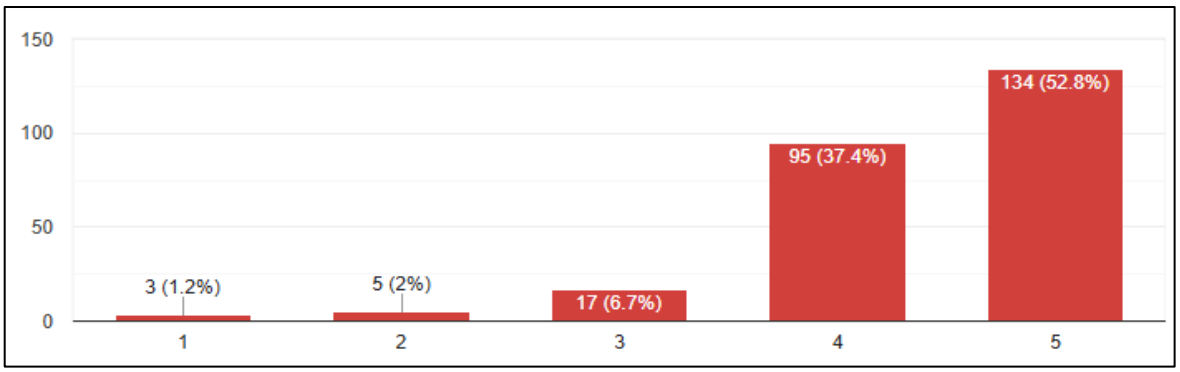
The color scheme and visual design received a total of 89% favorable ratings, with 61% of respondents strongly agreeing and 28% agreeing with the statement as shown in Figure 11. However, just four percent of respondents were in disagreement, which suggests that the visual design was acceptable and attractive to a wide audience, hence improving clarity and lowering cognitive strain.

Figure 11: Item 7: The text (font choice, size, spacing) is easy to read.



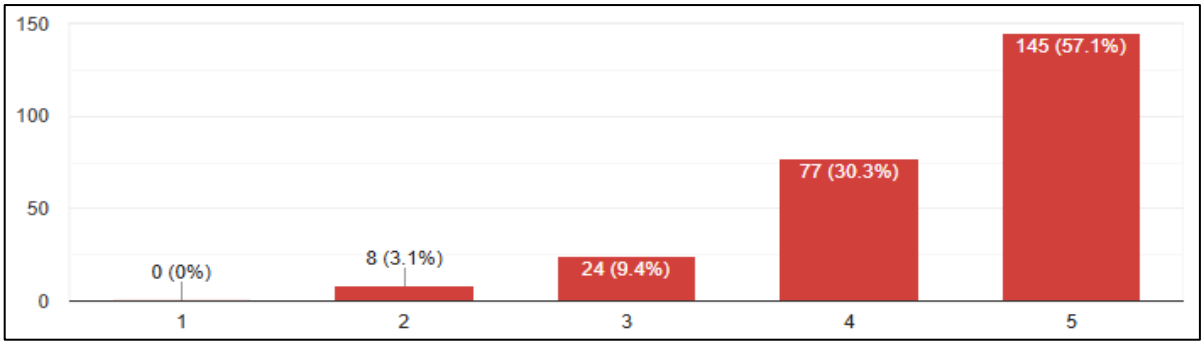
In the same vein, when it comes to the readability of text, which encompasses font selection, size, and spacing, 52.8% of respondents strongly agreed, while 37.4% agreed, culminating in 90.2% of favorable comments. Although just 3.2% of people considered it to be less legible, this might be a reflection of individual tastes or variations in the displays of different devices. Figure 12 shows the result of item 8.

Figure 12: Item 8: The system can adapt to various screen sizes and orientations.



Last but not least, the overall perceptions of the interface's organization and comfort garnered the greatest favorable evaluations, with 57.1% strongly agreeing and 30.3% agreeing, resulting in a total of 87.4% positive comments, while just 3.1% disapproved (Figure 13). This suggests that users considered the system to be user-friendly, uncluttered, and simple to use in practice, which facilitated the completion of tasks in an effective manner despite the high-pressure setting typical of live events.

