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Hospital Services Evaluation In Case Of Emergency: A KPK Case In Point

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Abstract:

Purpose: The objective of this study is to investigate and evaluate the hospital services in case of emergency in urban private/government and rural private/government hospitals. Also, identify the weakness and problems in hospitals and provide a new framework for the improvement of such services in the hospitals especially in Khyber Pakhtunkhwa (KPK). The services which are evaluated in different types of hospitals are ambulance workload, hospital sanitation and environment, administration policy, professional capability, doctor's availability, responsiveness, technology, payment process, a system of patient appointment, pharmacy, and medical treatment, staff orientation, and resource utilization.

Methodology: In this paper, both the secondary and primary data have been collected. Secondary data are collected from previously published articles, different journals, magazines, newspapers, blogs, and research papers. While the primary data was collected through questionnaires from different hospitals of rural private/government and urban private/government hospitals. For the data analysis, the MCDM technique Fuzzy VIKOR approach has been used to rank the hospital services and alternatives.

Findings: The results show that the services of the urban private hospitals are more convincible than other types of hospitals. Added to this, the basic arguments behind the urban private hospitals providing the best services are professional capability, doctor's availability, advanced technology equipment, staff orientation, resource utilization, and pharmacy and medical equipment.

Practical implications: In this paper, issues, and problems are identified related to hospitals and provide a new framework that can help them to improve their services and will gain satisfaction from the patients.

Originality/Value: No research work is present in the past literature that used the fuzzy VIKOR approach on the hospital services evaluation in case of emergency, especially in KPK Pakistan.

Keywords: Hospitals services, emergency, Fuzzy VIKOR, professional capability, technology

Introduction:

In our daily life, we are getting different types of services whether that is in the form of doctors, education, lawyer and labor, etc., and many others (Kotler, 2000). Nowadays patients are more conscious of the service quality in hospitals. Most hospitals try to enhance their profit by differentiating their services from their competitors in the field. So, many of hospitals are now focusing on improving the quality of healthcare services in order to gain the maximum revenue and benefit. Added to this, it can also increase the patient's satisfaction with hospital

services due to which they will come over to the hospital again and again (Turner & Pol, 1995). Employee attitudes, the appointment system for the patients, patient acceptance, diagnostics of the symptoms, intensive care, technology, bills or payment process, ambulance workload, and the patient's follow-up, these all are services that it should be improved by the hospitals. According to Shimizu, acquiring a new technology equipment's in the hospital are more expensive, instead of they should only to improve their quality of existing services and technology in the hospitals (Shimizu & Jindo, 1995).

An emergency department (ED) is basically dealing with emergency cases in hospitals. The emergency department (ED) is specialized in the immediate care of patients in uncertain situations without any appointment from the department (Afilalo, et al., 2004). In any emergency case, the emergency department (ED) should provide immediate medications to the patients which is not a permanent cure to the patient but to handle the current situation and prepared for the broad spectrum, these emergency cases must be life-threatening situations that require quick attention. The Emergency department (ED) a complex and important unit in any hospital that requires high coordination between material elements and human (Yeh & Lin, 2007).

In case of an emergency in the hospital, one of the important factors is to minimize the patients waiting time for treatment because mostly it will dis-satisfy the patient and they will leave the hospital without treatment. To overcome such types of problems in hospitals especially in emergency cases so it will enhance the Emergency department (ED) with better quality and also affect the patient's satisfaction with service quality (Valizadeh, Zamanzadeh, Rassouli, Ghahramanian , Archibald, & Asghari, 2018).

Much of the research had been done on hospital service quality but no work has been reported in the past literature on the hospital service evaluation in case of emergency in the Khyber Pakhtunkhwa (KPK) scenario. In this paper, the researcher targeted the urban private/public hospitals and rural private/public hospitals in Khyber Pakhtoon Khawa (KPK). Added to this, the researcher focused on hospital staff, doctors, and patients for the data collection. The data has been collected from different types of hospitals through questionnaires. These are numerous hospital services which have been evaluated in many different types of hospitals which are ambulance workload, hospital sanitation and environment, administration policy, professional capability, doctor's availability, responsiveness, technology, payment process, a system of patient's appointment, pharmacy, and medical treatment, staff orientation and resource utilization. The alternatives for the above factors are urban public/private hospitals and rural public/rural private hospitals.

