CAN INDIA-PAKISTAN SPORTS PROMOTE PEACE? A MCDM APPROACH

Yousaf Ali Ph.D
Assistant Professor
Department of Management Science
Ghulam Ishaq Khan Institute of Engineering Sciences & Technology
Topi, Swabi, KPK, Pakistan;
yousafkhan@giki.edu.pk

Shayan Arif
Ghulam Ishaq Khan Institute of Engineering Sciences and Technology
u2015419@giki.edu.pk

Fahad Munir
Ghulam Ishaq Khan Institute of Engineering Sciences and Technology
u2015104@giki.edu.pk

Muhammad Bilal Azeem
Ghulam Ishaq Khan Institute of Engineering Sciences and Technology
u2015353@giki.edu.pk

Amin Ullah Khan
Graduate Research Assistant
Department of Management Science
Ghulam Ishaq Khan Institute of Engineering Sciences & Technology
gem1847@giki.edu.pk

ABSTRACT

Sports is an effective vehicle that is being adopted by almost every country to improve ties with other countries. India and Pakistan share a long border, but do not share a very pleasant history. Over the years, these two countries have shared a fierce rivalry and no measures that have been taken have had a long-term positive impact on their relationship. None of the attempts at reconciliation have proved to be completely successful, and the relationship remains unbalanced. The factors that can improve the ties between the two countries are numerous, and sports is one of them. The objective of this study is to determine how much of an influence cricket, being the most popular sport in both countries, has on the overall relationship between them. For this purpose, data was gathered from people from both countries through a questionnaire-based survey and then analyzed by MCDM approaches like AHP (Analytic Hierarchy Process) and TOPSIS (Technique for Order Performance by Similarity to Ideal Solution). After performing the quantitative analysis, the study hopes to come to a solid conclusion about what people from both countries think about which alternative has the greatest influence on the ties between the two

countries, and how the selected factors are influenced by the type of cricket matches played between India and Pakistan. The positive results obtained from this research could be of great importance for the governments as well as for the people of both countries. This can divert the minds of people and politicians from all the controversies and wars in the past, and help move towards more healthy competition on the sports field.

Keywords**:** sports; cricket; peace; rivalry; India; Pakistan; MCDM

1. Introduction

The relationship between the two most important and powerful countries in Asia (India and Pakistan) has been questionable since their independence. Not long after their independence, India and Pakistan tried to develop positive political relations, but these efforts have been haunted by unpleasant events. Since their independence, the two countries have suffered three critical wars, one undeclared war and multiple military standoffs. The battle over Kashmir is the key central motivation behind these conflicts as well as the war between Pakistan and India in 1971, and the war which led to the liberation of Bangladesh, formerly known as East Pakistan (Rose & Sisson, 1991). Many different attempts have been made to improve relations such as the summits in Shimla, Lahore, and Agra. Ever since 1985, the relationship between the two countries has been strained mainly due to events like the conflict in Siachen, the fortification of the revolt in 1989 at Kashmir, the Kargil war in 1999 and the nuclear tests performed by both countries. In an effort to calm things down, measures have been taken like the 2003 cease-fire and the Lahore Bus, which proved to be very successful for the intended purpose. These attempts at peace did not prove to be enough because of the continuous assaults at border crossings and genocide in Kashmir. Furthermore, the attack on the Indian parliament in 2001 nearly pushed the two countries to the edge of a nuclear war. Another critical point in the relationship of the two countries was the Samjhauta Express bombings in 2007, which led to the killing of 68 people, the majority of whom were Muslims. Another serious hit to the peace talks came in 2008 after the Mumbai attack on the Taj hotel (Stelter & Cohen, 2008). Most recently, on February 26, 2019, Indian jets bombed inside Pakistani territory and claimed to have hit a camp belonging to an armed group. This act infuriated Pakistan and their army warned that they would respond to India's aerial bombing. In response, the Pakistan Air Force (PAF) shot down an Indian fighter jet and captured its pilot who was released later as part of a "peace gesture" by Pakistan (Aljazeera, 2019).

The list of disputes is very long, but many effective and non-effective measures have also been taken to tackle these disputes which cause problems for not only these two countries, but also for other countries. Sports is one of the effective measures that has been implemented to ensure stability in the region and to improve peace between the two neighboring countries. Many sports activities and tournaments have taken place between the two countries, but the most important and frequently played sport is cricket. Both countries have one of the best cricket teams and players in the world, and they often play cricket together all around the globe.

Different types of cricket tournaments have been played between both countries over the years. There are friendly series, tournaments, and cup matches, but the games played most frequently are in leagues like the PSL (Pakistan Super League) and the IPL (Indian Premier League). In these leagues, players from all around each of the

countries come together and play on the same teams. However, in recent years, the Indian players have not been allowed to participate in the Pakistan Super League, and the same is true for the Pakistani players not being allowed to play in the Indian Premier League. This is a result of the unpleasant political situation between both countries and the egos and rivalry that has been passed down through many generations of political parties. The series matches between India and Pakistan are always considered some of the most crucial matches around the globe, and people love to see these teams competing in the stadium. The same is true for tournament and World Cup matches, and no matter which country or city the match is being held in, the stands are always packed and people travel around the globe to see India and Pakistan play against each other. Furthermore, people would also love to see the Pakistani players playing in the Indian Premier League and Indian players participating in the Pakistan Super League, despite the political differences. Therefore, whether cricket has a positive or negative effect on the ties between Pakistan and India and their people, and how strong this effect is, is a big question that needs to be answered. The purpose of this study is to find a logical answer to this important question.