Figure 13: Item 9: Overall, the interface looks organized and is comfortable to use.



The standard deviation values for the items ranged from 0.789 to 0.992, indicating a relatively low to moderate level of variability in responses as shown in Table 1.

Table 1: Standard deviation for items in Design and Layout

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9
Std. Deviation	0.99	0.88	0.90	0.96	0.81	0.86	0.88	0.79	0.78

Item 1 recorded the highest standard deviation (SD = 0.99), suggesting that respondents' opinions for this item were the most varied compared to the others. This may indicate differing user experiences or interpretations related to that specific aspect of the interface design. In contrast, Item 9 showed the lowest standard deviation (SD = 0.78), followed closely by Item 8 (SD = 0.79), reflecting more consistent agreement among respondents. The remaining items (Items 2 to 7) demonstrated standard deviation values between 0.81 and 0.96, indicating generally consistent responses with only slight variations. Overall, the relatively low standard deviation values across all nine items suggest that respondents shared similar perceptions regarding the design and layout of the system. These findings imply that the Interface and Design dimension is perceived positively and consistently by users.

Dimension of Ease of Use Analysis

The Ease of Use dimension, consisting of four items, was analyzed using standard deviation to assess the consistency of respondents' perceptions as shown in Table 2. The results showed that the standard deviation values ranged from 0.85 to 0.94, indicating a moderate level of variability among responses. Item 4 recorded the highest standard deviation (SD = 0.94), suggesting slightly more diverse opinions among respondents for this item, while Item 1 had the lowest standard deviation (SD = 0.85), reflecting more consistent agreement. Items 2 and 3 showed standard deviation values of 0.90 and 0.88 respectively, indicating relatively stable responses with minimal variation.

Table 2: Standard deviation for items in Ease of Use

	Item 1	Item 2	Item 3	Item 4
Std. Deviation	0.85	0.90	0.88	0.94

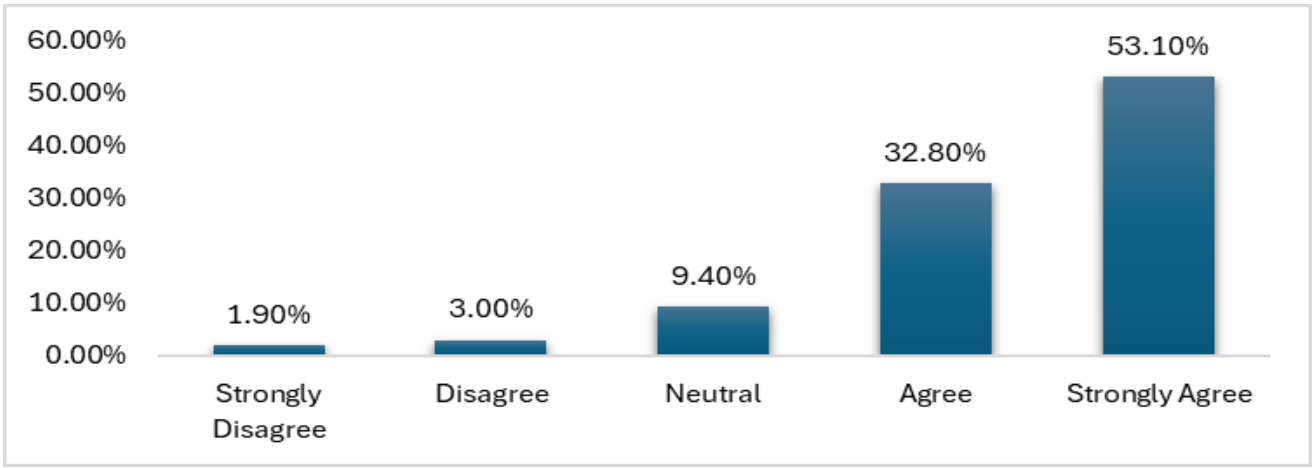
This dimension exhibits a consistently elevated level of user satisfaction across all assessed facets of the system. In response to the statement "The system is easy to use," 51.2% of participants strongly agreed and 36.6% agreed, for a total of 87.8% positive replies, while just 3.2% expressed negative feedback. This signifies that most users may engage with the system seamlessly, implying a little learning curve and efficient interface design.