To consider the factors discussed above, the main objective of this study is to evaluate the hospital services in case of emergency in urban public/private hospitals and rural public/private hospitals. Then to determine the type of hospitals which provides good services to their patients in case of emergency and also determine the alternative which provides bad services to their patients in case of emergency. For this purpose, the researcher used the multi-criteria decision making (MCDM) Fuzzy VIKOR approach to rank the alternatives on the basis of providing the good services to their patients in emergency case. In the first part, the researcher discussed the hospital services in case of emergency in different developing countries. In second part, the researcher did the literature review on topic related and as well as methodology-based literature which is about multi-criteria decision making (MCDM) approach fuzzy VIKOR. Third part is about the data collection, the researcher collected both the secondary and primary data for this paper. For analysis part, the researcher used the MCDM technique Fuzzy VIKOR, and then

the findings discussion part and at the end conclusion.

Literature review:

In today's world as most of the businesses are shifted towards the service industry. For such industry the major concern is better service and it's very important for them to developing, delivering and maintaining better service quality to their consumers. The better service quality should be measure through the evaluation on the service quality (Tseng, 2009). The purpose behind the service evaluating is to measure the service performance, identify service problems and hurdles, maintain the service quality, and manage the service delivery process and to provide the optimal service for the consumers (Li L. X., 1997). A numerous studies have been conducted on the service evaluations in different fields, which contains public agency (Gowan, Seymour, Ibarreche, & Lackey, 2001)bank (Karatepe, Yavas, & Babakus, 2005)airline and airport (Chang & Yeh, 2002)hospital and healthcare (Abhijit, 2011).

According to the patients when they seeking for a healthcare service, there are two main concerns for them which are quality and effectiveness of the services. If one of the hospitals is not satisfied their patients from their services so they switch to elsewhere for seeking a quality service. Hospitals, therefore need to focus on their services delivering process and trying to improve it, because it not only holds the existing patients but also attract the new patients (Chang, Hsiao, & Huang, 2011). Hospitals manager need to focus on a good quality hospital service in healthcare industry due to which they successfully manage the challenges and pressure of competition from the globalization. Therefore, they have need to closely meet the needs of patients and to evaluate the quality of hospital services of patients and in return it increases their satisfaction (Teng, Ing, Chang, & Chung, 2007).

In the classification of service industry, hospital is also one the service industry which basically engage with people directly, delivering and providing the customized quality of hospital medical services to their patients (Shiekh, Wu, & Huang, 2010). Hospital medical services includes the doctor's availability, technology, professionalism, adequate number of services, timely treatment, payment process and meeting acceptable standards of the medical practices (Li & Benton, 2003). The main objective of the hospitals to operate successfully in the hospital service industry on a condition when they provide a quality service to their patients and in this way, they retain and attract their existing and new patients (Shiekh, Wu, & Huang, 2010).Page | 497 Clinic carrier first-rate consists of suitable device, timely remedy, and good enough number of offerings, and assembly proper standards of the clinical practices (Li & Benton, 2003). To operate a health center successfully, the important thing goals must be hooked up in order to preserve and entice as many suffers as viable with the aid of assembly their wishes and needs (Shiekh, Wu, & Huang, 2010).Health facility service nice, related to admitting nursing, physicians, meals, rooms, technicians, travelers services, equipment's, surroundings, discharge system and the effected person's probability to go back, has been one of the foremost troubles which situation healthcare companies, employees, employers and governmental companies (Khattak, 2022). Even though health center service provider has been in improvements for several years, comparing provider exceptional expectation is as essential as to whether or not the hospitals are nicely aware about the importance of service quality.

In the previous research papers, many of the researchers used many other MCDM techniques like Fuzzy AHP, TOPSIS and simulation model for the purpose to determine the importance of different hospital services and also rank a suitable hospital of a good service provider to patients (Akdag, Kalayci, Karagoz, & Giz, 2014). In this

study, the researcher used the Fuzzy VIKOR because we going to identify the ranking of the alternatives and similarly to evaluate the important medical services in different hospitals that which service is more important in emergency case and which service is not present for the patients.