For this purpose, a questionnaire-based survey was drafted that was completed by the public in both Pakistan and India. In this questionnaire the people shared their thoughts about the impact that different criteria like match frequency, the location of matches, the role of the media, political agendas, public relations and type of matches, have on the relationship between these two countries. After collecting data from these questionnaires, the necessary mathematical approaches were applied to determine the weights of these factors. Finally, the impact of these factors on cricket and as a result the impact of cricket on the relationship between Pakistan and India was calculated and analyzed. The first part of this study, the questionnaire, provided the qualitative data that was necessary for the second part of the research, which was the analysis to discover a quantitative result. Much work has already been conducted on this very important issue of the relationship between India and Pakistan, but very few have discussed it from the perspective of sports. Most of the data that was used was qualitative and came from sources such as reports, newspaper articles, published journals, blogs, and research papers. Many researchers have discussed the issue of India and Pakistan, but there are very few who have researched the impact of cricket on the ties of these countries in a quantitative manner. The study aims to determine a productive outcome and communicate an essential message to individuals of both nations. This outcome will discuss how cricket matches between India and Pakistan can influence the tenuous situation between the two nations. In addition, if cricket can fulfill this vital purpose, then expanding the number of games like, football, squash, badminton, kabaddi, and hockey could have a huge impact on the ties between these countries.

Cricket is considered an efficient method to find a proper solution for the peace of the region and especially to ease the conflict between the two countries. For this purpose, this study proposes five criteria on which the five alternatives will be analyzed. Those alternatives include the different formats/types of tournaments played by various countries, and the aim is to determine an exact alternative that can prove to be the most effective in bringing India and Pakistan together.

For this purpose, the study will incorporate the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The AHP was developed by Thomas L. Saaty in 1970 for complex decision-making

situations that exist in any industry or field (Golden, Wasil, & Harker, 1989). In this study, the AHP will be incorporated to assign weights to the factors that will be considered after a vigorous literature review. Furthermore, to rank the alternatives based on the weighted criteria, TOPSIS is used for the quantitative analysis. TOPSIS was introduced by Hwang & Yoon (1981) to rank alternatives based on their distance from ideal solutions. The basics of this method are that an alternative is chosen as best if its distance from the ideal solution is the shortest and worst when the alternative's distance from the ideal solution is the longest.

The research has been arranged in the following format. The next two sections contain a literature review and methodology, after which the results are calculated and discussed, and finally a conclusion is drawn.

2. Literature review

Sporting events are considered very effective in bringing the people of different countries together. People travel to various places to cheer on and support their home team and to be a part of an outstanding crowd. Such events are necessary and useful to alleviate unfriendly and awkward relationships between different countries and to break the ice by bringing people from different countries together on a single platform (Murray, 2012). Since 1947, Pakistan and India have not been able to alleviate their unfriendly relationship and be united, and we believe that the long-term cure for this situation is through sports only.

According to Showkat (2018), the relationship between Pakistan and India is a major issue and has been a hot topic among researchers in the past few years. After 1947, both countries created their cricket teams and there were some players who played for both sides like Abdul Hafeez Kadar, Amir Elahi, and Gul Mohammad. The first test series between India and Pakistan was played in October of 1952 in India, and India won 2-1. This was the first time that the Pakistan cricket team played an international game and acquired test status.

Both countries have a very strategic geographical location in the region of South Asia and have been hostile towards each other for a long time. The many issues between the two include the dispute of Kashmir, the issues of a water treaty, and cross-border terrorism. As a consequence of these issues, both have faced four significant wars in 1947, 1965, 1971 and 1999. The Indo-Pak ties have resulted in much diplomacy, and cricket has had a neutralizing effect in every conflict. Citizens of both countries have used cricket as a way to bond and have enjoyed their time watching the matches and forgetting all of the harsh times. Cricket as a trust-building option was presented by Pakistani President General Zia in 1987 when he visited India out of the blue to watch a cricket match. Rizvi (2015) also pointed out that even though the people were divided by their political views, their love of cricket gave these two nations a common ground, a place where they both learned to appreciate each other even when cold, hostile conditions existed between the two nations. It has always been the love of cricket that brought these two opposed states together like the Kargil war in 1999 where the ties were completely dissolved and later resumed in 2003-2004. Rizvi (2015) also pointed out that this process was rather slow and would not readily solve major issues like the never-ending fight for Kashmir, but it would certainly give a chance for both countries to come and sit at a table. This willingness to talk will help develop proper communication of the issues and could lead to a sensible solution that would be advantageous to both parties.

Furthermore, another article by Iftikhar (2014) conveyed that the proper time for a cricket match between the two nations is whenever there is any violence, tussle or challenge that they blame each other for. For example, similar to Pakistan, the Indian cricket team has also visited Pakistan a few times, with the first visit being in 1954. This was done to mask the real problems at that time, such as the conflict for Kashmir or the water distribution disagreements.

According to the study by Beutler (2008), the international community has realized the importance and strength of sports in peacekeeping. In 2001, the first advisor was appointed for Sports Development for Peace; this is evidence that the UN has utilized sports as a cost-efficient option to achieve development goals for the millennium and to spread peace. It has also been shown that sports can contribute to universal education, public health, gender equality, prevention of HIV and AIDS, poverty reduction and environmental stability which promotes peace and reduces conflict. The members of the UN have recognized the role of sports in dealing with the numerous domestic and foreign policies ever since the 2005 International Year of Sports and Physical Education.

To find a solution to resolve such issues requires proper decision-making to determine the necessary steps that need to be taken to make it a success. For this purpose, many studies have decided to use multi-criteria decision-making techniques, also known as MCDM. There are various techniques within MCDM such as DEMATEL, VIKOR, Analytic Network Process (ANP), AHP and TOPSIS (Ali, Shah & Khan, 2018). Some MCDM techniques are carried out within a fuzzy environment. A fuzzy environment is formed when there is vagueness and ambiguity in the data. Fuzzy data is then integrated with MCDM techniques like VIKOR or TOPSIS to convert the data into numerical standards (Ali, Awan, Bilal, Khan, Petrillo, & Khan, 2019). One such study that takes into account the situation of the fuzzy environment and combines the fuzzy data with the MCDM technique is Awan & Ali (2019). The study incorporated VIKOR and grey relational analysis in a fuzzy environment, depicting the role and reliability of MCDM techniques in this environment. This study incorporates AHP and TOPSIS methods which are being used by various researchers and have given reliable results.

