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PERCEIVED SPORTS FACILITY QUALITY AND STUDENT SATISFACTION ACROSS FOUR PUBLIC UNIVERSITIES IN BORNEO: AN ANALYSIS OF DEMOGRAPHIC DIFFERENCES AND ASSOCIATIONS

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Abstract: *The quality of sports facilities is an important factor influencing students' experiences and satisfaction in higher education institutions. This study assesses perceptions of sports facility quality, particularly sports courts, fields and equipment, and examines their associations with student satisfaction across four public universities in Borneo. It also considers demographic differences in gender, ethnicity and athlete status. A quantitative approach was employed using questionnaire data from 916 respondents. Descriptive statistics were used to analyse demographic profiles and facility evaluations, while Pearson's correlation analysis examined the relationships between facility evaluations and student satisfaction. The findings revealed positive associations across all four institutions, indicating that more favourable facility evaluations were associated with higher student satisfaction, although causality cannot be established. Overall, the study highlights the importance of considering institutional contexts and user diversity in sports facility planning, maintenance and improvement, providing an empirical basis for more responsive management and future cross-institutional research*

Keywords: *sports facility quality; student satisfaction; public universities; demographics; sports management; Borneo.*

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Introduction

Sports facilities are an important component of sports management in higher education institutions, supporting students' participation in physical activity, recreation and competitive sports. Their quality, including the condition of sports fields and courts, equipment availability and suitability for sporting activities, should be evaluated based on users' experiences and satisfaction. Student satisfaction therefore provides an important indicator of how well the facilities meet users' needs and expectations.

Previous studies have examined satisfaction with university and sports facilities. Isa et al. (2021), involving 280 students at a Malaysian public university, found that satisfaction varied across different types of university facilities. Similarly, Azmi et al. (2022), in a study of 433 UPSI students, reported a significant relationship between sports facility service quality and student satisfaction, with assurance recording the highest mean score. Mohd Aznan et al. (2023) further examined perceived risk management in relation to satisfaction with university sports facility experiences. Although these studies highlight factors associated with facility satisfaction, further investigation is needed to establish whether satisfaction differs according to demographic characteristics, particularly gender, ethnicity and athlete status, across multiple institutions.

Therefore, this study aims to examine students' satisfaction with sports facilities and their evaluations of facility quality across four public universities in Borneo, focusing on differences according to gender, ethnicity and athlete status. By investigating these differences through statistical analysis rather than assuming their existence, the study seeks to provide a broader understanding of student experiences across different user groups. The findings may assist universities in planning and improving sports facilities in response to students' needs and experiences.

Research Gap.

Previous studies have highlighted the importance of student satisfaction in evaluating university facilities and sports facility services. Isa et al. (2021), involving 280 students at a Malaysian public university, found that satisfaction varied across 14 types of university facilities, although the study did not specifically examine demographic differences in sports facility satisfaction. Similarly, Azmi et al. (2022), involving 433 UPSI students, identified a significant relationship between sports facility service quality and student satisfaction using SERVQUAL and Pearson's correlation analysis. Mohd Aznan et al. (2023), involving 330 respondents, also reported a significant positive relationship between perceived risk management and satisfaction with university sports facilities ($r = .793$, $p < .01$). Although these studies provide valuable evidence concerning facility satisfaction, service quality, and risk management, their primary focus did not encompass simultaneous comparisons of satisfaction according to gender, ethnicity, and athlete status. Furthermore, findings from individual institutions or specific user populations may not fully represent student experiences across different universities.

Accordingly, further investigation is needed to examine demographic differences in sports facility satisfaction across multiple higher education institutions, particularly within the context of Borneo. The present study addresses this research gap by examining differences in students' satisfaction with sports facilities according to gender, ethnicity, and athlete status across four public universities in Borneo, Malaysia. It focuses on students' evaluations of sports facility quality and determines whether satisfaction differences between demographic groups are statistically significant. By incorporating cross-institutional comparisons and demographic

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characteristics, this study extends existing empirical evidence in higher education sports management and provides practical insights for university administrators to identify improvement priorities and enhance sports facility provision through evidence-based and user-responsive management.

Problem Statement.

Sports facilities are essential institutional resources that support student well-being, physical activity and sports development in higher education. However, their availability alone does not guarantee student satisfaction, as facility quality, condition, accessibility, suitability, maintenance, safety and equipment usability also influence users' experiences. Previous Malaysian studies have highlighted these factors. Abidin et al. (2019), involving 447 student-athletes from 20 public universities, reported generally positive service quality evaluations, although facility availability and conditions received moderate ratings. Similarly, Azmi et al. (2022) found a significant relationship between sports facility service quality and satisfaction among 433 UPSI students, while Mohd Aznan et al. (2023) reported a positive relationship between perceived risk management and satisfaction ($r = .793$, $p < .01$). Othman and Ahmad (2025), involving 361 UiTM Seremban students, also identified a significant positive association between service quality and satisfaction ($r = .627$, $p < .05$).

Despite these findings, research gaps remain in understanding student satisfaction across multiple institutions and demographic groups. Most previous studies focused on individual institutions or specific populations. Although Abidin et al. (2019) covered 20 public universities, their study primarily presented descriptive service quality evaluations rather than direct comparisons of satisfaction between institutions. Furthermore, differences involving gender, ethnicity and athlete status require further investigation. Ampofo-Boateng (2009) identified demographic differences in satisfaction with recreational sports facilities, while Wan Pa et al. (2022) reported gender differences in selected sports facility service dimensions at UKM. However, these findings cannot be generalised to all university populations, particularly regarding ethnicity and athlete status. Competitive athletes may also have different facility requirements and utilisation patterns compared with non-athletes, highlighting the need for further empirical investigation.

Accordingly, this study examines sports facility quality and student satisfaction across four public universities in Borneo, Malaysia. Specifically, it evaluates students' perceptions of facility quality, examines the relationship between facility quality and satisfaction, investigates satisfaction differences according to gender, ethnicity and athlete status, and compares findings across institutions. By integrating institutional and demographic perspectives within a cross-sectional research framework, the study extends existing evidence beyond single-institution assessments and provides insights to assist university administrators in prioritising improvements, strengthening facility management and addressing students' diverse needs.

Research Objectives.

1. To identify differences in the use of sports facilities according to students' demographic characteristics across four public universities in Borneo.
2. To assess the level of sports facility provision, particularly sports courts, fields, and other facilities, as well as sports equipment, across four public universities in Borneo.
3. To examine the relationship between sports facilities and student satisfaction across four public universities in Borneo

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Literature Review.

Sports Facility Quality in Higher Education Institutions.

Sports facilities are essential components of higher education institutions, supporting physical activity, recreational programmes, competitive sports, and campus well-being. However, their quality depends not only on availability but also on physical conditions, accessibility, suitability, maintenance, safety, and the adequacy of sports equipment. In Malaysia, Ahmad et al. (2019), involving 447 student-athletes from 20 public universities, reported an overall SERVPERF service quality mean of 3.51, with facility availability and physical conditions receiving comparatively moderate evaluations, highlighting the importance of assessing indoor and outdoor facilities separately. Similarly, *University Recreational Facilities Service Quality and Students' Physical Activity Level* (2016), involving 390 students from three Malaysian higher education institutions, highlighted the relevance of recreational facility service quality to students' physical activity participation. More recently, Othman and Ahmad (2025), involving 361 UiTM Seremban students, reported a significant positive relationship between sports facility service quality and student satisfaction ($r = .627$, $p < .05$). Collectively, these findings demonstrate that sports facility quality extends beyond infrastructure provision to include maintenance, accessibility, functionality, and users' needs. Nevertheless, further research is needed to examine variations in students' evaluations and satisfaction across multiple higher education institutions, particularly within the geographical context of Borneo.