MCDM technique VIKOR developed by (Opricovic , Multi-criteria optimization of civil engineering systems. , 1998)the VIKOR is Serbian name: VlseKriterijumskaOptimizacija, KompromisnoResenje, which means the multi-criteria optimization and compromise solution (Chu M.-T. , Shyu, Tzeng, & Khosla, 2007). The MCDM VIKOR technique was also developed for multi-criteria complex systems (Opricovic & Tzeng, Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS., 2004). The VIKOR method give the ranking and best alternative from the set of alternatives, and to identify the optimal solution for a complex problem with conflicting criteria, which can help the decision maker at their decision process. Here, the optimal solution means a feasible solution which is the closest towards the ideal solution (Opricovic & Tzeng, Extended VIKOR method in comparison with out ranking methods. , 2007). It introduces the multi-criteria ranking index which is depend on the measure of ‘‘closeness” to the ‘‘ideal” solution (Opricovic , Multi-criteria optimization of civil engineering systems. , 1998)

In the decision-making process, the decision maker is frequently faced doubts, uncertainties and problems. If more specifically, the language to express the feelings, judgment or perception is always vague or uncertain. To resolve such vagueness or uncertainty in the data the decision maker using the fuzzy sets theory (Zadeh, 1965)which was introduced to express the linguistic terms in decision making (DM) process. According to (Bellman & Zadeh, 1970)introduced the fuzzy multi-criteria decision making (FMCDM) methodology to resolve the vagueness in assigning the weights to different services and then ratings of alternatives regarding evaluation criteria.

Most rational people usually believe on the outcomes of a bivalent logic (True/false, yes/no, and right/wrong), but normally the daily life problems, thoughts and situations are by no means to bivalent logic (Tong & Bonissone, 1980). As traditionally, bivalent logic is based on the classic set theory, while the fuzzy logic is based on fuzzy sets. Fuzzy set is consisting of many objects which have no clear-cut boundary in between the objects and that are or are not members of the set. The basic theory behind this definition of ‘‘membership”: any object in the set may be a member of a set ‘‘to some degree”; and a logical proposition may hold true “to some degree”. Each object in the set is associated with a value indicating to what degree the element is a member of the set. The range for these values comes in between [0,1], where 0 indicate the minimum and 1 indicate the maximum degree of membership, while all the intermediate values indicate degrees of ‘‘partial” membership (Bevilacqua, Ciarapica, & Giacchetta, 2006). The methodology-based literature are shown in table 1 given below;

Table 1: Multi-criteria decision-making applications in past literature

Multi-criteria decision-making applications in past literature	
Authors	Description

(Akdag, Kalayci, Karagoz, & Giz, 2014)	This researcher used the Fuzzy MCDM technique for the evaluation of hospital Service Quality, and identify the important services for patients in the hospitals according to the doctor's perspective.
(Zhao, You, Liu, & Wu, 2015)	Used the fuzzy VIKOR approach to evaluate different supplier and then select the most suitable supplier for the project.
(Alguliyev & Mahmudova, 2015)	Used the MCDM technique, a modified Fuzzy VIKOR approach for the selection of personnel in the organization
(Chen & Wang, Optimizing patners choice in IS/IT outsourcing projects: The strategic decision of fuzzy VIKOR , 2009)	From the previous studies, it identified that the Fuzzy VIKOR also be used in some strategic decision like to optimizing partners choice in IS/IT outsourcing projects in developing countries.
(Dincer & Hacioglu, 2013)	The author used the integrated fuzzy VIKOR and AHP based method on the customer satisfaction and to evaluate their performance in Turkish banking sector.
(Eskandari, Riyahifard, Khosravi, & Geiger, 2011)	The researcher used the multi-criteria decision-making techniques for improving the services of emergency department in the medical industry.

Methodology:

Data collection

This research was conducted in Khyber Pakhtunkhwa (KPK) province which is the third most populated province in Pakistan. In paper, the researcher adopted quantitative approach for the data collection, because the quantitative data gives much accurate and efficient results then to qualitative approach. The data collected from both the secondary and primary sources. The secondary data would collect from articles, previous research papers, government documents, unpublished program report, journals, books and newspapers were studies for the literature review and also find a gap with the help from these data sources. While the primary data were collected through questionnaire from different private/public hospitals in rural and urban areas of KPK. For the data collection, the researcher approached to these respondents through online medium as well as physically. The questionnaire would be construct on Google.docs by using the linear seven Likert scale of 1-5, 1=very low, and 7=very high. The data collected from the following hospitals;

1. Urban private hospitals
2. Urban government hospitals
3. Rural private hospitals
4. Rural government hospitals

Research process model:

After the extensive literature review and opinions from the experts, the researcher identified the hospitals services which is beneficiary in emergency case. In this study, the researcher wants to evaluate these hospital services in different sectors of hospitals. The researcher collected the data through the questionnaire from urban private hospitals, urban government

hospitals, rural private hospitals and rural government hospitals. The questionnaire contains seven Likert scale (1=very low, 7=very high). For analysis, the researcher used the fuzzy VIKOR approach. Then results of the analysis, discussion and then last conclusion of the study. The research process is shown in figure 1 below;

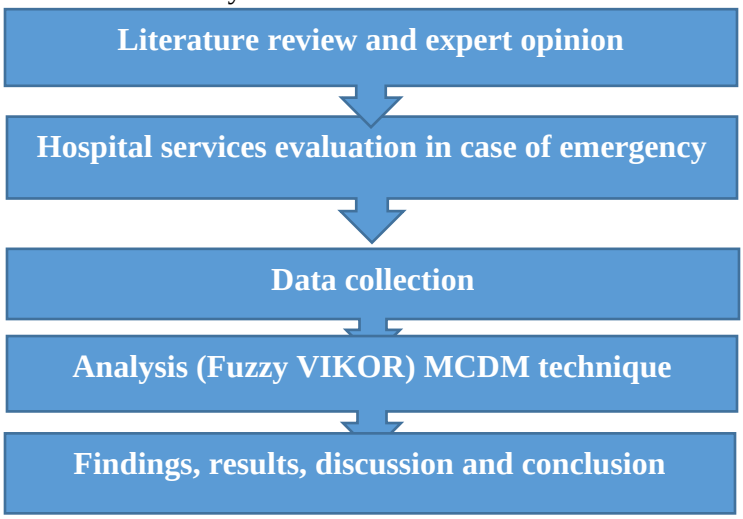

Figure 01: research process model

Fuzzy VIKOR approach

On the basis of critical analysis on literature and experts' opinion, the researcher identified some of the criteria that are important to hospital services evaluation in case of emergency in private/public hospitals in rural and urban areas a case from KPK. Then the respondents assign weights and rate to criteria on accordingly to different alternatives in the questionnaire. The questionnaire used a seven Likert scale for Fuzzy VIKOR approach (1=very low, 7=very high). For analysis of criteria the researcher used the Fuzzy VIKOR approach. And then, the findings and results of the research which give the rank and importance of the criteria and alternative in ascending order, and then discussion and conclusion of the research.

The Fuzzy VIKOR is an MCDM (multi-criteria decision making) technique. This technique helps the decision makers to rank the criteria and alternatives in ascending order according to the priority weights. The Fuzzy VIKOR approach gives the optimal alternative to the decision maker. This approach is very helpful to solve the problems in the fuzzy environment. To handle the vagueness in the numerical quantities or data a fuzzy triangular be used. Fuzzy operations used for the purpose to rank the fuzzy numbers. These numbers are used in fuzzy VIKOR algorithms.

Steps of Fuzzy VIKOR:

Fuzzy VIKOR consists of multiple steps:

Step 1: Identify and make a complete list of alternatives and evaluation criteria and a constitute category of decision makers. Let z be equal to the total number of alternatives, so z=4. The alternatives set is denoted by A. the set is shown below in table 3;

$$A = \{1, 2, 3 \ldots z\} \quad (1)$$

The total number of decision makers is denoted by 'x'. The decision makers set should be denoted by D which is shown below:

$$D = \{1, 2, 3 \ldots . x\} \quad (2)$$

The total number of criteria is denoted by 'e'. The criteria set should be denoted by C which is shown below in table 2;