One study by Metin Dağdeviren (2008) observed the process of weapons selection as a strategic problem that had an effect on the defence system. Selecting the correct weapon from among several options is a MCDM problem. The research focused on an assessment model based on AHP and TOPSIS to help the required personnel select the best weapon in a fuzzy environment where a verbal variable was used to assign a set of triangular based numbers to ambiguity and biases that were present in the decision. In this problem, AHP was used to find a proper structure for the problem so that the definite values could be attached to the required standards, and fuzzy TOPSIS was adopted to assign ranks to the proposed alternatives. Furthermore, the study showed the effectiveness of hybrid techniques.

The MCDM technique called Analytic Hierarchy Process (AHP) was the brainchild of Thomas L. Saaty (Saaty, 1980). This method has proven to be an effective tool for making the best decision in a situation that requires complex decision making or priority setting. It takes into account the subjective and objective parts of the decision and diminishes the biases in the process of decision making. The AHP presents a very strong and malleable technique that includes final results calculated by matrix comparison based on the criteria and options, both of which are selected by the user.

The calculations performed are controlled by the knowledge of the decision-makers and are transformed to multi-criteria rankings.

The research conducted by Byun (2001) for the selection of an automobile model shows how the technique was successful in providing a proper path in a decision where a few select choices were available. In the case of shopping, it was necessary to take into account the components that delivered the features that made the decision for the purchaser much easier and therefore, lead to the acquisition of the correct item. It provided attributes that make consumer decision-making easy and comfortable and therefore, led to the purchase of the right car.

Dožić and Kalić (2014) used the AHP to solve a type of aircraft selection problem for a known route network and forecasted air travel demand. Ali, Asghar, Muhammad, and Salman (2017) and Ali, Iftikhar and Edwin (2017) also used the AHP for the selection of a fighter aircraft and the assessment of career selection problems, respectively.

The technique for order performance by similarity to the ideal solution also known as TOPSIS is used to solve MCDM problems. It helps organize the decision-making problems, and perform the analysis and comparisons needed to rank and select several externally determined alternatives based on distance measures from the ideal solution.

Deng, Yeh and Willis (2000) used TOPSIS to solve the problem of multiple financial ratios that were required to adequately evaluate and rank the relative performance of competing companies. The TOPSIS approach identified the relevance of financial ratios to the evaluated result and indicated the performance differences between the companies based on each financial ratio.

Another study by Balcerzak and Pietrzak (2016) examined the progress of European countries in implementing the concept of sustainable development. TOPSIS was used because the sustainable development concept is considered a multidimensional phenomenon. TOPSIS evaluated the objects in terms of multidimensional economic phenomena based on the set of detailed economic attributes (variables). The dynamic synthetic index describing the relative level of sustainable development of the countries was created, which enabled the researchers to propose a rating of the countries and group them into homogenous subsets.

Based on the literature review, the reliability of the techniques is definite and can fulfill the scope and objective of this study. The novelty of this study is that it quantitatively analyzes the role of cricket in the improvement of ties between Pakistan and India.

Much research has been done on this issue of whether cricket can improve ties between Pakistan and India, but none of the research has approached it in a quantitative manner as this study intends to do. The study also aims to recommend necessary steps to governments of both countries to ensure a healthy relationship for the sake of their people

.

3. Research methodology

The criteria and alternatives for this study were collected and combined after a rigorous literature review. The factors that had the potential to be most effective in the analysis and fulfillment of the purpose of this study were adopted. The research model was developed using the literature and knowledge of cricket, and the factors or criteria that can have a greater impact on friendly ties between the two countries based on different formats of cricket. The literature included studies that were being carried out for the revival of relations between countries based on sports. In these studies the criteria included the frequency of matches, media coverage, public relations, match locations and political agendas. The alternatives such as exhibition, tournament and league matches will be analyzed based on the above-mentioned distinct criteria. The research goal is to determine which alternative of sports format is the most vital and efficient in the recovery and development of friendly ties between India and Pakistan. The best alternatives determined from the analysis can be recommended to both governments so that the relationship can be strengthened.

Similarly, in this research the analysis is being carried out using the AHP and TOPSIS. First, pairwise comparisons of the factors were completed and then certain weights were assigned using the AHP method. Next, by using the obtained weights the TOPSIS method was applied to the ratings to generate rankings of suitable alternatives for the research objective.

As mentioned above, the study has three alternatives that were analyzed based on five distinct criteria. The hierarchical structure for the study is depicted in Figure 1.

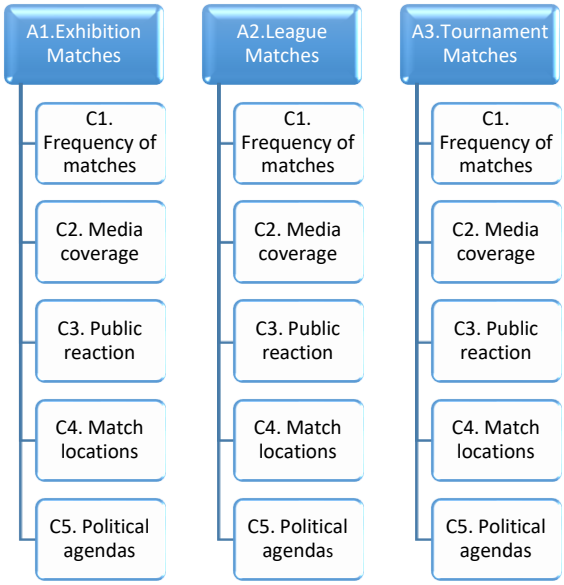

Figure 1 Hierarchical structure

The criteria and the alternatives are as follows;