In a similar vein, 52.8% strongly concurred and 32.7% concurred, resulting in a cumulative 85.5% affirmative replies about the ease of information retrieval, whilst 5.5% indicated dissent. This indicates that the system's information structure and organization were mostly successful, however a little greater level of dissent compared to other items may reflect modest difficulties in obtaining particular information.

Regarding navigation and layout, 53.9% strongly agreed and 31.5% agreed, resulting in 85.4% good comments, with just 4.4% negative replies. This indicates that the majority of users saw the navigation as intuitive and the layout as conducive to seamless engagement. Similarly, regarding overall comfort in using the system, 54.3% strongly agreed and 30.3% agreed, culminating in 84.6% affirmative replies, while 6.3% expressed disagreement, suggesting that the technology mostly offered a pleasant user experience throughout operation.

The Ease of Use dimension indicates that the system excels in all four criteria, with average affirmative replies of almost 85.8% as shown in Figure 14. Neutral answers fluctuate between 9% and 10%, but negative reactions constantly stay low, often around 6%. The results validate that the Varsity Combat Sport 2025 system is intuitive, navigable, and user-friendly, facilitating efficient interaction for users in a live tournament setting. Subtle discrepancies across items indicate potential for more refinement, especially in optimizing information retrieval and augmenting overall user experience.

Figure 14: Analysis summary of dimension ease of use.



Dimension of Usefulness Analysis

The Usefulness dimension indicates the system's efficacy in assisting users to attain their objectives and enhance overall tournament administration procedures. This dimension comprises four items, showing standard deviation values ranging from 0.83 to 0.94 as shown in Table 3. Item 2 recorded the highest variability (SD = 0.94), while Item 4 had the lowest (SD = 0.83). Meanwhile, Item 1 and Item 3 showed standard deviations of 0.86 and 0.91 respectively, indicating relatively consistent responses across the items.

Table 3: Standard deviation for items in Usefulness

	Item 1	Item 2	Item 3	Item 4
Std. Deviation	0.86	0.94	0.91	0.83

The results demonstrate a continuously elevated perception of usefulness among participants. A significant majority of respondents affirmed the statement "The system is useful and helpful," with 55.9% strongly agreeing and 30.7% agreeing, for a total of 86.6% favorable replies. This indicates that users clearly acknowledge the system's utility in supporting their functions, whether as athletes, organizers, or authorities. The minimal amount of dissent (4.3%) further substantiates the system's efficacy in addressing practical requirements.

The system's capacity to enhance information accessibility received favorable evaluations, with 54.3% strongly agreeing and 29.9% agreeing, resulting in a total of 84.2% good replies. This illustrates that technology effectively enhances information accessibility in contrast to conventional manual techniques. A somewhat elevated disagreement rate (6.7%) suggests that certain users may have had modest challenges in finding particular information, indicating potential areas for improvement in search functionalities or navigation routes.

Regarding user expectations, 53.1% strongly agreed and 31.5% agreed, with a total of 84.6% favorable replies. This indicates that the system's features and operations correspond well with user expectations for a digital tournament administration platform. The assertion that technology enhances the tournament process garnered 53.9% strong agreement and 31.1% agreement, culminating in 85.0% affirmative replies, indicating that users recognize substantial advancements in efficiency, coordination, and overall event administration.

In summary, the Usefulness dimension obtained an average affirmative response of approximately 85.1%, which indicates that the system significantly contributes to the improvement of user productivity and operational effectiveness. The persistently low negative feedback and moderate neutral replies indicate that, while the system is very advantageous, more improvements in information accessibility and feature optimization might further augment its effectiveness.

Dimension of Learnability Analysis

The Learnability dimension assesses the ease with which users can comprehend and acclimate to the system, especially in a real-time event context. Learnability dimension consisting of three items, recorded standard deviation values ranging from 0.85 to 0.89 as shown in Table 4. Item 3 showed the highest variability (SD = 0.89), while Item 1 had the lowest (SD = 0.85). Item 2 reported a standard deviation of 0.86, indicating relatively consistent responses across all items.