$$C = \{1, 2, 3 \ldots e\} \quad (3)$$

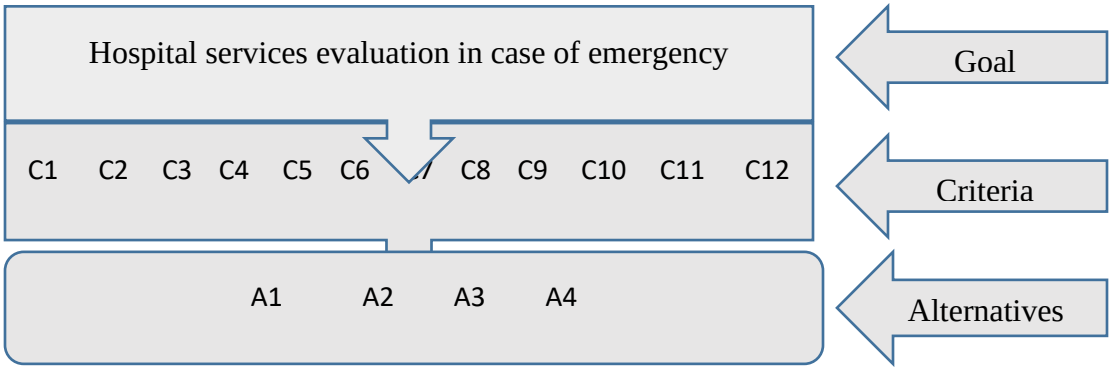

Figure 2: problem structure

Table 2: Criteria

C1	**Ambulance workload**	**C7**	**Technology**
C2	**Hospital sanitation and environment**	**C8**	**Payment process**
C3	**Administration policy**	**C9**	**System of patient's appointment**
C4	**Professional capability**	**C10**	**Pharmacy and medical treatment**
C5	**Doctors' availability**	**C11**	**Staff orientation**
C6	**Responsiveness**	**C12**	**Resource utilization**

Table 3: Alternatives

A1	**Rural private hospitals**	**A3**	**Rural government hospitals**
A2	**Urban government hospitals**	**A4**	**Urban private hospitals**

Step 2: Identify the specific linguistic variables and their positive fuzzy numbers. Linguistic variables are basically used to measure the importance of weights of different criteria and the rating of alternatives with respect to each different criterion. Linguistic variables like "Very High (VH)" in a triangular fuzzy number are (0.75; 1; 1).

Step 3: To make a fuzzy decision matrix by pulling the decision makers' opinions to get the aggregated fuzzy weight of the criteria, and fuzzy rating of alternatives which collected through survey from the experts. Let VL is the aggregated fuzzy weight number of alternative z,

$$v_L = \frac{1}{z}[v_{L1} + v_{L2} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + v_{Lz}] \quad (4)$$

The nonindicated the fuzzy rating of alternatives. The equation for fuzzy rating is shown below:

$$n_{ij} = \frac{1}{t}[n_{ij1} + n_{ij2} + \ldots\ldots\ldots + n_{ije}] \quad (5)$$

Now, the values of combine aggregate weight and ratings are expressed in matrix, and the matrix be denoted by P.

$$P = \begin{bmatrix} n_{11} n_{12} & \cdots & n_{1e} \\ \vdots & \ddots & \vdots \\ n_{z1} n_{z2} & \cdots & n_{ze} \end{bmatrix} \quad (6)$$

In the fuzzy ratingn$_{11}$ is the 1st alternative and 1st criterion and n_{12} is the fuzzy rating of 1st alternative and 2nd criterion. The criteria are changing in row wise and similarly, the alternatives are changing in the columns wise. The WL denotes weights for alternatives.

$$\bar{W} = w_1, w_2, w_3 \dots\dots\dots\dots\dots\dots w_L \quad (7)$$

Step 4: With the help of BNPi (Best Non-fuzzy Performance) based on the COA defuzzification method, Defuzzify the fuzzy decision matrix and fuzzy weight of each criterion into crisp values. The formula of BNPi (Best Non-fuzzy Performance) is given below:

$$BNP_I = \frac{[(c-a)+(b-a)]}{3} + a \quad (8)$$

The crisp values shown in table A.4 in Appendix A.2.

Step 5: Now to determine best crisp value f * j and worst crisp value f − j for all criterion ratings, (j = 1... n) by using the equation 9 and 10 below. The best crisp value is the maximum value in the column or row which get from the equation 9 while the worst crisp value is the minimum value in the column or row which get from equation 10. The equation is as following:

$$h_j^* = \max_i n_{ij} \quad (9)$$

The value for the worst crisp value is calculated using the following equation:

$$h_j^- = \min_i n_{ij} \quad (10)$$

Compute the best values which is denoted by f* and worst values which is denoted by f ‘of all criterion ratings and presented in table A.5 in Appendix A.2.

Table 7: Ranking of alternatives

Step 6: Calculate the values of Si and Ri by using the following equation 11 and 12 given below:

$$Si = \sum_{L=1}^{n} v_L (h_L^* - h_{iL})/(h_L^* - h_L^-) \quad (11)$$

$$Ri = \max_{L=1}^{n}[h_L] (h_L^* - h_{iL})/(h_L^* - h_L^-) \quad (12)$$

Compute the values of Si and Ri for alternatives 1, 2, 3 and 4, which is shown in table A.6 in Appendix A.2.