Criteria:

1. The frequency of matches (C1)
2. Media Coverage (C2)
3. Public Reaction (C3)
4. Match Locations (C4)
5. Political agendas (C5)

Alternatives:

A. Exhibition Matches (A1)
B. League Matches (A2)
C. Tournament Matches (A3)

3.1 Data collection

The selected topic was based on a social issue; therefore, the data was collected from laymen i.e. the public living on both sides of the border instead of using an expert opinion. Therefore, the constructed questionnaire utilized terms that were relatively easier for the public to understand. The mode of data collection was a questionnaire-based survey which was completed by the people according to their understanding. The distribution of the questionnaire took place in different Pakistani and Indian forums so that a reliable number of responses from both sides could be generated to improve the accuracy of the overall collected data.

Our target audience was not limited by age, race, religion, and nationality but by their compassion for and their love of sports. The designed questionnaire used a nine-value scale and a seven-value scale for AHP and TOPSIS, respectively. The questionnaire is shown in Appendix B.

Through the suggested data collection strategy, 65 people responded. Their profession and it's percentage of the whole sample are shown in Table 1.

Table 1
Breakdown of the participants based on their profession

Profession	Number of Participants	Percentage %
Student	15	23
Government Employee	12	18.5
Private Sector Employee	9	14
Health and Medical	12	18.5
Education	17	26

Table 1 shows that the majority of people who responded were from the education sector such as teacher/lecturer/professor, followed by students. This makes sense since the younger generation is more inclined towards sports.

The Analytic Hierarchy Process (AHP) is one multi-criteria decision-making strategy that was initially created by Thomas L. Saaty (Saaty, 1980). It is an MCDM tool that can be used to consider several criteria and sub-criteria on various levels to rate the alternatives. It has numerous applications in the modern world including conflict resolution, budget allocation, project selection, health care, manufacturing, transportation and many more.

The influence of these five factors on each other will be determined through the questionnaire that was filled out by the public of both India and Pakistan. The influence of these factors on each other is divided into nine different choices. The ratings are assigned to these choices and shown in Table 2 (Saaty, 1980).

Table 2
AHP linguistic scale

Choice	Rating
Extremely Unimportant	-9
Very Strongly Unimportant	-7
Strongly Unimportant	-5
Moderately Unimportant	-3
Equally Important	1
Moderately Important	3
Strongly Important	5
Very Strongly Important	7
Extremely Important	9

One of the factors mentioned above will be compared to every other factor, and the influence of the first factor on the second will be any one of the ratings in the table. The influence of the second factor on the first will be its reciprocal. Using these rating values, a pairwise comparison matrix for each criterion will be formed. The AHP pairwise comparison values are depicted in Table 3. That pairwise matrix will be normalized and used to determine the priorities and decision matrix. The priorities will reveal the weight of every factor in our research. The decision matrix will let us know the comparative weights of every factor based on the eigenvector of the decision matrix. In the end, a consistency ratio of our results will be calculated.

Steps involved in AHP:

1. Compare the criteria matrix in pairs using values from 1 to 9 as stated in Table 2. When both criteria have the same importance '1' will be used. A square matrix named A will be formed when criteria i and Criteria j will be compared in pairs, a_{ij} will represent how criteria i is more important than Criteria j. When $i = j$, $a_{ij} = 1$ and so $a_{ji} = \frac{1}{a_{ij}}$

Table 3
AHP pairwise comparison

	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Criteria 1	1	3	4	7
Criteria 2	1/3	1	6	8
Criteria 3	¼	1/6	1	2
Criteria 4	1/7	1/8	1/2	1

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix} \quad (1)$$

2. Normalize the geometric mean of rows in the matrix of comparisons and construct the relative normalized weight (W_j).

3. Matrix A3 will be constructed by making A3 = A1* A2

4. Matrix A4 will be constructed by making A4 = A3 /A2

5. The average of matrix A4 will give the maximum eigenvalue.

6. Find the consistency index (C.I.) using the formula below:

$$CI = \frac{L_{max} - n}{n-1} \quad (2)$$

Consistency Ratio (CR) = $\frac{CI}{RI}$ (2)

CR = CI/RI, where, RI is random index

If the consistency ratio is below 10%, the results are consistent and can be considered acceptable, but if the consistency ratio is above 10% judgments must be reexamined.

The TOPSIS method is used to solve ranking problems in the real world. Although it is a very popular and a simple method, TOPSIS has some limitations. These limitations include its inability to adequately handle the inherent uncertainty related to the mapping of the decision maker's perception of crisp values (Ceballos, Lamata, & Pelta, 2016). In the traditional formulation of TOPSIS, personal judgments are signified with crisp values. However, in several sensible cases, the human preference model is unsure, and decision-makers may be reluctant or unable to assign crisp values to the comparison judgments (Chan & Kumar, 2007). The need to use crisp values is one of the problematic points within the crisp analysis method. This is

because decision-makers typically feel more assured when they use interval judgments instead of using single numeric values to express their judgements. Some criteria are difficult to measure using crisp values, and they are typically neglected throughout the analysis. The rationale for employing a triangular fuzzy range is that it is intuitively simple for the decision-makers to use and calculate. Additionally, modeling exploitation of triangular fuzzy numbers has been verified to be a good approach for formulating all issues wherever the data is subjective and inexact. Triangular applications are employed most frequently for representing fuzzy numbers.