Table 4: Standard deviation for items in Learnability

	Item 1	Item 2	Item 3
Std. Deviation	0.85	0.86	0.89

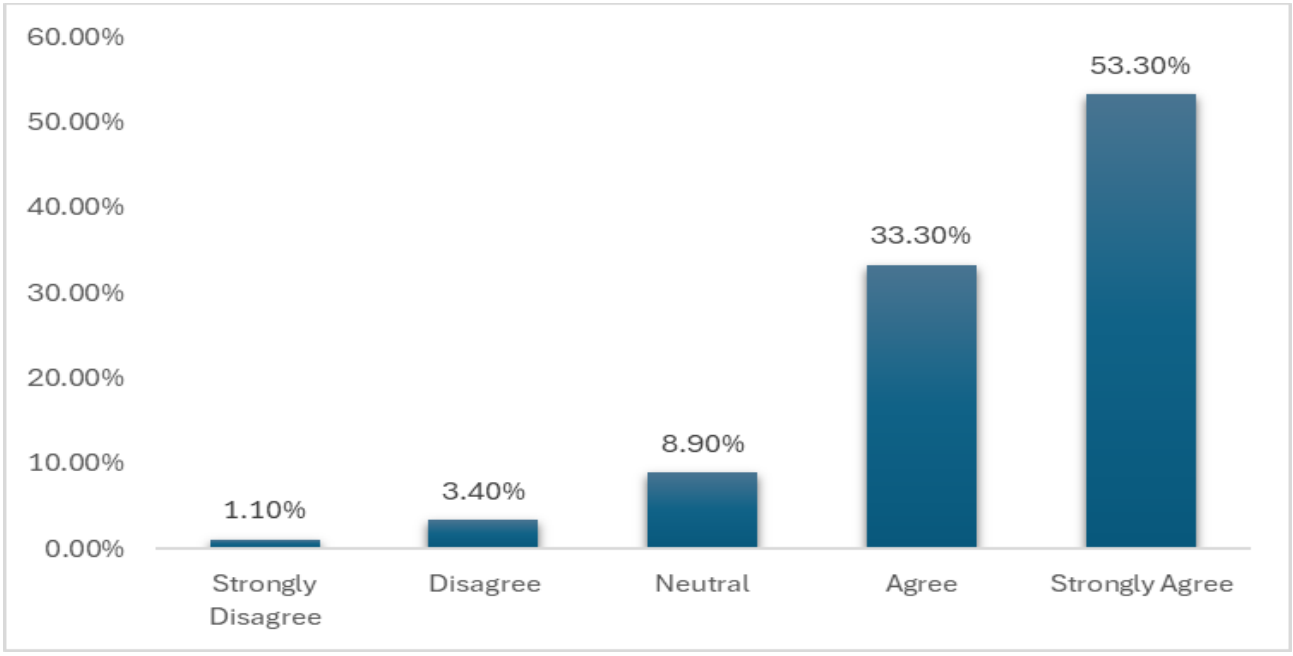
The findings demonstrate significant consensus across all elements, suggesting that the approach is straightforward and easily comprehensible. To ensure the accuracy of information for seamless match processes, 51.2% strongly agreed and 35.4% agreed, for a total of 86.6% affirmative replies. This underscores that users have confidence in the system's data precision, which is essential for decision-making in contests.

The clarity of the exhibited information garnered high scores, with 54.7% strongly agreeing and 32.3% agreeing, resulting in a total of 87.0% favorable replies. This indicates that the system conveys information well, minimizing misunderstanding and facilitating rapid comprehension across users with diverse expertise levels. A mere 4.7% of respondents indicated disagreement, suggesting little concern over information complexity or presentation.

Moreover, the assertion that using the system promotes engagement in subsequent contests garnered 53.9% strong agreement and 32.3% agreement, culminating in 86.2% affirmative replies. This is especially important, since it shows that the system not only facilitates usability but also improves user engagement and motivation. When consumers have confidence and familiarity with a system, they are more inclined to use it in subsequent instances.