Step 7: Calculate the value of Qi by using the equation given below:

$$Qi = \frac{v(S_i - S^*)}{(S^- - S^*)} + \frac{(1-v)(R_i - R^*)}{(R^- - R^*)} \quad (13)$$

Compute the values of Q for all alternatives by using the equation 13 and values are presented in the table 7 Appendix A.2.

Step 8: The ranking of the alternative is shown in table 7 and criteria ranking are shown in table 8 given below,

Results:

The responses were collected through online questionnaire from different types of hospitals as mentioned above. For the data analysis, multi-criteria decision making (MCDM) technique fuzzy VIKOR has been used to evaluate the medical services in different type of hospitals. Seven-point linguistic variables were used in the questionnaire to assign weights and rating to the criteria and alternatives. Fuzzy VIKOR give the ranking of the required alternatives. Those ranking shows the best alternative in hospital services in emergency case. The alternatives are accordingly to the ascending order on the basis of their importance set by the respondents in the questionnaire. The ranking of the alternatives based on the values of Q.

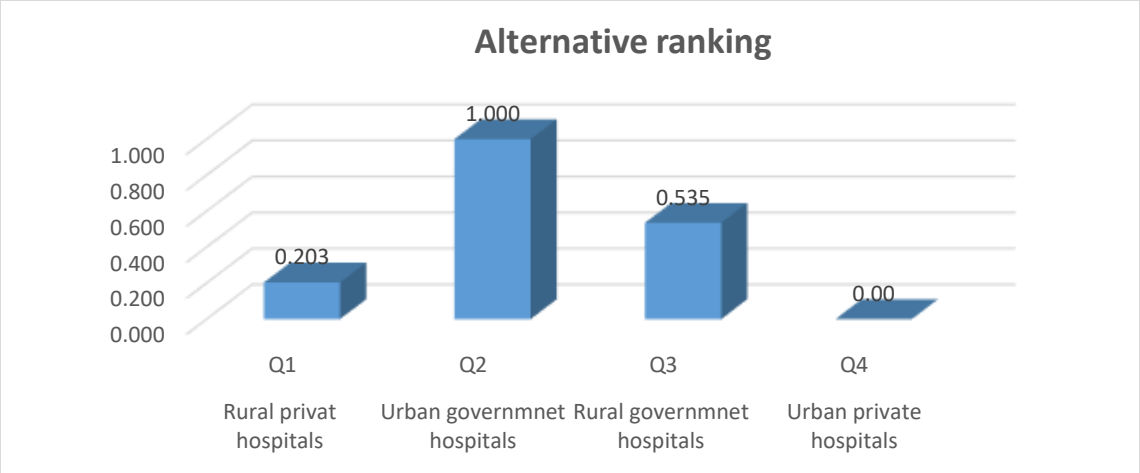

Table 7 shows the alternatives and Q values of each alternative, therefore it allowing the author to measure their distance from the ideal solution of zero. The obtained the proclivity of the alternatives, ranked the alternative according to the Q values of alternatives. Rank the alternative on to the top, if they have a minimum value of Q in the table 7 and the ranking of other alternatives are also arranged on the basis of their Q values. According to the participant's survey, the urban private hospitals is the best alternative at providing services to their patients in case of emergency is a minimum value of Q equal to 0.001 and minimum distance from the ideal solution of 0. Rural private hospitals are the second alternative close to the ideal solution of 0 and its Q value is 0.203. Rural government hospitals are the third alternative close to ideal solution of 0 which has a Q value is 0.535. The last alternative is urban government hospitals with a maximum value of Q which is 1.000. After the analysis, now it would be obvious for the people that which type of the hospital's services should be good enough for patients in case of emergency. Urban private hospitals are better in all aspects from other type of hospitals. The closest value to the ideal solution of zero confirm over argument that Urban private is the best alternative while all other alternative is relatively away from the ideal solution of zero. The alternatives have highest value of Q show that these hospitals are not good enough in providing hospital services in case of emergency.

DISCUSSION:

In this research paper, author evaluated the hospitals services in case of emergency in different types of hospitals in Khyber Pakhtunkhwa (KPK). Therefore, according to the findings of the analysis shows that urban private hospitals possess a highest rank in providing a good service to their patients in case of emergency as comparatively to other types of hospitals. The ranking of the alternatives is as following respectively; urban private hospitals, rural private hospitals, rural government hospitals and then urban government hospitals. These hospitals are good in services like professional capability, doctor's availability, resource utilization, staff orientation, responsiveness and in pharmacy and medical treatment. Similarly, these sectors of hospitals are lack in providing such services to their patients like appointment system, administration policies of the hospitals, payment process, hospital sanitation and environment, ambulance workload and Ambulance workload.