Servicescape and the Physical Service Environment.

The servicescape concept provides an important theoretical perspective for understanding how physical environments influence users' perceptions, experiences, and evaluations of service quality. Bitner (1992) introduced the framework, highlighting environmental elements such as spatial layout, functionality, ambient conditions, and signs or symbols that shape customer and employee perceptions and behaviours. In university sports facilities, these elements include the condition of sports courts, suitability of playing surfaces, equipment availability, cleanliness, lighting, ventilation, accessibility, and spatial arrangement. These characteristics are particularly important in sports settings, where facilities must be safe, functional, comfortable, and suitable for various sporting activities. Similarly, Wakefield and Blodgett (1996) demonstrated that physical surroundings influence users' evaluations and behavioural intentions in leisure service environments.

Brady and Cronin (2001) further developed a hierarchical service quality framework comprising interaction quality, physical environment quality, and outcome quality, reinforcing the importance of the physical environment in overall service evaluations. Collectively, these theoretical perspectives suggest that students' satisfaction with university sports facilities may be influenced by the combined experience of physical conditions, functional suitability, and the surrounding environment. Accordingly, the servicescape framework provides a relevant conceptual foundation for understanding how students' evaluations of sports facility quality may contribute to differences in their experiences and satisfaction across university settings.

University Recreational Facilities and Student Participation.

University recreational facilities provide opportunities for students to engage in physical activity, maintain fitness, develop social relationships, and participate in extracurricular activities. These facilities typically include sports courts, playing fields, fitness areas, indoor recreational spaces, and supporting sports equipment. Their availability, suitability, and accessibility are essential in creating an environment that encourages regular physical activity

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among university students. However, students' experiences and utilisation may vary according to activity preferences and demographic backgrounds. Selvaratnam et al. (2021), involving 344 undergraduate students at a Canadian university, found that participation barriers varied by activity type, with international students reporting greater difficulties accessing recreational facilities than domestic students, although no significant gender differences were identified across the ten barriers examined. Similarly, Wilson et al. (2020), involving 319 college students in the United States, reported gender differences in physical activity participation and facility comfort, particularly in weight-training areas, with women reporting greater participation in cardiovascular activities and group exercise but lower comfort in selected recreational environments. Peterson et al. (2023), involving 160 students across four public universities in the United States, also identified variations in recreational facility comfort according to sexual orientation.

Collectively, these studies highlight the importance of evaluating university recreational facilities in terms of physical provision, accessibility, utilisation, and the diversity of student experiences. Nevertheless, facility utilisation, participation barriers, comfort, and satisfaction represent distinct constructs and should not be interpreted interchangeably. Although previous research provides evidence of differences in recreational facility experiences across student groups, further investigation is needed to examine satisfaction with sports facility quality across different demographic groups and institutional settings. This provides a basis for the present study to investigate students' evaluations and satisfaction with sports facilities across four public universities in Borneo, Malaysia.

Sports Service Quality and Student Satisfaction.

Service quality and student satisfaction are closely related concepts in evaluating service organisations. The SERVQUAL model by Parasuraman et al. (1988) comprises tangibles, reliability, responsiveness, assurance and empathy, while SERVPERF by Cronin and Taylor (1992) emphasises perceived service performance as an antecedent of satisfaction. Oliver (1980) further explains satisfaction through the comparison between prior expectations and perceived performance. These frameworks provide a theoretical basis for evaluating university sports facilities, including infrastructure, equipment, operational services, safety and management responsiveness. Supporting evidence includes Abdul Rahman et al. (2021), who found a significant relationship between sports services and satisfaction among 115 university volleyball athletes, with staff-related services showing a stronger association than booking services. Wan Pa et al. (2022), involving 83 UKM students, identified gender differences in selected service dimensions, while Azmi et al. (2022), involving 433 UPSI students, reported a significant relationship between SERVQUAL dimensions and satisfaction, with assurance recording the highest rating ($M = 4.41$, $SD = 0.62$).

Further studies highlight the relevance of service quality to sports facility experiences. Mohd Aznan et al. (2024), involving 453 university students, reported a positive relationship between service quality and motivation to use sports facilities ($r = .793$, $p < .001$), although motivation is distinct from satisfaction. Khalid and Lamat (2025) examined service quality and student satisfaction in sports facility management at IKTBN Chembong, while Othman and Ahmad (2025) investigated these constructs among UiTM Seremban students. Collectively, these studies support the importance of service quality in understanding student experiences and satisfaction. However, differences in institutional settings, study populations and service dimensions indicate the need for broader evidence across multiple universities. Accordingly,

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the present study examines sports facility quality and student satisfaction across four public universities in Borneo, Malaysia.

Demographic Differences in Sports Facility Experiences and Satisfaction.

Demographic characteristics, particularly gender, ethnicity, and athlete status, are important in understanding variations in students' perceptions, participation patterns, facility utilisation, and satisfaction with sports facilities. Ampofo-Boateng (2009), involving 602 participants in two Malaysian urban areas, found that satisfaction with recreational sports facilities and services varied according to demographic characteristics, with male participants reporting higher satisfaction than females. Similarly, Wilson et al. (2020) identified gender differences in recreational facility usage and comfort among college students, particularly in weight-training areas. In Malaysian universities, Abdul Rahman et al. (2021) reported differences in selected sports service experiences according to gender and sporting achievement among university volleyball athletes, while Wan Pa et al. (2022) identified gender differences in selected dimensions of sports facility service quality and satisfaction at UKM. These findings suggest that demographic differences may influence specific aspects of facility experiences, although they should not be generalised across all dimensions of satisfaction.

Athlete status and ethnicity also warrant consideration when examining sports facility experiences. Student-athletes may require more frequent access to sports courts, fields, specialised equipment, and training facilities, whereas non-athletes may primarily use these facilities for recreational and general fitness activities. Similarly, students' ethnic backgrounds and recreational experiences may contribute to variations in participation patterns and perceptions of facility provision. However, the direction and extent of these differences require empirical verification. Overall, although previous studies provide evidence of demographic variations in sports facility experiences, limited research has simultaneously examined gender, ethnicity, and athlete status within a multi-institutional Malaysian university sample. Therefore, the present study addresses this gap by examining these characteristics within a consistent analytical framework.

Research Gap and Conceptual Positioning of the Present Study.

