

Application of Factor Analysis for Extracting Significant Factors Related to Futsal

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Abstract— *Futsal is becoming an appropriate choice and alternative means of entertainment for the urban people. It can be played in a limited space, for a comparatively shorter time period, and with a small team. The objective of the study was to identify the factors associated with the students' perception to play the Futsal. The young college students (n = 110) completed a self-administered questionnaire to acquire their perception on the Futsal. The questionnaire was prepared using Likert scale with five options (strongly agree to strongly disagree). The descriptive cross-sectional study used exploratory factor analysis with varimax rotation method to extract the factors related to Futsal. The result revealed that social benefit, health benefit, and the reward were the major three components that had positively influenced majority of the students and their perception on the Futsal game was positive.*

Keywords— *Factor Analysis, Futsal, Varimax Rotation, Cross-sectional, Descriptive Research, Student's Perception.*

I. INTRODUCTION

Futsal (Five-a-Side Soccer) dates back to 1930, when Juan Carlos Ceriani developed a five-a-side version of soccer for youth competition in Montevideo, Uruguay. The game is referred to as FUTSAL in the international community. FUTbol or FUTebol is the Spanish or Portuguese word for "soccer," and SALon of SALa is the French or Spanish word for "indoor" [1].

Futsal, which literally translates to "mini-football," is a form of association football that is played on a hard court that is smaller than a football pitch and is primarily played indoors. Futsal is a high-intensity indoor sport wherein brief sprints and direction changes alternate with brief relaxation periods for a rather long time. It's a five-a-side football variant that's played on artificial turf. In a 40 x 20 m indoor court, Futsal is a sport in which two teams of five players compete against each other, one of whom is the goalkeeper. Substitutions are allowed indefinitely. The game is played on a hard court surface delimited by lines, rather than on walls or boards, as in some other types of indoor football. The game lasts two halves of 20 minutes each, with a 20-minute pause in between, and the clock stops when the ball is out of play [2, 3, 4].

Futsal is becoming an appropriate choice and alternative means of entertainment for the urban people of Nepal. Since its introduction in Nepal in 2011, the sport has taken a step forward. The craziness for Futsal has been increasing in the country recently, with people of all ages, children, youth, and the elderly, becoming attracted to sport [5].

The trend of Futsal has grown so rapidly that it has attracted young people, especially students. In recent days, students have become more interested in playing Futsal. The young students are influenced and interested to play Futsal because of advertisement and their own friend circle. The researcher was interested in conducting a study in the specific field, due to growing concerns of Futsal among the students. The objective of the study was to identify the factors associated with the students' perception to play Futsal. It was assumed that the students would be interested to play Futsal.

II. METHOD

In this cross-sectional study, the consent of the participation was obtained from all the respondents, and they were assured that their information would remain confidential. Participants in the study included 110 college students of Kathmandu who were involved in the Futsal since last three years. Descriptive research design was used to describe the characteristics and perceptions of the participants being studied.

A questionnaire survey method was adapted to measure participants' perceptions of the potential importance of the Futsal. The pre-testing of the questionnaire was done, among 15 students who were not included in the study, to remove any misunderstandings, inconsistencies, or inadequate response options. After pilot study, the questionnaire was corrected and then it was reprinted. The questionnaire was a balanced mix of open-ended questions and close-ended questions. There were two parts to the questionnaire: demographic information and perception of the respondents on importance of Futsal.

The research instrument consisted of dichotomous choice questions, multiple choice questioning, and the Likert 5-point scale (strongly agree to strongly disagree) was used to measure the strength of the response [6]. Data analysis was completed using IBM SPSS version 21. The analysis

of the data was carried out using an exploratory factor analysis. The study used the extraction method based on the principal component analysis and the rotation method based on varimax with Kaiser normalization [7, 8, 9].

III. RESULT

3.1 Socio-demographic Information

The study reported that there were $n = 23$, 20.9% of female and $n = 87$, 79.1% of male participants. The majority of the students (45.5%) belong to the age group 18-20 years, 37.3% in 20-22, 14.5% in 22-24, and the rest 3% had age more than 24 years. 62.7% of students spent less than NRs. 300, 23.6% spent NRs. 300-600, 3.6% spent NRs. 600-900, and 10% of participants spent NRs. 900 and more money per week to play Futsal. The mass of the students (80%) were likely to play both indoor and outdoor games, 17.3% preferred outdoor games, while 2.7% were interested in indoor games.

It was interesting that the majority (88.2%) of participants used to play Football, 5.5% of them played cricket and 6.4% played other games before joining the Futsal. The participants were asked to mention frequency to play Futsal. They disclosed that 41.8% played Futsal once a week, 33.6% played Futsal occasionally, 16.4% almost daily, and 8.2% of them played twice a week. They were interested to play Futsal at college (54.5%), nearby house (38.2%), and clubs (7.3%).