The Learnability dimension had an average favorable response of around 86.6%, indicating that the system is facile to learn, comprehend, and apply as shown in Figure 15. The results indicate that the system effectively reduces the learning curve, making it accessible to a varied user demographic, including those with no technical expertise. Subtle neutral answers suggest that some users may still need initial acclimatization; yet, the system exhibits robust learnability generally.

Figure 15: Analysis summary of dimension learnability.



Dimension of Functionality Analysis

The Functionality dimension evaluates the system's efficacy in executing its designated duties and the reliability of its features in practical scenarios. This dimension comprises of three items, showing standard deviation values ranging from 0.89 to 0.94 as shown in Table 5. Item 1 recorded the highest variability (SD = 0.94630), while Item 2 had the lowest (SD = 0.89). Item 3 reported a standard deviation of 0.92174, indicating relatively consistent responses across the items.

Table 5: Standard deviation for items in Functionality

	Item 1	Item 2	Item 3
Std. Deviation	0.94	0.89	0.92

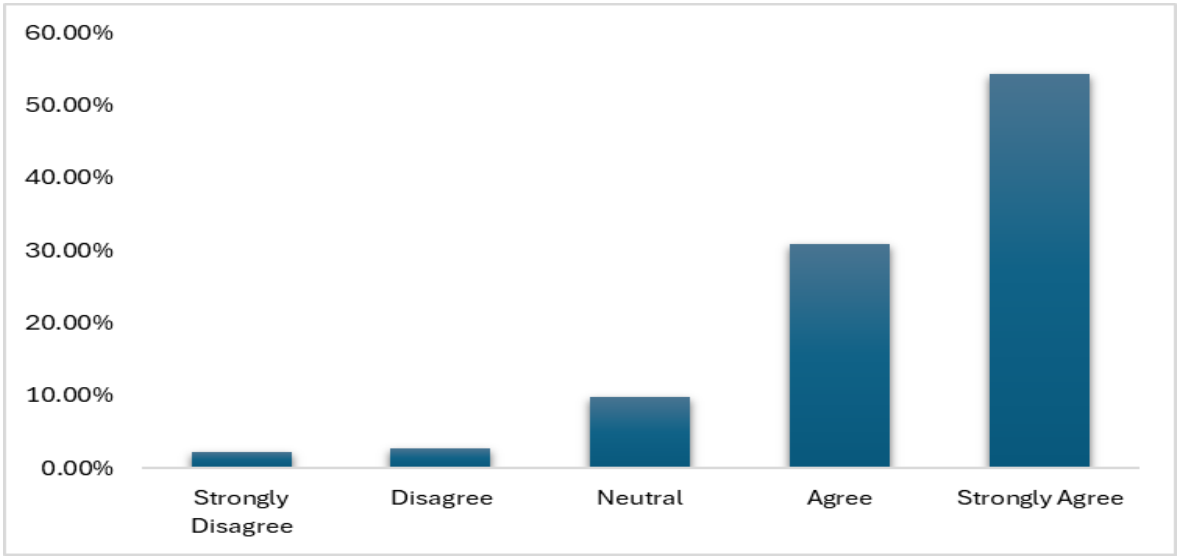
The findings demonstrate that the system operates efficiently and fulfills user expectations about functionality. In response to the statement "The system's features and functions work as expected," 55.5% strongly agreed and 30.7% agreed, yielding a total of 86.2% affirmative replies. This indicates that customers often encountered seamless and dependable system functionality without significant technical problems.

The system's capacity to manage output effectively garnered high scores, with 48.4% strongly agreeing and 36.6% agreeing, resulting in a total of 85.0% good comments. Despite being somewhat lower in strong agreement relative to other elements, this nevertheless demonstrates that the system can successfully process and provide outputs, including results, timetables, and reports. A little fraction of dissent (4.8%) indicates sporadic problems that may pertain to particular circumstances or system stress situations.