Previous studies highlight the importance of sports facility quality, the physical service environment, facility utilisation and service quality in shaping student experiences and satisfaction. However, research has largely focused on individual universities or specific populations, such as student-athletes. Although Ahmad et al. (2019) examined facility service quality across 20 Malaysian public universities, the study primarily provided descriptive evaluations. Limited research has simultaneously investigated gender, ethnicity and athlete status in relation to student satisfaction across multiple institutions, particularly in Borneo. Addressing this gap, the present study examines students' evaluations of sports courts, playing fields, other sports facilities and equipment across four public universities in Borneo, investigates satisfaction differences by gender, ethnicity and athlete status, examines the relationship between facility quality and satisfaction, and compares findings across institutions. By integrating institutional and demographic perspectives, the study provides cross-institutional evidence and practical insights to help university administrators and sports facility managers identify improvement priorities, strengthen facility management and address students' diverse needs.

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Research Methodology.

Research Design.

This study employed a quantitative approach using a cross-sectional survey design to examine sports facility utilisation and students' satisfaction across four public universities in Borneo, Malaysia. Data were collected at a specific point in time using a structured questionnaire covering respondents' demographic characteristics, sports facility utilisation, evaluations of sports facilities, and student satisfaction. This approach provided a systematic assessment of students' experiences and perceptions within their respective institutions.

Descriptive and inferential statistical techniques were employed in accordance with the research objectives. Descriptive statistics summarised respondents' demographic profiles and evaluations of sports facilities, while inferential analyses examined differences and relationships across demographic groups and participating institutions. The analyses also provided a basis for investigating associations between sports facility assessments and student satisfaction, including potential interaction effects between institutional affiliation and demographic characteristics, where appropriate.

Study Population, Sampling and Sample Distribution.

This study employed stratified random sampling to ensure representation from all four participating public universities in Borneo, Malaysia, with students grouped according to institutional affiliation. The total study population comprised 2,790 students, distributed across Public University A (700), Public University B (800), Public University C (500) and Public University D (790). Sample size determination was guided by the Krejcie and Morgan (1970) table. A total of 984 questionnaires were distributed to eligible students with previous experience using university sports facilities and equipment. Following data screening, 68 incomplete questionnaires were excluded, leaving 916 valid responses, representing a 93.1% valid response rate and approximately 32.8% of the total population. The valid responses comprised 216 from University A (248 distributed; 32 excluded), 250 from University B (260 distributed; 10 excluded), 200 from University C (217 distributed; 17 excluded) and 250 from University D (259 distributed; 9 excluded). In terms of the final sample, University A contributed 23.6%, University B 27.3%, University C 21.8% and University D 27.3%. The distribution ensured that all four institutions were represented in the final dataset, providing a basis for examining sports facility utilisation, perceived facility and equipment quality, and student satisfaction according to demographic characteristics and institutional affiliation.

Table 1: Distribution of Population and Sample Across Four Public Universities in Borneo

University	Population (N)	Questionnaires distributed	Excluded	Valid sample (n)
Public University A	700	248	32	216
Public University B	800	260	10	250
Public University C	500	217	17	200
Public University D	790	259	9	250
Total	**2,790**	**984**	**68**	**916**

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Research Instrument

The research instrument consisted of a structured questionnaire divided into three main sections: respondents' demographic information, sports facility quality, and student satisfaction. The demographic section comprised three items covering gender, ethnicity, and athlete status. The sports facility quality section consisted of 44 items designed to assess the quality of the sports facilities provided, while the student satisfaction section comprised 23 items measuring respondents' levels of satisfaction with sports facilities and sports equipment. Overall, the questionnaire contained 70 items intended to collect demographic information and assess respondents' perceptions of sports facility quality and student satisfaction at the participating higher education institutions in Borneo.

Section A: Demographic Information.

This section collected respondents' demographic information, including gender, ethnicity, and athlete status. These variables were used to classify respondents and facilitate the analysis of differences in sports facility utilisation and student satisfaction according to demographic characteristics.

Section B: Students' Perceptions of Sports Facilities and Equipment Quality.

This section comprised 44 items divided into two main aspects: sports facilities (Items 1–22) and sports equipment (Items 23–44). These items were designed to assess the perceived quality of the sports facilities and equipment provided. The data obtained enabled the researcher to examine students' evaluations and analyse differences in their assessments according to demographic characteristics and institutional affiliation.

Table 2. Questionnaire Structure for Section B.

No	Sports Facilities and Equipment	Item Numbers	Number of Items
1.	Sports Facilities (Fields, Courts, and Other Facilities)	1-22	22
2.	Sports Equipment (Jerseys, Balls, and Other Equipment)	23-44	22

To measure respondents' perceptions of the quality management of sports facilities and equipment, this study employed a five-point Likert scale based on respondents' levels of agreement with each questionnaire statement. The scale ranged from 1 (*strongly disagree*), 2 (*disagree*), 3 (*uncertain*), 4 (*agree*), to 5 (*strongly agree*). This scale enabled respondents' levels of agreement to be assessed systematically, thereby facilitating the analysis of their perceptions of the quality management of sports facilities and equipment.

Section C: Student Satisfaction with Sports Facilities and Equipment

Table 3. Questionnaire Structure for Section C.

Bil.	Student Satisfaction Aspect	Item Numbers	Number of Items
1.	Sports Facilities	1–11	11
2.	Sports Equipment	12–23	12
	Total	**1-23**	**23**

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For the section measuring student satisfaction with sports facilities and equipment, the researcher employed a five-point Likert scale based on the scale introduced by Rensis Likert (1932), as discussed by Chua Yan Piaw (2006). This scale was selected because it is easy to administer, straightforward for respondents to understand and complete, and suitable for measuring satisfaction systematically. The data obtained were subsequently used to analyse students' satisfaction with sports facilities and equipment and to identify differences in satisfaction according to demographic characteristics and institutional affiliation.

The research instrument employed a five-point Likert scale, introduced by Rensis Likert (1932) and referenced in Chua Yan Piaw (2006), to measure respondents' satisfaction with sports facilities and equipment. The scale consisted of the following response categories: 1 (*very unsatisfactory*), 2 (*unsatisfactory*), 3 (*uncertain*), 4 (*satisfactory*), and 5 (*very satisfactory*). The Likert scale offers several practical advantages, including ease of administration and the use of items that are straightforward for respondents to understand and answer. Furthermore, it enables respondents' satisfaction levels to be measured systematically for subsequent data analysis.

Table 4. Interpretation of Correlation Strength (Collins et al., 2009)

Correlation Coefficient	Strength of Relationship
±0.90 to 0.99	Very Strong
±0.70 to 0.89	Strong
±0.40 to 0.69	Moderately Strong
0 to ±0.39	Weak

Results of Normality and Reliability Analyses.

Normality Assessment.

Normality was assessed for the four research constructs using skewness and kurtosis statistics. As presented in Table 5, skewness values ranged from −0.351 to −0.572, indicating slight negative skewness and a tendency towards higher respondent ratings. Kurtosis values ranged from −0.372 to 0.312, with positive values for Sports Facilities (0.312) and Sports Equipment (0.177), indicating slightly peaked distributions, while Satisfaction with Sports Facilities (−0.362) and Satisfaction with Sports Equipment (−0.372) showed slightly flatter distributions. Overall, the skewness and kurtosis values were relatively close to zero, suggesting no substantial deviation from normality.

Table 5. Normality Test Results Based on Skewness and Kurtosis.