This technique gives preference to order by comparison with the ideal solution also known as the positive ideal solution. In this, the cost characteristic will be minimized and benefit characteristics will be maximized. The negative ideal solution is the opposite of the positive ideal solution (also known as an ideal solution) in the fuzzy TOPSIS technique. In this technique, the cost characteristic will be maximized, and benefit characteristics will be minimized (Gupta & Kumar, 2018).

Let us say we have the score of every option (**m**) against every criterion (**n**), so the score x_{ij} will be the option I with respect to criterion j. We have a matrix X= (X_{ij}) m x n matrix. Now J is the set of benefit attributes, the higher the number of attributes the better it is. Now J' is the set of negative attributes, and lesser the number of attributes the better it is.

Table 4
TOPSIS linguistic variable

Very poor (VP)	(0; 0; 1)
Poor (P)	(0; 1; 3)
Medium poor (MP)	(1; 3; 5)
Fair (F)	(3; 5; 7)
Medium good (MG)	(5; 7; 9)
Good (G)	(7; 9; 10)
Very good (VG)	(9; 10; 10)

Steps:

1. To find the rankings construct of a decision matrix, convert the obtained data using the linguistic variable from Table 4. The matrix structure will be as follows while every 'f' will have 3 components f= (a, b, c). The alternates for j will be denoted by A_j, j = 1, 2, 3, 4 ..., J; the i^{th} attribute will be represented by F_i, i = 1, 2, 3, 4 ..., n, related to ith alternative; the crisp values will be f_{ij} and will indicate the ratings of performance of each alternate A_i with respect F_j criteria.

2. Construct a normalized decision matrix, after gaining the initial decision matrix. To transform the several criteria scales to a comparable scale in a fuzzy environment, the method of linear scale transformation is used.

$$r_{ij} = \left(\frac{a_{ij}}{c_j^*}, \frac{b_{ij}}{c_j^*}, \frac{c_{ij}}{c_j^*} \right), \; c_j^* = \max_i c_{ij} \qquad (3)$$

Where $x_{ij} = \left(a_{ij}, b_{ij}, c_{ij}\right)$ are the elements of the initial decision matrix.

3. The normalized weighted decision matrix will be constructed, where

$$v_{ij} = w_j \cdot r_{ij}, \quad j = 1,2,3,4\ldots m,\ i = 1,2,3,4\ldots n \tag{4}$$

4. Determine the fuzzy ideal and fuzzy negative-ideal solutions.

$$A^+ = \{v_1^+, v_2^+, \ldots v_m^+\} \tag{5}$$

$$A^- = \{v_1^-, v_2^-, \ldots v_m^-\} \tag{6}$$

Where $v_j^+ = (1,1,1)$ and $v_j^- = (0,0,0)$, j=1, 2, 3, 4 ..., m.

5. Calculate the separation measure:

– Ideal separation

$$S_i^+ = \sum_{j=1}^{m} s(v_{ij}, v_j^+) \qquad i=1, 2, 3, 4 \ldots, n \tag{7}$$

– Negative-ideal separation

$$S_i^- = \sum_{j=1}^{m} s(v_{ij}, v_j^-) \quad i = 1, 2, 3, 4 \ldots, n \tag{9}$$

Where $s(v_{ij}, v_j^+)$ and $s(v_{ij}, v_j^-)$ are distance measurements.

6. Calculate the relative closeness to the ideal solution.

$$c_i^* = \frac{S_i^-}{(S_i^+ + S_i^-)}, \qquad 0 < c_i^* < 1, \quad i = 1, 2, 3, 4 \ldots, n \tag{8}$$

$c_i^* = 1$ if $A_i = A^+$

$c_i^* = 0$ if $A_i = A^-$

7. Rank the preference order

– A set of alternatives can now be preference ranked according to the descending order of c_i^*.

4. Results

After the collection of responses from the appropriate resources, the collected data was transferred to a spreadsheet for the application of the proper calculations to generate results. This study also incorporated a combined MCDM where the Analytic Hierarchy Process was utilized to generate weights for the selected criteria, and then TOPSIS was applied to generate the ranking of the alternatives. This was used to determine which alternatives were the best for the purpose of this study.

Using the linguistic variable provided in Table 2, we converted the data for the AHP into a numerical format to obtain a qualitative response after the conversion arithmetic mean was calculated to obtain a pairwise comparison as shown in Table 5.

Table 5
Pairwise Comparison Matrix

	Pair wise Comparasion Matrix				
	C1	C2	C3	C4	C5
C1	1	2	2	1	1
C2	0.5	1	1	1	1
C3	0.5	1	1	1	1
C4	1	1	1	1	1
C5	1	1	1	1	1

By following the steps for AHP discussed in the methodology section, the values obtained in Table 6 show that the factors that have a major effect on the study are C1 (having the highest weight), with C4 and C5 coming in second, and C2 and C3 coming in last. The consistency ratio obtained from the pairwise comparison matrix is 0.017<0.1. Since the consistency ratio was well within the required range, the calculated weights are reliable and can be used in further calculations.

Table 6
Priority vector, weights calculation

	Priority Vector		
C1	0.26333	λmax	5.077452
C2	0.171667	CI	0.019631
C3	0.171667	RI	1.12
C4	0.19667	CR	1.70%
C5	0.19667		

After the implementation of the AHP, TOPSIS's triangular fuzzy numbers were used to assign numerical values to linguistic variables from the data that was obtained from the questionnaire. Appendix A shows different stages of the results calculated from the data obtained.

Table 7
Computation of close coefficient along with the rankings

	computation of Close Coeffecient					
	CC	Ranking				
A1	0.966666667	1st				
A2	0.138080495	3rd				
A3	0.324364281	2nd				

After performing the final calculation, the obtained ranks for the alternatives were as follows: A1 ranked in first place, A3 in second place and A2 came in last (Table 7.). In Table 7, the A1 alternative represents 'exhibition matches', A2 represents 'league matches' and lastly, A3 represents 'tournament matches'.