The reaction time and overall system performance yielded 59.1% strong agreement and 25.2% agreement, culminating in 84.3% positive replies, with the greatest degree of strong agreement in this category. This suggests that users were mostly satisfied with system responsiveness, which is essential in live tournament environments where delays might hinder operations. The elevated neutral response rate (10.6%) may indicate that some users encountered performance unpredictability, perhaps attributable to network circumstances or peak use times.

The Functionality dimension got an average favorable response of around 85.2%, indicating that the system is dependable, efficient, and proficient in facilitating real-time event management. Although users provided several requests for improvements to enhance ease of access to the system, no errors were identified or reported during its use. This indicates that the system is functionally stable and reliable, as it was able to operate without technical faults despite varying user interactions and feedback.

Figure 16: Analysis summary of dimension functionality.



Dimension of Satisfaction Analysis

The Satisfaction dimension measures users' overall acceptance of the system and their willingness to continue using and recommending it. Among four items in this dimension, the standard deviation values ranging from 0.81 to 0.94 as shown in Table 6. Item 2 recorded the highest variability (SD = 0.94), while Item 1 had the lowest (SD = 0.81). Items 3 and 4 reported standard deviations of 0.91 and 0.90 respectively, indicating relatively consistent responses across all items.

Table 6: Standard deviation for items in Functionality

	Item 1	Item 2	Item 3	Item 4
Std. Deviation	0.81	0.94	0.91	0.90

The results indicate a high level of user satisfaction across all items. For the availability of core functions, 53.5% strongly agreed and 34.3% agreed, resulting in 87.8% positive responses, indicating that users feel the system provides all essential features required for tournament management.

The intention to reuse the system in future competitions also received strong support, with 54.7% strongly agreeing and 31.1% agreeing, totaling 85.8% positive responses. This suggests that users are confident in the

system and willing to rely on it for future events. Similarly, the recommendation for future tournaments recorded 53.5% strongly agree and 31.5% agree, resulting in 85.0% positive responses, reflecting a strong level of trust and endorsement among users.

The highest level of strong agreement in this dimension was observed for overall satisfaction, with 60.2% strongly agreeing and 26.4% agreeing, totaling 86.6% positive responses. This indicates that the majority of users had positive overall experience with the system, reinforcing its success in meeting user expectations.

Overall, the Satisfaction dimension achieved an average positive response of approximately 86.3%, demonstrating that users are highly satisfied with the system's performance, features, and usability. The low levels of dissatisfaction further confirm that the system is well-received, while the high willingness to recommend and reuse the system highlights its potential for broader adoption in future tournaments.

DISCUSSION AND CONCLUSION

This study's results illustrate the effective creation and implementation of the Varsity Combat Sport 2025 system, which attained elevated levels of usability, functionality, and user satisfaction across various participant groups. A total of 254 participants, including players, coaches, officials, volunteers, and university personnel, offered an extensive viewpoint on system efficacy in actual tournament environments. Positive feedback consistently above 85 percent in the criteria of Design & Layout, Ease of Use, Usefulness, Learnability, Functionality, and Satisfaction. A few indifferent or unfavourable comments suggest specific areas for improvement, including the optimization of information retrieval and the assurance of constant performance during high use periods.

Participants positively evaluated the system's interface design, layout, and readability from a usability standpoint. Elevated scores for device adaptability, information clarity, and sensible icon positioning indicate that the system accommodates diverse user interactions across PCs, tablets, and mobile devices. The findings demonstrate the primary contribution of the research, which is the provision of a scalable digital framework for university sports administration. The framework is sufficiently adaptable to accommodate diverse user roles, several martial arts disciplines, and intricate event structures, all while ensuring usability and accessibility.

The system exhibited reliable output management, constant reaction times, and the provision of anticipated features in terms of functionality and operational performance. Users affirmed that it streamlines information access, enhances precise match processing, and promotes participation across several platforms. These results correspond with the study's second contribution, which is a cost-efficient CMS-based implementation approach. The methodology utilizes existing digital infrastructure to provide a reliable and high-performing event management system without necessitating costly proprietary software development.