Research Constructs	Skewness	Kurtosis
Sports Facilities	-0.518	0.312
Sports Equipment	-0.572	0.177
Satisfaction with Sports Facilities	-0.351	-0.362
Satisfaction with Sports Equipment	-0.361	-0.372

Overall, all skewness and kurtosis values fell within the acceptable range of ±1.00. This indicates that the distributions of the four research constructs were approximately normal. Therefore, based on the skewness and kurtosis assessment, the data demonstrated satisfactory distribution characteristics and provided preliminary support for proceeding with subsequent statistical analyses that assume approximate normality. Other relevant statistical assumptions should also be examined according to the requirements of the respective analyses.

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Reliability Analysis.

The reliability of the research instrument was assessed using Cronbach's alpha coefficient to determine the internal consistency of the measurement items within each research construct. Cronbach's alpha is a widely used statistical measure for evaluating the extent to which a set of items consistently measures the same underlying construct. A higher Cronbach's alpha value indicates stronger internal consistency among the items, suggesting that they measure the intended construct in a consistent manner.

As presented in Table 6, all four research constructs demonstrated excellent internal consistency, with Cronbach's alpha values ranging from 0.94 to 0.96. Specifically, the Sports Facilities construct recorded a Cronbach's alpha value of 0.94, indicating a high level of consistency among the items used to measure students' perceptions of sports facilities. Similarly, the Sports Equipment construct achieved a value of 0.95, demonstrating excellent reliability among the items assessing the quality and adequacy of sports equipment.

For the satisfaction-related constructs, Satisfaction with Sports Facilities recorded a Cronbach's alpha value of 0.95, while Satisfaction with Sports Equipment achieved the highest value of 0.96. These findings indicate that the items measuring students' satisfaction with sports facilities and sports equipment were highly consistent in assessing their respective constructs. The slightly higher coefficient for Satisfaction with Sports Equipment suggests marginally stronger internal consistency compared with the other constructs.

Overall, all four Cronbach's alpha coefficients exceeded the commonly accepted minimum threshold of 0.70, indicating that the measurement items demonstrated excellent internal consistency. These results provide evidence that the research instrument was reliable for measuring students' perceptions of sports facilities and sports equipment, as well as their satisfaction with both aspects. Consequently, the instrument was considered sufficiently reliable for use in subsequent statistical analyses.

Nevertheless, it is important to distinguish reliability from validity. Although the high Cronbach's alpha values demonstrate strong internal consistency, they do not independently establish the validity of the measurement instrument. Further evidence of validity would require appropriate assessment of content and construct validity.

Table 6. Reliability Analysis of Research Constructs

Research Constructs	Cronbach's Alpha	Interpretation
Sports Facilities	0.94	Excellent
Sports Equipment	0.95	Excellent
Satisfaction with Sports Facilities	0.95	Excellent
Satisfaction with Sports Equipment	0.96	Excellent
Overall Range	**0.94–0.96**	**Excellent**

Research Findings

Data analysis in this study involved the application of descriptive and inferential statistics. Descriptive statistics, comprising frequencies and percentages, were used to describe the demographic profiles of respondents according to gender, ethnicity, and athlete status across

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four public universities in Borneo, Malaysia. In addition, means and standard deviations were used to describe respondents' assessments of the quality of sports facilities and equipment.

Subsequently, one-way analysis of variance (ANOVA) was employed to examine differences in the mean ratings of sports facilities and equipment among the four public universities in Borneo. Where the ANOVA results indicated statistically significant differences, appropriate *post hoc* tests were conducted to identify the pairs of institutions that differed significantly. The selection of the *post hoc* test was based on the results of the homogeneity of variance assumption test.
Furthermore, Pearson's product–moment correlation was used to assess the strength and direction of the relationship between students' evaluations of sports facilities and equipment quality and their levels of satisfaction. Pearson's correlation coefficient (r) was used to determine whether the relationships between the variables were positive or negative and to assess their strength. The probability value (p) was used to determine whether the observed relationships were statistically significant. This test was applied where the composite scores met the relevant assumptions, including linearity and the absence of serious influential outliers.

Research Objective 1.
To identify differences in sports facility utilisation according to students' demographic characteristics across four public universities in Borneo.

Demographic Characteristics by Gender

Table 8. Distribution of Respondents by Gender Across Four Public Universities in Borneo.

	University A	University B	University C	University D
Male	98	120	94	115
Female	118	130	106	135
Total Recorded	**216**	**250**	**200**	**250**

n=916

Based on Table 8, a total of 916 respondents from the four public universities in Borneo participated in the study, comprising 427 males and 489 females. University A recorded 98 male and 118 female respondents out of 216 participants, while University B comprised 120 males and 130 females out of 250 respondents. At University C, 94 males and 106 females were recorded among the 200 respondents. Meanwhile, University D comprised 115 males and 135 females out of 250 respondents.

Overall, female respondents outnumbered male respondents. In terms of the targeted sample size, University A recorded 216 respondents against a target of 250, whereas Universities B, C, and D achieved their respective target sample sizes.

Table 9. Gender Differences in Ratings of Sports Facility Utilisation.

Jantina	N	Mean (M)	Standard Deviation (SD)	MD	t	df	p
Male	427	3.146	0.666	-0.313	-7.585	844	< 0.001
Female	489	3.459	0.570				

(n=916)

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Based on Table 9, a difference in the mean ratings of sports facility utilisation was observed between male and female respondents among the 916 participants from the four public universities in Borneo. Female respondents recorded a higher mean score (M = 3.459, SD = 0.570) than male respondents (M = 3.146, SD = 0.666). The mean difference between the two groups was 0.313 points, indicating that female respondents reported higher ratings of sports facility utilisation than their male counterparts. The independent-samples t-test indicated that this difference was statistically significant, (844) = −7.585, p < 0.001. Therefore, the findings indicate a statistically significant gender difference in the ratings of sports facility utilisation among students at the four public universities in Borneo.

Demographic Characteristics by Ethnicity.

Table 10. Distribution of Respondents by Ethnicity Across Four Public Universities in Borneo.

Ethnic Group	University A	University B	University C	University D
Bumiputra Borneo	119	135	110	130
Chinese	15	20	12	18
Indian	9	8	6	7
Melay	60	70	58	78
Others	13	17	14	17
Total Recorded	**216**	**250**	**200**	**250**

n=916

Based on Table 10, the distribution of respondents by ethnicity shows that the Bumiputra Borneo group recorded the highest number of respondents across all four public universities, with 119 respondents at University A, 135 at University B, 110 at University C, and 130 at University D. The Malay group represented the second-largest ethnic group, comprising 60, 70, 58, and 78 respondents at Universities A, B, C, and D, respectively.

The Chinese ethnic group comprised 15 respondents at University A, 20 at University B, 12 at University C, and 18 at University D. Meanwhile, the Indian ethnic group consisted of 9, 8, 6, and 7 respondents, respectively. For the other ethnic groups, 13 respondents were recorded at University A, 17 at University B, 14 at University C, and 17 at University D. Overall, the study involved 916 respondents, comprising 216 from University A, 250 from University B, 200 from University C, and 250 from University D. These findings indicate that Bornean Bumiputera respondents constituted the largest ethnic group in the study.

Table 11. Mean Ratings of Sports Facility Utilisation by Ethnic Group.