5. Discussion

Based on the results, exhibition matches ranked first among the alternatives or in other words, was given the highest priority by the respondents. Exhibition matches are single event matches that are not a part of any competition, but rather are tested series, one day series and T20s matches or a combination of all three (Press, 2000). There are three types of international cricket matches (HowTheyPlay.com, 2018)

1. Tests

This is the highest standard of cricket, and the players who set records in these are the greatest players (Allsopp & Clarke, 2004). Currently, a standard test match lasts 5 days, with approximately 90 overs bowled per day. There are two innings per team without any restriction on the number of overs faced by the batting team. There are usually two reasons for the end of the inning, when the batting team gets out or when the captain declares the innings (happens when the captain is satisfied with runs scored or if a team is in a relatively safe position, giving the opposing team the chance to bat).

2. One-day internationals

ODI's are limited-overs matches in which 50 overs are bowled per inning. They only have 2 innings, 1 inning per team. Both teams have colored clothing; white balls are used and there are some fielding and bowling restrictions.

3. Twenty 20 internationals

Twenty 20 matches, also knowns as T20s, are the newest form of international cricket. There are only 20 overs per innings. This is now the most athletic and passionate format of international cricket. Fans enjoy it more than other formats because it is a short game and mostly revolves around hard-hitting the ball.

It is suggested that these formats are followed in exhibition matches between Pakistan and India in order to gain better results and involvement from every type of supporter for these games.

There are many advantages of exhibition cricket. In countries like India and Pakistan, it is a tool to unite the divided nations because regardless of religion or caste a cricket match between these two countries can help put all differences aside and unite the people under the flag of their respective country. For the Pakistanis and Indians living in foreign countries, people from both nations interact with each other either by discussing the scores or commenting on the match. International matches also provide vital marketing opportunities to companies located in Pakistan and India. A series of matches provides a base for the future development of sports in these nations, and provides a chance to meet and understand the people living on the other side. The demand for sporting equipment like replica shirts, sneakers, and other cricket items will increase. Media coverage of the matches will not only cover the cricket match, but also provide a glimpse into the culture of the country and places which will attract tourists from all over the world.

The least ranked alternative was league matches. These results also conform to the weights that each criterion carried as calculated by the AHP decision-making model because currently Pakistan and India have two separate leagues. Not since the first season of the Indian Premier League have the Pakistani players been allowed to take part in the league, and the same is true for Indians being allowed to participate in the Pakistan Super League. In addition to this, one might argue from the economic

increase that each leagues season could contribute to each country. Most of the league matches for Pakistan are held in Dubai due to unstable conditions, and therefore have not been of much value to Pakistan yet. Similarly, the leagues include players from different countries so the particular unity is not as easy to observe during those matches when compared to the games held on a national level. The league matches, being the worst alternative, can be justified by the fact that many people do not watch league matches or just watch a game to see their favorite players like Shahid Khan Afridi, Chris Gayle and AB De Villiers. Therefore, these games cannot contribute much towards the betterment of ties between the two countries. It is recommended that players from both countries be allowed to take part in each country's leagues because this might help melt the ice between these two countries.

If there is a match between Pakistan and India, people from both sides of the border will find time in their very busy lives to watch the match because it is tradition. These games possess an intense rivalry and competitiveness, and this competitiveness is felt by everyone on both sides of the border. This competitiveness would not be seen in league matches because both countries would not be alone in the league but would be a small part of something bigger than themselves. This notion is further supported by the number of viewers for a match between Pakistan and India, which has been 47.45 million (Laghate, 2017). This is in contrast to the viewership for the other 60 matches in IPL 2017 which was 411 million. This makes 6.85 million views per match, and the total viewership for the PSL 2018 was only 8.2 million for a total of 15 matches (Akbar, 2018). These figures support the idea that exhibition matches should be more supported and relied upon than league matches.

5.1 Limitations

The study tried to cover all of the relevant aspects of the required objective, but there are a few limitations. One of the limitations is that the study was conducted only in Pakistan and India. The issues between these countries were the main focus, and this was the reason that the survey was only conducted in these two countries. Another limitation in this study is that the data collection was more focused on the general population as there were no other options available that could prove to be more feasible.

5.2 Future improvements

Future studies can highlight conflicts between other countries and also take into account relevant data collection from politicians, government officials, sports players, commentators, and cricket experts. Similarly, the study can also be extended to other sports to resolve disputes between different countries.

6. Conclusion

The results extracted from the research and analysis suggest that exhibition matches, and bilateral series conducted between Pakistan and India are the most followed cricketing events as compared to the league matches that each country holds every year. The results allow us to confidently conclude that governments of both sides should focus on increasing the frequency of bilateral series. This will help people compete on the sports grounds rather than arguing on social media and talk shows. Some of the drawbacks this study faced are the number of criteria selected, and the fact that an expert opinion was not easily available. Furthermore, the data gathered focused on Pakistan and India which is why this model cannot be easily implemented elsewhere. More accurate results can be obtained using the developed model if there

is access to expert opinions and a greater number of criteria are involved. Involving experts would help generate more accurate weights for the AHP decision model, which in turn will give a more accurate alternative ranking.