Urban private hospitals are at the top in providing a good hospitals service to the patients among all other alternatives. This alternative (urban private hospitals) has the most well qualified and trained staff from foreign. They have very extensive

exposure and specialization in medical field. In hospitals, these doctors' services or fees are normally expensive than other hospitals because of good quality of services and treatment. The laboratory technology equipment in these hospitals is so advanced and reliable in quality. In such hospitals the appointment system is strictly followed, where no any unfair means has been used by the patients or by the hospital staff to give the appointment when he/she didn't deserve it. The urban private hospitals are very strict on their SOPs (standard operating procedures) rules and regulations. Accordingly, to my perspective, they have very rigid hierarchical process of every activity in the hospitals like patient have first to take appointment and then wait a several minutes for checkup for a doctor. Added to this, one of the small issues found in these hospitals is that mostly people use their own convenience to get their patient to the hospital in emergency case because in such private hospitals the ambulance workload be issue for the hospital management. So, for ambulance staff it is very hard to cover or reach to every destination. Added to this, as hospitals are operating in urban areas, so obviously the emergency cases are these hospitals are comparatively high then the rural areas because of the large population. The traffic in urban areas is also one of the reason due to which the hospitals ambulance takes much time to reach to patient destination as comparison to rural areas. The services of the profitable organization are be more effective and efficient as compare to the non-profit organization (Younis, Rice, & Barkoulas, 2001).

The rural private hospitals ranked second among the alternatives in providing hospitals services to their patients in case of emergency. There are many reasons behind it. Firstly, the hospitals staff and doctors in terms of professionalism, qualification and specialization. The very unique thing which has been considered in rural private hospitals they adopted into their hospitals are their new aspect of modern technology in their processes. The researcher visited six hospitals of rural areas among which four of the hospitals adopted a software. By the help of such software, they keep the entire history of their patients. On a first visit of patient, they entered some of the patient details into their software like their name, address, and patient current status of disease through which he/she suffering from and also the medicine prescription of the patients. In this way, they keep their patient history in to their software. So, when they visit again to that hospital, the staff only entered their name in to their system and then the whole history of the patients is revealed on a screen. On the basis of such previous history then the doctors take other measures like to change their medicines or prescription to the patient etc. The other important thing is these hospitals are providing the medicines to their patients very cheap from the local pharmacies and especially medicines are free for non-affordable patients. These hospitals are mostly funded up to some extend by the NGOs etc. so this is the reason that their medicines are cheap. In private hospitals, have high monitoring over the staff especially in hospitals pharmacy store, counter and laboratory. They using the CCTVs cameras and some software for their monitoring. So, there be high transparency and nobody do unfair means or favor to any patient.

Rural government hospitals secure the third rank in the list of different sectors of hospital services providers in case of emergency. The staff of rural government hospitals are no doubt well qualified and graduated from the top universities of (KPK) Khyber Pakhtunkhwa. In this sector the professional capability up to mark but these doctors do not want to work and stay for along in these locations because due to the un-proper and lack of infrastructure and residential and other social problems. Most of the facilities are in urban areas so mostly they are attracted towards urban areas. So, this type of non-committed attitude effects the hospital services up to some extent. The Doctor's absentees in such sector were also

high in last few years but now this problem is very minimized by the current government. This government has major focus on hospitals and education sector. Added to this, the rural private hospitals are observed to be very lack in advanced technology equipment's in the laboratory like ECG machine, X-rays machine etc. and many others. In case, if they have technology then they will have no physician or technician available. The most important is that there is no strict evaluation or monitoring on the hospitals staff. The rural government hospitals are lack at delivering the medical advice and medicines to the poor patients which has led to increase in mortality rates and diseases. Added to this, the hospitals sanitation and environment system is very un-satisfactory and the current local government is un-able to minimize such problem. Urban government hospitals are lack in providing the good services to the patients in the emergency case comparatively to all others alternatives. The high doctor's availability in urban government hospitals but the patients flow rate in urban government hospitals is also high than rural government hospitals. This also one of the reasons that due to high flow rate of patients in the hospitals increase the workload and burden on doctors in comparison to other doctors in rural areas. Similarly, a high workload on ambulance in urban government hospitals because of maximum rate of emergency cases. The local government provides the funds to the government hospitals in order to improve the hospital services and facilities. The government hospitals have the duty to provide the free medicines to the poor patients but these hospitals are lack behind in providing such services. There are many reasons behind it but the most important is because of the non-transparency system in the pharmacy store. They basically portray to their senior staff and make a fake record in their registers and showing them that they providing the free medicines to the patients but in actual they deliver those free medicines to the local pharmacies store and make commission out of them. In such hospitals, the supervision from their administration or from their upper management is very low. Added to this, the equipment's of laboratory are also very adequate due to which the results of patient health tests take a long period of three to six days of wait. These all are the reasons due to which the private hospitals are more efficient and effective at providing the hospital services to their patients than the government hospitals.