Ethnic Group	N	Mean (M)	Standard Deviation (SD)	Level
Bumiputera Borneo	494	3.309	0.650	Moderate
Chinese	65	2.806	0.650	Moderate
Indian	30	2.676	0.650	Moderate
Melay	266	2.993	0.650	Moderate
Others	61	2.493	0.650	Moderate
Overall	**916**	**3.106**	**0.696**	**Moderate**

n=916

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Based on Table 11, the descriptive analysis shows that the Bumiputera Borneo group recorded the highest mean rating for sports facility utilisation (M = 3.309, SD = 0.650), followed by the Malay group (M = 2.993, SD = 0.650), the Chinese group (M = 2.806, SD = 0.650), and the Indian group (M = 2.676, SD = 0.650). The group categorised as others recorded the lowest mean score (M = 2.493, SD = 0.650). Overall, the mean rating for sports facility utilisation was 3.106 (SD = 0.696), which was classified as moderate. These descriptive findings indicate variations in the mean ratings across ethnic groups, with Bumiputera Borneo respondents recording the highest mean and respondents in the other ethnic groups category recording the lowest.

Table 12. Differences in Sports Facility Utilisation Ratings by Ethnic Group.

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p
Between Groups	58.073	4	14.518	34.362	.001*
Within Groups	384.898	911	0.423		
Total	442.970	915			

Based on Table 12, the one-way ANOVA revealed a statistically significant difference in sports facility utilisation ratings among the five ethnic groups, $F(4, 911) = 34.362$, $p = .001$. This indicates that at least one ethnic group differed significantly in its mean rating. However, post-hoc analysis is required to identify the specific groups with significant differences.

Demographic Characteristics by Athlete Status.

Based on Table 13, of the 916 respondents, 354 were university athletes, while 562 were non-university athletes. University A recorded 87 athletes and 129 non-athletes out of 216 respondents. University B comprised 100 athletes and 150 non-athletes out of 250 respondents, while University C recorded 72 athletes and 128 non-athletes out of 200 respondents. At University D, 95 respondents were athletes and 155 were non-athletes out of 250 respondents. Overall, non-university athletes constituted the majority of respondents across all four institutions, accounting for 562 respondents compared with 354 university athletes. This indicates that the study included a larger proportion of students who were not university athletes than those who were actively classified as university athletes.

Table 13. Distribution of Respondents by Athlete Status Across Four Public Universities in Borneo

Athlete Status	University A	University B	University C	University D	Total
University Athletes	87	100	72	95	354
Non-University Athletes	129	150	128	155	562
Total Recorded	216	250	200	250	916

Note: N = 916

Based on Table 14, the independent-samples *t*-test revealed a statistically significant difference in sports facility utilisation ratings between university athletes and non-university athletes, $t(914) = 3.120$, $p = .002$. University athletes reported higher mean ratings ($M = 3.250$, $SD = 0.650$) than non-university athletes ($M = 3.100$, $SD = 0.750$), with a mean difference of 0.150 points. These findings indicate that athlete status was associated with differences in sports facility utilisation ratings, although no causal relationship can be established.

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Table 14. Differences in Sports Facility Utilisation Ratings by University Athlete Status.

Athlete Status	N	Mean (M)	Standard Deviation (SD)	*t*	*df*	*p*
University Athletes	354	3.250	0.650	3.120	914	.002
Non-University Athletes	562	3.100	0.750			
Overall	916					

N = 916.

Assessment of Sports Facilities.

Research Objective 2:
To determine the level of sports facilities, particularly courts, fields, and sports equipment, across four public universities in Borneo.

Table 15. Differences in Sports Facility Ratings by Facility Aspect Across Four Public Universities in Borneo.

Sports Facility Aspect	University A	University B	University C	University D
Courts, fields, and other facilities	3.131	2.284	2.087	3.246
Sports equipment	3.098	3.215	3.042	3.178
Number of respondents	216	250	200	250

Assessment of Courts, Fields, and Other Facilities.
Based on Table 15, the mean ratings of courts, fields, and other sports facilities varied across the four public universities in Borneo. University D recorded the highest mean score (M = 3.246), followed by University A (M = 3.131). University B recorded a mean score of 2.284, while University C recorded the lowest mean score (M = 2.087). The difference between the highest and lowest mean scores was 1.159 points, indicating a considerable descriptive variation in the ratings across the institutions.

Assessment of Sports Equipment.
For sports equipment, University B recorded the highest mean score (M = 3.215), followed by University D (M = 3.178), University A (M = 3.098), and University C (M = 3.042). The difference between the highest and lowest mean scores was 0.173 points. This range was smaller than that observed for courts, fields, and other facilities (1.159 points), indicating that the mean ratings for sports equipment were more closely grouped across the four institutions.

Based on Table 16, a one-way analysis of variance (ANOVA) was conducted to examine differences in sports facility ratings across the four public universities in Borneo: University A, University B, University C, and University D. The analysis covered two main aspects: courts, fields, and other facilities, and sports equipment. A total of 916 students participated in the study.

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Table 16. One-Way ANOVA Results for Differences in Sports Facility Ratings Across Four Public Universities in Borneo.

Sports Facility Aspect	Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	*F*	*p*
Courts, fields, and other facilities	Between groups	233.061	3	77.687	158.545	< .001
	Within groups	446.880	912	0.490		
	Total	679.941	915			
Sports equipment	Between groups	4.069	3	1.356	2.768	.041
	Within groups	446.880	912	0.490		
	Total	450.949	915			

N = 916.

For courts, fields, and other facilities, the ANOVA results indicated a statistically significant difference in mean ratings across the four universities, F (3, 912) = 158.545, p < .001. This finding indicates that students' ratings of these facilities differed significantly by institution. As shown in Table 12, University D recorded the highest mean score (M = 3.246), followed by University A (M = 3.131). University B recorded a lower mean score (M = 2.284), while University C recorded the lowest (M = 2.087). The descriptive pattern suggests that students at Universities D and A gave higher ratings to courts, fields, and other facilities than students at Universities B and C.

For sports equipment, the reported ANOVA results also indicated a statistically significant difference across the four universities, F(3, 912) = 2.768, p = .041. As the p-value was below .05, the result suggests that at least one university's mean rating differed significantly from that of another university. Based on Table 12, University B recorded the highest mean score (M = 3.215), followed by University D (M = 3.178), University A (M = 3.098), and University C (M = 3.042). Although the differences in mean ratings were smaller than those observed for courts and fields, the reported ANOVA result indicates an overall statistically significant difference between institutions.

Overall, the findings suggest that students' ratings of sports facilities were not uniform across the four universities. The differences in ratings for courts, fields, and other facilities were more pronounced descriptively than those for sports equipment. From a university sports management perspective, these findings may provide a basis for further evaluation of facility maintenance, improvements to physical infrastructure, and sports equipment procurement planning.

Relationship Between Sports Facilities and Student Satisfaction.

Research Objective 3: To identify the relationship between sports facilities and student satisfaction across four public universities in Borneo.