Among the respondents, 40.9% had participated in intra college Futsal tournament, 40% had participated in inter college Futsal tournament, 5.5% played in national level

leagues and 13.6% of them did not participated in any tournaments.

3.2 Exploratory Factor Analysis

In order to identify factors related to the students' perception on importance of playing Futsal, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's Sphericity Test and the determinant score were calculated to determine the suitability of the data set for applying factor analysis [9, 10].

Table 1: KMO, Bartlett's Test, and Determinant Score

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.6
Bartlett's Test of Sphericity	Approx. Chi-Square	253.5
	df	28
	Sig.	0
Determinant Score		0.09

Table 1 display that the value of Kaiser-Meyer-Olkin statistics is equal to 0.60 (mediocre), which specifies that the sampling is adequate, and factor analysis is appropriate for the data. The Bartlett's test of Sphericity is highly significant with $p < 0.001$, indicating that there are some relationships between the variables. The determinant score is $0.09 > 0.0001$, which displays that there is absence of multicollinearity.

Table 2: Eigenvalues and Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.31	28.82	28.82	2.31	28.82	28.82	2	24.96	24.96
2	1.87	23.31	52.13	1.87	23.31	52.13	1.96	24.51	49.48
3	1.53	19.08	71.2	1.53	19.08	71.2	1.74	21.72	71.2
4	0.74	9.23	80.43						
5	0.63	7.83	88.27						
6	0.37	4.66	92.93						
7	0.29	3.66	96.59						
8	0.27	3.41	100						
Extraction Method: Principal Component Analysis									

Table 2 displays that there are eight linear components within the data set before the extraction process. After extraction and varimax rotation, there are three linear components with a value greater than one within the data

set. The result shows that 71.2% of the common variance shared by 8 variables can be accounted by the three factors. This initial outcome suggests that no more than three components will be extracted from the final solution.

Table 3: Rotated Component Matrix with Factor Loadings

Variables	Component		
	1:Social Benefit	2: Health Benefit	3:Reward
Futsal is a great fun sport to play.	0.868		
It helps to develop teamwork and communication skills.	0.818		
It helps to enhance a social circle.	0.713		
Futsal is a great form of aerobic activity.		0.889	
I can improve my overall fitness levels.		0.836	
It is an effective way to reduce stress and anxiety.		0.658	
Winning sports is important for popularity.			0.927
There is reward and scholarship.			0.906
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			

Table 3 demonstrates the components and factor loadings. The factor loading expressed the relationship of each variable to the underlying factor of students' perception to play Futsal. The first component is labeled as 'Social Benefit' explained 24.96% of total variance with eigenvalue 2.31. This first component contained three items such as Futsal is fun sport, develops teamwork and communication skill, and enhances a social circle. The second component entitled 'Health Benefit' described 24.51% of total variance with eigenvalue 1.87. This component included three items such as Futsal is a great form of aerobic activity, improves fitness levels, and reduces stress and anxiety. The third component named 'Reward' illuminated 21.72% of total variation with eigenvalue 1.53. This component comprised two items such as winning for popularity and reward and scholarship.

Table 4: Reliability, Average Variance Extracted (AVE) and Composite Reliability (CR)

Constructs	Cronbach's Alpha	AVE	CR
Component 1: Social Benefit	0.729	0.644	0.843
Component 2: Health Benefit	0.725	0.641	0.84
Component 3: Reward	0.835	0.84	0.913

Internal consistency is established by calculating Cronbach's alpha to test the accuracy and reliability of the instrument. The acceptable threshold value for Cronbach's alpha is that it should be > 0.7 . In table 4, the components social benefit, health benefit, and reward have Cronbach's alpha values 0.729, 0.725, and 0.835 respectively, which confirmed the reliability of the survey instrument. The

convergent validity is established in this analysis because average variance extracted (AVE) is ≥ 0.5 . The AVE values corresponding to the components social benefit, health benefit, and reward are 0.644, 0.641, and 0.840 respectively. The composite reliability value for first, second, and the third component are 0.843, 0.84, and 0.913 respectively [11]. It indicates the internal consistency in scale items.

To sum up, all the students were interested to continuously play Futsal in future. The perception of majority of the participants ($n = 92$, 83.6%) were positive and wanted to play Futsal daily but $n = 18$, 16.4% of them did not want to involve daily in Futsal.

IV. CONCLUSION

The study discussed the college students' perception on importance of Futsal game. There is significant positive perception of students towards the Futsal. The findings of this study disclosed that the three components social benefit, health benefit, and reward were the major factors extracted by the exploratory factor analysis. The present study made use of cross-sectional data with small sample size and hence it cannot be generalized for the large population. However, the findings of the study will be beneficial to the future researchers who were interested on study of sports.

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