Research Limitations

There are several limitations of this research paper. The most important limitation is the resource constraints. This study is conducted in (KPK) Khyber Pakhtunkhwa perspective. The data collected from the urban/rural areas of private/public hospitals in different part of province. The author collected the data through paper based from different hospitals by physically approach to them which are nearby to Topi, and these cities are Mardan, Peshawar, Katlang, Rustum and Swabi. While collected the data from the far-off cities by online send a questionnaire through emails and different social media, the researcher didn't approach to them physically and these places includes Kohat, Karak and Bannu etc. Added to this, the second reason behind it that the time period of data collection was only 6-weeks in which were very difficult for the author to reach every part of the province and to collect the data physically.

Conclusion:

The main purpose of this paper was to use a hybrid MCDM technique, fuzzy VIKOR which is the combination of fuzzy sets theory and VIKOR to evaluate the hospitals services in emergency case in different sectors of hospitals and then reach to the best sector that provides the best services and high level of satisfaction to their patients. In this paper, the researcher measured the data about the hospital services evaluation in

four different sectors which are; rural government hospitals, rural private hospitals, urban government hospitals and urban private hospitals. After the data analyzed, the results show that the ranking of most important criteria of the hospital services in case of emergency are; professional capability, doctors' availability, resource utilization, staff orientation, responsiveness, pharmacy and medical treatment and technology. The results also show that the private hospitals in Khyber Pakhtoon Khawa (KPK) provides a good hospital service as comparatively to the government hospitals. The reasons behind it are; in private hospitals a great monitoring and support from the top management because the professional capability, capacity and qualifications of the doctors are almost similar in each sector but the most important thing is their commitment. According to the results, the private hospitals doctors are more serious and committed about their job as comparatively to a government hospital doctors because they have no strict upper hand to monitor them. According to researcher, the local government failed in to improve the government hospitals performance up to the level of private hospitals. Added to this, the private hospitals use more advanced technology than the government hospitals, doctors use advanced technology while a diagnosing a disease, they also use a more advanced laboratory equipment's, while in most government hospitals at least laboratory were not present. This research also addresses the hospitals weakness which help most of the hospitals through which they can improve their services and provide benefits to the patients and gain their satisfaction.

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Appendix A.2.

Table A.4: Crisp values

Criteria	Weight	A1	A2	A3	A4
1	0.532143	4.714286	6.142857	5	4.047619
2	0.517857	6.047619	3.52381	4.619048	6.857143
3	0.482143	5.47619	2.857143	5.52381	6.380952
4	0.723457	6.857143	6.47619	7.285714	7.428571
5	0.715476	7.52381	6.095238	7	8.333333
6	0.590476	6.047619	5.285714	7.285714	7.428571
7	0.534524	7.142857	4.666667	3.190476	7.714286
8	0.490805	7	3.52381	4.428571	4.47619
9	0.402381	5.809524	2.857143	3.47619	6.952381
10	0.547619	7.619048	4.380952	4.238095	7.52381
11	0.604762	6.571429	4.190476	5.285714	6.904762
12	0.609524	7.761905	3.857143	5.571429	7.238095

Table A.5: PIS and NIS values

Criteria	f*	f'
C1	4.047619	6.142857
C2	6.857143	3.52381
C3	6.380952	2.857143
C4	7.428571	6.47619
C5	8.333333	6.095238
C6	7.428571	5.285714
C7	7.714286	3.190476
C8	7	3.52381
C9	6.952381	2.857143
C10	7.619048	4.238095
C11	6.904762	4.190476
C12	7.761905	3.857143

Table A.6: Si and Ri for alternatives

Alternatives	Si	Ri
A1	1.75	0.43
A2	6.55	0.72

A3	3.77	0.55
A4	0.45	0.36

Table A.8: Criteria ranking