Based on Table 17, Pearson's product–moment correlation analysis revealed positive relationships between sports facility ratings and student satisfaction across all four public universities in Borneo. University A recorded the strongest correlation (r = .842), followed by University D (r = .813), University B (r = .686) and University C (r = .658). All relationships were statistically significant (p = .001), indicating that higher sports facility ratings were

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associated with higher student satisfaction in each institution. Overall, the findings demonstrate consistent positive associations between students' evaluations of sports facilities and their satisfaction, with University A showing the strongest relationship and University C the weakest. These results highlight the importance of facility evaluations in understanding student satisfaction. However, the correlational findings indicate associations only and do not establish a causal relationship between sports facility ratings and student satisfaction.

Table 17. Correlations Between Sports Facility Ratings and Student Satisfaction Across Four Public Universities in Borneo.

University	Correlation Coefficient (*r*)	*p*-value	Sample Size (*n*)
University A	.842	.001	216
University B	.686	.001	250
University C	.658	.001	200
University D	.813	.001	250

Discussion.

Sports Facility Use and the Diverse Demographic Needs of Students.

The use of sports facilities in higher education institutions is an important aspect of supporting student participation in physical activities, recreation, and sports development. The effectiveness of sports facility provision depends not only on the availability of infrastructure but also on users' experiences, the suitability of facilities for students' needs, and opportunities to access these facilities. In this context, demographic factors such as gender, ethnicity, and athlete status should be considered to understand variations in sports facility use among students. This study examined differences in the evaluation of sports facility use among 916 students from four public higher education institutions (PHEIs) in Borneo. The findings provide an overview of variations in the evaluation of sports facility use according to respondents' demographic backgrounds, thereby providing a basis for assessing the appropriateness of sports facility management in higher education institutions.

Previous research by Selvaratnam et al. (2021) showed that barriers to participation in campus recreational activities varied according to the type of activity and users' backgrounds. The study also reported that international students were more likely than local students to perceive recreational facilities as difficult to access. However, the study found no differences between male and female students in the participation barriers examined. These findings indicate that demographic factors do not necessarily influence all aspects of sports facility use in the same way. Therefore, evaluations of sports facility use should consider the institutional context, user characteristics, and the constructs being measured rather than assume that demographic differences always result in different usage experiences.

Differences in Sports Facility Use by Gender.

The findings revealed a statistically significant difference in the evaluation of sports facility use by gender. Specifically, female students recorded a higher mean score than male students. This indicates that female respondents gave higher evaluations of sports facility use than male respondents across the four public higher education institutions involved in the study in Borneo. These findings demonstrate that evaluations of sports facility use differed significantly by gender within the institutional contexts examined.

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The findings are consistent with Wilson et al. (2022), who reported differences in recreational facility usage patterns between men and women. Their study found that women used weight-training facilities and participated in informal sports less frequently but engaged more frequently in cardiovascular exercise and group exercise activities. Women were also reported to experience lower levels of comfort when using certain facilities, particularly weight-training areas. The findings of Wilson et al. (2022) indicate that recreational facility use varies by gender, depending on the type of facility and the activities undertaken.

The similarity between the two studies lies in their findings that gender differentiates certain aspects of sports and recreational facility use. However, the present study identified differences based on overall evaluation scores for sports facility use, whereas Wilson et al. (2022) described differences in specific activity patterns and users' comfort levels. Therefore, the findings of Wilson et al. (2022) support the present study in demonstrating the existence of gender-related differences but do not establish that women necessarily have higher overall evaluations than men. Overall, both studies highlight the importance of considering gender when examining the use of sports and recreational facilities.

Differences in Sports Facility Use by Ethnic Group.

The findings revealed that evaluations of sports facility use differed across ethnic groups among students at the four public higher education institutions in Borneo. Specifically, statistically significant differences were found between ethnic groups. This finding indicates that ethnic background is one of the demographic characteristics associated with differences in the evaluation of sports facility use within the context of this study.

These findings can be discussed alongside the study by Selvaratnam et al. (2021), which examined barriers to participation in recreational activities according to users' backgrounds. The study reported that international students were more likely than local students to perceive recreational facilities as difficult to access. The similarity between the two studies lies in their emphasis on the importance of users' backgrounds in understanding experiences related to recreational facilities. However, Selvaratnam et al. (2021) focused on access barriers according to student status, whereas the present study examined differences in the evaluation of sports facility use across ethnic groups. Therefore, the earlier study provides conceptual support for considering users' backgrounds but cannot be regarded as direct evidence confirming the ethnic differences identified in the present study.

In addition, Wilson et al. (2022) reported that recreational facility usage patterns differed according to gender and activity type. Their findings indicate that experiences of facility use are not necessarily the same across all user groups. This is relevant to the present study because both highlight differences in facility-use experiences according to demographic characteristics. Nevertheless, Wilson et al. (2022) focused on differences related to gender and activity type rather than ethnicity. Therefore, their study provides a comparative context for understanding variations in recreational facility use but does not directly confirm differences in evaluations across ethnic groups.

Overall, the present study extends the discussion of sports facility use by focusing on differences in evaluations across ethnic groups within public higher education institutions in Borneo. The studies by Selvaratnam et al. (2021) and Wilson et al. (2022) demonstrate that users' backgrounds and demographic characteristics are relevant to understanding experiences related to recreational facilities. However, because the studies differ in their focus and measured

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constructs, neither can be considered direct support for the ethnic differences identified in the present study. This comparison highlights the need for further research specifically examining sports facility use across ethnic groups in higher education institutions.

Differences in Sports Facility Use by Athlete Status.

The findings revealed a statistically significant difference in the evaluation of sports facility use between student-athletes at higher education institutions and non-athlete students. In general, student-athletes gave higher evaluations than non-athlete students. This indicates that the two groups differed in their evaluations of sports facility use within the higher education institutions examined. This difference is important because athletes and non-athletes may have different needs and objectives in their participation in sports activities.

From the perspective of sports facility use, student-athletes are generally involved in more structured training to meet the demands of competition preparation, skill development, and performance enhancement. Their systematic involvement in training may provide them with more specialised experiences of the facilities, equipment, and training spaces available. In contrast, non-athlete students may use sports facilities for physical fitness, recreation, social interaction, or leisure. These differences in the purposes of participation provide a conceptual basis for understanding why evaluations may differ between the two groups. However, this explanation is an interpretation based on the different functions and purposes of sports participation rather than a factor directly demonstrated through the analyses in this study.

These findings can also be discussed in the context of research on recreational facility use, which emphasises the importance of users' experiences and characteristics in understanding participation patterns. For example, Wilson et al. (2022) reported that recreational facility usage patterns differed according to gender and activity type. Although their study did not specifically compare student-athletes with non-athletes, the findings provide context for understanding how recreational facility use may vary according to user characteristics and the types of activities undertaken. Therefore, the present study extends this discussion by showing that athlete status also differentiates evaluations of sports facility use among higher education students. Nevertheless, this relationship should be understood as a comparison highlighting the importance of user characteristics rather than as direct confirmation of the effect of athlete status.

From the perspective of sports management in higher education institutions, these findings highlight the importance of planning and managing facilities according to the needs of both athletes and non-athletes. Facilities that support athlete training and performance development should be balanced with appropriate spaces and opportunities for non-athlete students to engage in fitness and recreational activities. Factors such as facility-use scheduling, equipment availability, the suitability of training spaces, and the diversity of sports programmes should be considered to ensure that facilities are used effectively by different categories of students.