REFERENCES

Akbar, F. (2018). *CricinGif*. Retrieved Nov 6, 2018, from https://www.cricingif.com/stories/11434/PSL-viewership-figures-are-something-we-can-cherish

Ali, Y., Asghar, A., Muhammad, N., & Salman, A. (2017). Selection of a fighter aircraft to improve the effectiveness of air combat in the war on terror: Pakistan Air Force- A case in point. *International Journal of the Analytic Hierarchy Process,, 9(2),* 244-273 Doi: https://doi.org/10.13033/ijahp.v9i2.489

Ali, Y., Awan, M. A., Bilal, M., Khan, J., Petrillo, A., & Khan, A. A. (2019). Risk assessment of China-Pakistan Fiber Optic Project (CPFOP) in the light of Multi-Criteria Decision Making (MCDM). *Advanced Engineering Informatics, 40*, 36-45. Doi: https://doi.org/10.1016/j.aei.2019.03.005

Ali, Y., Iftikhar, N., & Edwin, C. A. (2017). Assessment of career selection problems in developing countries: a MCDM approach. . *International Journal of the Analytic Hierarchy Process, 9(2),* 219-243. Doi: https://doi.org/10.13033/ijahp.v9i2.488

Ali, Y., Shah, Z. A., & Khan, A. U. (2018). Post-terrorism image recovery of tourist destination: a qualitative approach using Fuzzy-VIKOR. *Journal of Tourism Analysis:*Doi: https://doi.org/10.1108/jta-05-2018-0016

Aljazeera (2019). *India-Pakistan tensions: latest updates.* https://www.aljazeera.com/news/2019/02/india-pakistan-tensions-latest-updates-190227063414443.html

Allsopp, P., & Clarke, S. (2004). Rating teams and analysing outcomes in one-day and test cricket. *Journal of the Royal Statistical Society Series A, 164(4),* 657-667. Doi: https://doi.org/10.1111/j.1467-985x.2004.00505.x

Awan, M. A., & Ali, Y. (2019). Sustainable modeling in reverse logistics strategies using fuzzy MCDM. *Management of Environmental Quality, 30(5),* 1132-1151. Doi: https://doi.org/10.1108/meq-01-2019-0024

Balcerzak, A., & Pietrzak, M. B. (2016). Application of TOPSIS method for analysis of sustainable development in European Union countries. *The 10th International Days of Statistics and Economics. Conference Proceedings.*Prague: Institute of Economic Research.

Beutler, I. (2008). Sport serving development and peace: Achieving the goals of the United Nations through sport. *Sport in Society , 11(4),* 359-369. Doi: https://doi.org/10.1080/17430430802019227

Byun, D.-H. (2001). The AHP approach for selecting an automobile purchase model. *Information and Management, 38(5),* 289-297. Doi: https://doi.org/10.1016/s0378-7206(00)00071-9

Ceballos, B., Lamata, M., & Pelta, D. (2016). A comparitive analysis of MCDM methods. *Progress in Artificial Intelligence, 5(4),* 315-322.

Chan, F., & Kumar, N. (2007). Global supplier development considering risk factors using fuzzy extended AHP-based approach. *Omega, 35(4),* 417-431. Doi: https://doi.org/10.1016/j.omega.2005.08.004

Deng, H., Yeh, C.-H., & Willis, R. (2000). Inter-company comparison using modified TOPSIS with objective weights. *Computers & Operations Research, 27(10),* 963-973. Doi: https://doi.org/10.1016/s0305-0548(99)00069-6

Dožić, S., & Kalić, M. (2014). An AHP approach to aircraft selection process. *17th Meeting of the EURO Working Group on Transportation, EWGT2014.* Sevilla: Transportation Research Procedia. Doi: https://doi.org/10.1016/j.trpro.2014.10.102

Golden, B. L., Wasil, E. A., & Harker, P. T. (1989). *The analytic hierarchy process.* Berlin, Heidelberg: Springer.

Gupta, H., & Kumar, M. (2018). A frame work to overcome barriers to green innovation in SMEs using BWM and fuzzy TOPSIS. *Science of The Total Environment, 633,* 122-139. Doi: https://doi.org/10.1016/j.scitotenv.2018.03.173

HowTheyPlay.com. (2018). *How they play*. Retrieved Nov 1, 2018, from https://howtheyplay.com: https://howtheyplay.com/team-sports/Types-of-cricket-matches

Hwang, C.-L., & Yoon, K. (1981). *Methods for multiple attribute decision making.* Berlin, Heidelberg: Springer.

Iftikhar, M. (2014). *SportsandDev.org*. Retrieved Oct 5, 2018, from https://www.sportanddev.org/en/article/news/role-cricket-india-pakistan-conflict

Laghate, G. (2017). *The Econimic Times*. Retrieved Nov 15, 2018, from https://economictimes.indiatimes.com/industry/media/entertainment/media/india-pakistan-odi-creates-tv-viewership-history/articleshow/59168451.cms

Metin Dağˇdeviren, S. Y. (2008). Weapon selection using the AHP and TOPSIS methods under fuzzy environment. *Expert Systems with Applications, 36(4),* 8143-8151. Doi: https://doi.org/10.1016/j.eswa.2008.10.016

Murray, S. (2012). The two halves of sports-diplomacy. *Diplomacy & Statecraft, 23(3),* 576-592. Doi: https://doi.org/10.1080/09592296.2012.706544

Press, C. U. (2002). *Cambridge Advanced Learner's Dictionary & Thesaurus*. Retrieved Nov 8, 2018, from https://dictionary.cambridge.org: https://dictionary.cambridge.org/dictionary/english/exhibition-match

Rizvi, U. H. (2015). *Let cricket diplomacy strengthen Pakistan-India relations*. Retrieved Oct 8, 2018, from https://blogs.tribune.com.pk/story/27617/let-cricket-diplomacy-strengthen-pakistan-india-relations/

Rose, L., & Sisson, R. (1991). *War and secession: Pakistan, India, and the creation of Bangladesh* (2nd ed.). California, Berkeley: University of California Press. Doi: https://doi.org/10.1086/ahr/96.4.1265

Saaty, T. L. (1980). *The Analytical Hierarchy Process* (2 ed.). Pittsburgh: McGraw Hill.