The assessment of utility, ease of learning, and satisfaction further substantiates the system's practical worth. Participants unanimously agreed that the technology enhances tournament operations, fulfils functional requirements, and promotes engagement in future events. Elevated learnability ratings suggest that users with less technical expertise may swiftly acclimate, demonstrating that the system mitigates the learning curve and amplifies engagement. These results corroborate the final contribution of the research, which is an empirically verified usability assessment. The assessment offers measurable proof of the system's efficacy and presents recommendations for further enhancements.

The research presents a reproducible framework for digitizing multi-sport events that integrates robust design principles, dependable functionality, and confirmed usability results. Favourable feedback across all aspects indicates that digital solutions may augment operational efficiency, diminish administrative burdens, and enhance the entire experience for athletes, authorities, and organizers. The Varsity Combat Sport 2025 system offers a pragmatic and adaptable solution for universities and athletic organizations aiming to enhance event administration. This substantiates the fourth contribution of the research, demonstrating the applicability of a scalable, cost-effective, and empirically proven strategy to additional multi-sport events.

REFERENCES

1. Aldoseri, A., Al-khalifa, K. N., & Hamouda, A. M. (2024). Methodological Approach to Assessing the Current State of Organizations for AI-Based Digital Transformation.
2. Anju, M. I., Kishore, K., Swaroopa, M. S. S., & Sharma, S. A. (2025). Smart Sports Association Management System with Real-Time Tournament. Innovations and Advances in Cognitive Systems: ICIACS 2025, Volume 1, 1, 275.
3. Ashmel, M., Hashim, M., Tlemsani, I., & Matthews, R. (2022). Higher education strategy in digital transformation. Education and Information Technologies, August 2021, 3171–3195. https://doi.org/10.1007/s10639-021-10739-1
4. Channabasappa, N. (2021). Sports Facilities and Sport Performance in the Soccer Sports Between Male and Female College Players : A Comparative Study. International E- Research Journal.
5. Christodimitropoulou, M., Choustoulakisi, E., & Antonopoulou, P. (2025). DIGITAL TRANSFORMATION IN SPORTS MANAGEMENT : TECHNOLOGIES , TRENDS , AND STRATEGIC IMPLICATIONS. European Journal of Management and Marketing Studies, 135–152. https://doi.org/10.46827/ejmms.v10i2.2031
6. Deng, L., Turner, D. E., Gehling, R., & Prince, B. (2010). User experience, satisfaction, and continual usage intention of IT. European Journal of Information Systems, 19(1), 60–75.
7. Giblin, G., Tor, E., & Parrington, L. (n.d.). The impact of technology on elite sports performance. 3–9.
8. Glebova, E., Gerke, A., Book, R., Glebova, E., Gerke, A., Book, R., & Transformational, T. (2024). The Transformational Role of Technology in Sports Events To cite this version : HAL Id : hal-04363588.
9. Lee, T. D., & Schmidt, R. A. (2025). Motor learning and performance: From principles to application. Human Kinetics.
10. Mahmood, F., Khan, A. Z., & Khan, M. B. (2019). Digital organizational transformation issues , challenges and impact : A systematic literature review of a decade. Abasyn Journal of Social Sciences, 12, 231–249. https://doi.org/10.34091/AJSS.12.2.03
11. Nielsen, J. (1993). Usability Engineering. In Academic Press, Inc. (United Kin). Academic Press Limited.
12. Nielsen, J., & Phillips, V. L. (1993). Estimating the relative usability of two interfaces: heuristic, formal, and empirical methods compared. Association for Computing Machinery, April. https://doi.org/10.1145/169059.169173
13. Paul, J., Dennis, C., Kacprzak, A., Curtis, L., Kunz, W. H., Liu, J., Petit, O., & Tyagi, S. (2024). Digital transformation : A multidisciplinary perspective and future research agenda. January, 1–28. https://doi.org/10.1111/ijcs.13015
14. Vaezi, R. (2013). User satisfaction with information systems: A comprehensive model of attribute satisfaction.
15. Wang, Y. (2024). The Impact of Digital Transformation in the Sports Industry. 0, 1–6. https://doi.org/10.54254/2754-1169/77/20241821