In conclusion, the difference in evaluations between student-athletes and non-athletes indicates that athlete status is a demographic characteristic associated with differences in the evaluation of sports facility use in this study. This finding has implications for sports facility management, as planning should not focus solely on competitive training requirements but should also consider broader student participation in sports and recreational activities. Future research examining usage frequency, facility types, purposes of use, and user experiences could help explain the factors that may underlie differences in evaluations between the two groups.

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Overall, the findings indicate that demographic factors, namely gender, ethnicity, and athlete status, are associated with differences in the evaluation of sports facility use among students at the four PHEIs in Borneo. Gender-related differences indicate that male and female students evaluated sports facility use differently, while differences by ethnicity demonstrate variations in evaluations across the ethnic groups examined. In addition, student-athletes gave higher evaluations than non-athlete students. These findings indicate that evaluations of sports facility use are not uniform among students but vary according to their demographic characteristics. Therefore, gender, ethnicity, and athlete status should be considered in the planning and management of sports facilities in higher education institutions to ensure that the facilities provided meet the diverse needs of students.

Discussion of Sports Facilities, Particularly Courts, Fields and Other Facilities, and Sports Equipment, Across Four Public Higher Education Institutions (PHEIs) in Borneo.

The findings revealed that students' evaluations of sports facilities differed across the four public higher education institutions in Borneo, particularly in relation to courts, fields and other facilities, as well as sports equipment. More pronounced differences were observed in the evaluations of courts, fields and other facilities, whereas evaluations of sports equipment showed a more similar pattern across institutions. The one-way analysis of variance (ANOVA) also indicated statistically significant differences between the PHEIs in both aspects examined. These findings demonstrate that evaluations of sports facility provision were not uniform across institutions, highlighting the importance of examining each aspect of the facilities separately to understand students' experiences as users.

For courts, fields and other facilities, differences in evaluations across institutions indicate that students' experiences of physical sports facilities varied between PHEIs. These findings can be compared with the study by Nor Eeza Zainal Abidin, Tajul Arifin Muhamad, and Jamil Ahmad (2019), which assessed the service quality of sports facilities at Malaysian public universities. Their study found that although overall evaluations of sports facility service quality were high, certain aspects of facility availability and provision received moderate ratings. The researchers also emphasised the importance of considering different types of facilities, including indoor and outdoor facilities, in sports facility development planning.

The similarity between the two studies lies in their identification of physical facilities as an important component of user evaluations. However, the present study identified statistically significant differences in evaluations across institutions, whereas Zainal Abidin et al. (2019) provided a broader assessment of sports facility service quality among athletes at Malaysian public universities. Therefore, the earlier study supports the importance of evaluating physical facilities specifically but does not establish that the same factors caused the differences observed among the four PHEIs in Borneo.

Regarding sports equipment, the findings also revealed statistically significant differences in evaluations across institutions, although the descriptive differences in mean scores were smaller than those observed for courts and fields. This indicates that students' evaluations of sports equipment were also not entirely consistent across the PHEIs. In this context, Mohd Aznan et al. (2024) examined the relationship between service quality and motivation to use sports facilities among university students. Their study found that service quality had a significant positive relationship with users' motivation. These findings provide relevant context by indicating that evaluations of sports facility service quality are associated with user

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engagement. However, Mohd Aznan et al. (2024) examined the relationship between service quality and motivation rather than differences in sports equipment evaluations across institutions. Therefore, their study cannot be regarded as direct confirmation of the differences identified in the present study, although it helps explain the importance of facility quality in managing sports participation in higher education institutions.

In addition, Wan Ahmad Munsif Wan Pa et al. (2022) examined the service quality of sports facilities and student satisfaction at Universiti Kebangsaan Malaysia during the COVID-19 pandemic. Their study reported gender differences in several service and satisfaction dimensions and indicated that overall evaluations of sports facility services remained high within their study context. This study is relevant because it demonstrates that users' evaluations of sports facilities may differ according to the aspects assessed and the research context. However, the study did not compare courts, fields, and sports equipment across several universities. Therefore, comparisons with the present study should focus on the importance of users' evaluations of sports facilities rather than treating the constructs and analytical findings of the two studies as directly equivalent.

Overall, the findings indicate that evaluations of courts, fields and other facilities showed more pronounced differences across institutions than evaluations of sports equipment. This pattern provides a basis for PHEI management to review the development and maintenance of physical facilities while ensuring that the sports equipment provided is suitable for users' needs. However, the ANOVA results only establish the existence of at least one significant difference in mean scores between institutions for each aspect. Post hoc tests are required to determine which specific pairs of institutions differ significantly.

Future research could also examine factors such as the physical condition of facilities, equipment availability, maintenance, and user access to clarify the factors that may be associated with variations in evaluations. Thus, the findings contribute to a better understanding of sports facility evaluations across PHEIs in Borneo and provide an empirical basis for planning sports facility management that is more responsive to students' needs.

Relationship Between the Quality of Sports Facilities and Student Satisfaction.

The relationship between the quality of sports facilities and student satisfaction is an important aspect of understanding the effectiveness of sports management in higher education institutions. The facilities provided should be evaluated not only in terms of the availability of physical assets, but also in terms of the extent to which they meet users' needs and support positive sporting experiences. From a management perspective, user evaluations can serve as one of the indicators for understanding how the facilities and services provided are associated with student satisfaction.

The study by Azmi et al. (2022) is directly relevant to this issue. The study examined the relationship between the service quality of sports facilities and satisfaction among students at Universiti Pendidikan Sultan Idris (UPSI), and reported a statistically significant relationship between the two variables. This finding provides empirical evidence that the service quality of sports facilities is associated with students' satisfaction ratings in the context of Malaysian higher education institutions.

Abdul Rahman et al. (2021) also reported a significant relationship between sports services and athlete satisfaction. Although that study focused on athletes, whereas Azmi et al. (2022) examined university students, both studies highlight the importance of sports services in

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understanding user satisfaction. This similarity supports the need to examine sports facilities as a service that must meet the needs of different categories of users, rather than viewing them merely as physical facilities provided by an institution.

Nevertheless, differences in the populations and instruments used in previous studies should be taken into consideration. Athletes' satisfaction with sports services may not necessarily be the same as that of students in general. Similarly, findings from a study conducted at a single university cannot be assumed to represent all higher education institutions, as the conditions of facilities, management structures and user composition may differ. Therefore, a study involving four public higher education institutions (IPTAs) in Borneo can broaden the context of the discussion by examining this relationship across different institutional environments.

In terms of interpretation, a positive relationship between evaluations of facilities and satisfaction indicates that more favourable evaluations tend to be associated with higher levels of satisfaction. However, a statistical relationship does not establish that facility quality is the sole factor determining satisfaction. Other factors that were not measured may also be associated with users' experiences. Therefore, the appropriate academic conclusion is that facility quality is associated with satisfaction based on the analysis conducted, rather than that changes in facilities directly cause changes in satisfaction.