Showkat, N. (2018). Cricket diplomacy between India and Pakistan: A case study of leading national dailies of both the countries (The Hindu & Dawn). *Journal of Mass Communication & Journalism, 3(1)* 1-10. Doi: https://doi.org/10.4172/2165-7912.1000142

Stelter, B., & Cohen, N. (2008, November 30). *Citizen journalists provided glimpses of Mumbai attacks*. Retrieved July 10, 2019, from https://www.nytimes.com/2008/11/30/world/asia/30twitter.html

APPENDIX A

Table B

	Factors				
Alternatives	**C1**	**C2**	**C3**	**C4**	**C5**
A1	(0;6.4;10)	(0;7.10769	(0;7.06153	(0;7.18461	(0;6.15384;10)
A2	(0;6.24615	(0;6.81538	(0;6.81538	(0;6.50769	(0;5.78461;10)
A3	(0;6.36923	(0;6.76923	(0;6.67692	(0;6.63076	(0;6.16923;10)

Table B1

Normalization of matrix					
	Factors				
Alternatives	**C1**	**C2**	**C3**	**C4**	**C5**
A1	(0;0.64;1)	(0;0.71076	(0;0.70615	(0;0.71846	(0;0.615384;1)
A2	(0;0.62461	(0;0.68153	(0;0.68153	(0;0.65076	(0;0.578461;1)
A3	(0;0.63692	(0;0.67692	(0;0.66769	(0;0.66307	(0;0.616923;1)

Table B2

Weighted decision matrix					
	Factors				
Alternatives	**C1**	**C2**	**C3**	**C4**	**C5**
A1	(0;0.1685;0.2634)	(0;0.1219;0.1716)	(0;0.1211;0.1716)	(0;0.1413;0.1967	(0;0.1210;0.1967)
A2	(0;0.1476;0.2634)	(0;0.1169;0.1716)	(0;0.1169;0.1716)	(0;0.1280;0.1967	(0;0.1137;0.1967)
A3	(0;0.1505;0.2634)	(0;0.1161;0.1716)	(0;0.1145;0.1716)	(0;0.1304;0.1967	(0;0.1213;0.1967)
A*	(0;0.1685;0.2634)	(0;0.1219;0.1716)	(0;0.1211;0.1716)	(0;0.1413;0.1967	(0;0.1213;0.1967)
A-	(0;0.1476;0.2634)	(0;0.1161;0.1716)	(0;0.1145;0.1716)	(0;0.1280;0.1967	(0;0.1137;0.1967)

Table B3

	Computation of FPIS					
	C1	**C2**	**C3**	**C4**	**C5**	**D***
A1	0	0	0	0	0.01	0.01
A2	0.0834	0.0408	0.0374	0.0665	0.0503	0.2784
A3	0.0774	0.0439	0.0469	0.0603	0	0.2285

Table B4

	Computation of FNIS					
	C1	**C2**	**C3**	**C4**	**C5**	**D-**
A1	0.0834	0.0439	0.0469	0.0665	0.0493	0.29
A2	0	0.0163	0.0283	0	0	0.0446
A3	0.0311	0	0	0.0283	0.0503	0.1097

APPENDIX B

1. **To what extent would match scheduling frequencies be comparable to the below factors?** *

Mark only one oval per row.

	Extremely Unimportant	Very Strongly Unimportant	Strongly Unimportant	Moderately Unimportant	Equally Important	Moderately Important	Strongly Important	Very Strongly Important	Extremely Important
Media coverage									
Public reactions									
Match locations									
Political agendas									

2. **To what extent would media coverage be comparable to the below factors?** *

Mark only one oval per row.

	Extremely Unimportant	Very Strongly Unimportant	Strongly Unimportant	Moderately Unimportant	Equally Important	Moderately Important	Strongly Important	Very Strongly Important	Extremely Important
Public reactions									
Match locations									
Political agendas									

3. **To what extent would civilian public reactions be comparable to the below factors?** *

Mark only one oval per row.

	Extremely Unimportant	Very Strongly Unimportant	Strongly Unimportant	Moderately Unimportant	Equally Important	Moderately Important	Strongly Important	Very Strongly important	Extremely Important
Match locations									
Political agendas									

Mark only one oval per row.

4. **To what extent would match locations be comparable to the below factors?** *

	Extremely Unimportant	Very Strongly Unimportant	Strongly Unimportant	Moderately Unimportant	Equally Important	Moderately Important	Strongly Important	Very Strongly Important	Extremely Important
Political agendas									

Match types and their effect on preceding criteria

5. **What effect would scheduling friendly exhibition matches have on the external factors pertaining to political relations?** *

Mark only one oval per row.

	Very Poor	Poor	Medium Poor	Fair	Medium Good	Good	Very Good
Match scheduling frequencies							
Media coverage							
Public reactions							
Match locations							
Political agendas							

6. **What effect would scheduling league matches have on the external factors pertaining to political relations?** *

Mark only one oval per row.

	Very Poor	Poor	Medium Poor	Fair	Medium Good	Good	Very Good
Match scheduling frequencies	◯	◯	◯	◯	◯	◯	◯
Media coverage	◯	◯	◯	◯	◯	◯	◯
Public reactions	◯	◯	◯	◯	◯	◯	◯
Match locations	◯	◯	◯	◯	◯	◯	◯
Political agendas	◯	◯	◯	◯	◯	◯	◯

7. **What effect would scheduling tournament matches have on the external factors pertaining to political relations?** *

Mark only one oval per row.

	Very Poor	Poor	Medium Poor	Fair	Medium Good	Good	Very Good
Match scheduling frequencies	◯	◯	◯	◯	◯	◯	◯
Media coverage	◯	◯	◯	◯	◯	◯	◯
Public reactions	◯	◯	◯	◯	◯	◯	◯
Match locations	◯	◯	◯	◯	◯	◯	◯
Political agendas	◯	◯	◯	◯	◯	◯	◯