This discussion also indicates that the evaluation of sports facilities should be approached comprehensively. Courts, playing fields and sports equipment are important physical components, but users' experiences may also depend on accessibility, the management of facility use, maintenance conditions and service support. As previous studies have highlighted the importance of various service dimensions, future research could examine these dimensions in greater detail, provided that appropriate instruments and data are available.

Implications of the Study.

Implications for Public and Private Higher Education Institutions and Educational Institutions.

This study has important implications for sports facility management in educational institutions, highlighting the need for user-oriented planning and systematic evaluation. The availability of sports courts, playing fields, and equipment alone is insufficient to determine facility effectiveness; institutions must also consider users' experiences, facility conditions, accessibility, and the needs of different groups. Previous studies by Abdul Rahman et al. (2021), Wan Pa et al. (2022), and Azmi et al. (2022) emphasise the importance of service quality and student satisfaction in Malaysian universities. Accordingly, public and private higher education institutions should implement regular evaluation mechanisms combining user feedback, facility inspections, and usage records to identify maintenance priorities, utilisation constraints, and opportunities for service improvement.

These principles can also be adapted by schools, colleges, and other educational institutions according to users' ages, activity requirements, and available resources through questionnaires, facility condition audits, usage records, and programme feedback. Such evaluations can help identify problems early and support evidence-based management decisions. Furthermore, institutions should recognise that athletes, recreational students, and beginners may have different facility requirements. Therefore, scheduling, access information, and facility provision

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should accommodate diverse user needs without relying on assumptions or stereotypes based on gender or background.

Implications for Sports Associations and Clubs.

For sports associations and clubs, this study highlights the importance of strengthening collaboration with educational institutions to improve sports facility management and utilisation. User needs can guide the planning of training sessions, recreational activities, competitions and athlete development programmes, while clear scheduling, usage regulations, equipment coordination and effective communication can minimise booking conflicts and maintain participation opportunities for both athletes and general students. Sports associations can also contribute to facility evaluations by collecting feedback from athletes and coaches on facility suitability, equipment conditions and operational issues, while ensuring that the views of other users are also considered. Consistent with Abdul Rahman et al. (2021), who highlighted the relationship between sports services and athlete satisfaction, a service quality perspective can support collaboration with facility management. However, the effectiveness of these initiatives should be assessed through actual implementation and continuous monitoring.

Implications for State and National Sports Organisations.

At the state and national levels, this study may support a more evidence-based approach to sports facility monitoring and development. Sports organisations could adopt standardised indicators to evaluate facility conditions, user experiences, and maintenance requirements, while strengthening collaboration among educational institutions, sports associations, and relevant agencies to optimise facility utilisation and sharing. Before investing in new infrastructure, assessments should consider existing facility conditions, usage patterns, user needs, and opportunities for shared resources.

However, policy formulation and resource allocation should not rely solely on satisfaction scores but also consider safety, physical conditions, user numbers, facility functions, maintenance costs, and local sports development priorities. Further research could develop a comprehensive sports facility evaluation framework integrating user perspectives, physical condition assessments, and management evaluations. Such a framework should be systematically developed, tested, and validated before adoption as an official evaluation instrument or a basis for policy decisions.

Implications for Resource Management and Facility Maintenance.

Another important management implication is the use of systematic user and facility information to guide maintenance prioritisation and resource allocation. Educational institutions and sports organisations should consider asset conditions, frequency of use, safety levels, and user experiences rather than relying solely on complaints or informal observations. This approach enables management to distinguish urgent issues, such as safety risks and damage affecting facility usability, from other improvements that can be implemented gradually according to functional priorities and available resources.

Nevertheless, although this study examines facility evaluations and student satisfaction, it does not directly measure financial efficiency or return on investment. Therefore, resource management recommendations should be supported by additional operational and financial data. Future research could integrate these indicators to determine whether facility improvements contribute to better user experiences and more effective asset utilisation.

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Implications for Academics and Sports Science Research.

From an academic perspective, this study contributes to discussions on sports facility management by connecting issues related to usage, demographics, satisfaction and institutional context. The literature review indicates that previous studies have examined these aspects from different perspectives. International studies have focused on participation barriers, differences in usage patterns and user comfort, whereas studies conducted in Malaysia have examined sports services, athlete satisfaction and the relationship between service quality and student satisfaction.

This diversity of research focuses indicates that sports facility research can be further developed through an approach that integrates several constructs in a more systematic manner. Nevertheless, differences in definitions, instruments and study populations in previous research must be considered before findings are compared or combined. Researchers need to ensure that the variables being compared genuinely measure equivalent concepts.

For sports science research, several potential directions for future studies include:
1. **Instrument validation**: Assessing the validity and reliability of instruments used to measure facility evaluations, user experiences and student satisfaction.
2. **Comparative studies**: Examining differences between institutions and demographic groups using actual data and consistent data collection procedures.
3. **Relationship analysis**: Exploring the associations between facility quality, services and satisfaction while taking other relevant factors into account.
4. **Interaction analysis**: Examining whether the relationship between demographic characteristics and satisfaction varies according to institutional context, provided that the research design and sample size support such analyses.
5. **Longitudinal studies**: Evaluating changes in user experiences and satisfaction following the implementation of interventions or facility improvements.

In terms of scholarly contribution, the strength of a multi-institutional study lies not merely in the number of institutions involved, but also in its ability to examine research questions that cannot be adequately addressed through a single-institution study. By employing consistent methods and valid empirical data, such research can broaden the understanding of the role of institutional context in shaping users' experiences of sports facilities.

Implications for the Development of Future Research Frameworks.

Based on the six previous studies, future research could develop a framework that distinguishes between facility environmental factors, user experiences and user-related outcomes. Such a framework could position evaluations of facility quality and service quality as constructs whose relationships with satisfaction are examined, while demographic characteristics and institutional context could be investigated as factors potentially associated with variations in user experiences.

This proposal should be understood as a direction for future research rather than a model that has been validated by the current study. Its development requires a clear theoretical foundation, operational definitions for each construct, appropriate instruments and sufficient empirical analysis. Researchers should also distinguish between variables that merely describe respondents' profiles and those that are actually tested as predictor variables or moderators.

If supported by further research, such a framework could help integrate studies on facility usage, service quality, satisfaction and differences in user experiences. This contribution has the

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potential to strengthen the connection between academic research and sports facility management practices in educational institutions and sports organisations.

Conclusion.

Overall, previous studies highlight the importance of understanding sports facility experiences through demographic characteristics, participation constraints, utilisation patterns, service quality, and satisfaction. Studies by Selvaratnam et al. (2021), Wilson et al. (2022), and Peterson et al. (2023) emphasise variations in user experiences across demographic groups and usage contexts, while Abdul Rahman et al. (2021), Wan Pa et al. (2022), and Azmi et al. (2022) provide relevant evidence within the Malaysian context. These findings indicate that demographic differences do not necessarily produce uniform experiences, and satisfaction should be distinguished from usage frequency and comfort. Accordingly, the present study involving four public universities in Borneo extends existing research through an integrated examination of facility evaluations, demographic differences, institutional comparisons, and student satisfaction. Its contribution lies in providing empirical evidence to support more systematic, user-oriented sports facility management and inform future research and institutional improvement. All conclusions regarding group differences, institutional variations, and relationships must be grounded in the actual statistical findings and appropriate analytical procedures

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