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Evaluation of Unreliable Retrial G-queue using Fuzzy ARAS Method

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Abstract. A Regular busy server crashes due to negative customer traffic, and holiday interruption is being considered. If the orbit empties at the end of a positive customer service, the server worked Going on vacation. A working vacation (WV) server at a low service rate works. If there are clients on the computer at the end of each holiday, the server the probability that a new visitor is inactive and on vacation is p (single WV) or with probability q (multiple WVs). Substantial variable technique, constant state probability for the system and its orbit we found the generating function. System performance measures, reliability measures and random decay law are discussed. Finally, Some numerical examples and cost optimization analysis provided. Alternative: Single-Server Review G- Sequence, Incredible Review G-Series, Volume Visit Review G-Series. Evaluation Preference: Working vacation, Bernoulli feedback, Random vacations, single vacation. Unreliable retrial G-queue, Batch arrival Retrial G-queue, single server iteration is taken as a G-sequence alternative and working vacations, random vacations, single vacation, and Bernoulli vacation is taken evaluation parameters. In this from analysis Fuzzy ARAS method the best solution determines the solution with the shortest distance and the longest distance from the negative-best solution, but comparison of these distances is not considered significant. As a result it seems unreliable retrial G-queue got the first rank where as is the Batch arrival Retrial G-queue is having the lowest rank.
Keywords: Unreliable Retrial G-queue, Fuzzy ARAS Method.

1. Introduction

A repeat order by the feature where a customer who cannot receive service leaves the service area Settings are classified, but after some random delay return to the computer to request service will return. In recent years, telecommunications systems, neutral networks and multiprocessor systems and their applications in manufacturing systems Due interest in queues with negative customers is growing. Keene was the first to introduce this type of sequence The G-line named after the line with the negative customers was accepted for recognition. A detailed survey of queuing systems with negative attendance can be found at Glebe. One that is known is the mean ratios applied to large populations without random deviations the affirmative process trusts. A stochastic process, on the other hand, reflects possible sampling paths in time- Defines a set of sorted random variables. Various industrial applications have been developed interested in modeling reliability using G-series. Negative visits, also known as G-arrays, were first introduced with the aim of modeling Galenpey neural networks. Positive customers enter the queue and the normal service queue network they will get customers. Negative Client disappears, server becomes inactive or It will queue up when idle or on vacation. In the review system, server status and orbital clients' ignorance of each other Due to which the server will be idle before and after each service. Server idle by searching orbital customers Reduces time. Introduced by News et al. searching for customers after stopping a service By the way the authors explored the classical sequence. A recursive sequence with orbital search is considered. The sample was extended to a block visit repeat sequence and standard analysis of the sequence was performed. Considered a review model, in which each service during the completion period, two different search algorithms are implemented to bring Orbital customers into service. On most single server line models, the server serves all customers with the same average service rate Consider that does. This is not possible in real life situations. Spontaneous in two fluctuation modes Investigate the behavior of a block arrival queue system with a single server providing service did with volume arrival and general service in three fluctuation modes of different average service rates Analyzed single server array. With two types of services and J vacations Repairable Block Visit Analyzed the G-sequence of feedback regression. This article considers a queuing system with negative customer visits, fluctuating service patterns, prioritization, random breakdown, delayed repair and orbital search.

2. Unreliable Retrial G-queue

Unreliable retry queue models whose Attendance, service, failure, repair, and retry rates are all M/M/1 in a stochastic environment over time the order will vary. Single and multiple work vacations and we consider a single-server retry queue system with both holiday disruptions, with the busy server generally being negative will be affected by customer attendance. Module Visit Review G-Series and Unreliable Server Delay The repair is analyzed. In packages according to Poisson positive customer processes are coming. If the server is idle, one of the positive customers in the group will sign in for service and the rest will join the orbit. Otherwise all customers will enter orbit. A negative customer visit a positive removes

the client from the system and causes the server to crash. Fixing a failed server starts after a random time called lag time. The Bernoulli holiday policy will cause the influx of negative customer's causes a busy server to crash. Server after service Bernoulli takes leave. Calling positive customers at specific times May block (or encourage) the system. Service, Holidays Or when the repair is complete, the server searches for the client in orbit or idle state. During work holidays, the server serves the customer at a low service rate, But normally the server stops the service completely holiday season. Sys in providing network service, internet service, file transfer service and mail service in this order deem there are key applications. Changeable work leave policy: Orbit will be empty each time the server takes a vacation and the vacation time is high speed with the parameter Follows the delivery. If the client comes during holidays, the server at a lower speed service rate will continue to operate. The holiday season is a slow operating time. As per the Holiday Interruption Rule, and the customer must also leave the service at the end of the holiday period. If on the computer, the server will pause and immediately return to normal busy state. Otherwise, if there are no clients on the computer at the end of a holiday or at the moment of completing regular service, the server is at least one Take the maximum number of J vacations until the client arrives in orbit, and then Server return work holiday. . No client in orbit after Jth working holiday if so, the server remains idle to serve the new client. After a holiday, if there are clients in orbit, the server switches to normal work state. An M [X] / G / 1 review is subject to G-Series server downtime and at intervals Repair. If the server is free upon arrival, positive customers will be served immediately will receive Otherwise, they may re-enter the re-entry Try their luck in orbit after random time intervals. Negative customers they will not only remove the client who is in service, but will also repair the server they make it in position. The server goes on vacation when the computer is idle. During a normal busy period, the system crashes after completing a service, if negative customers do not come service period, the server takes a vacation. In addition, the server will be turned off if the computer goes down after the vacation. Otherwise, the server starts up during its normal working hours and works at the normal service rate. Server outages induced by performance analysis of cellular mobile networks and Single-server with negative clients and complete random leave subject to repair we consider the order of review. Server crash due to negative customer traffic when, after the fast distribution time, the server starts vacation. The focus of our study the purpose is to study the conditions necessary and for system stability, order and reliability it is also sufficient to understand the detailed analysis of the system from the point of view of both.

3. Fuzzy ARAS Method

Addition Ratio assessment (ARAS), introduced by Zavatskas and Tarskis (2010), in the complex world Events can be understood using simple comparisons based on concept. Alternatives to the ARAS method In addition to determining efficiency, each calculates the conversion rate and best alternative. ARAS According to the basic concepts of the method, the decision-making team compares the importance of the assessment and will be considered using numeric values it also provides estimates of possible alternatives depending on the criteria. In the real world Problems, precision Criteria depending on the criteria under consideration and determining weights for alternatives are often difficult for the decision maker. Worth using a vague approach, to real world events the importance of criteria that use ambiguous numbers instead of appropriately sensitive numbers or determining the option. Therefore, Fuzzy Logic and ARAS technique can solve real world problems in the form of Fuzzy ARAS system can be created accurately. Preference is given to alternative choices in the presence of ambiguous or inaccurate information a detailed analysis of the supply is carried out using the Fuzzy ARAS technique assists the team in decision making. The fuzzy ARAS process can be defined as follows.

4. Proposed solution methodology with combination of Fuzzy ARAS

TABLE 1. Alternative factors

A1	A single-server retrial G-queue
A2	unreliable retrial G-queue
A3	bath arrival retrial G-queue

TABLE 2. Parameter factors

C1	Working vacations
C2	Random vacations
C3	Bernoulli vacation
C4	single vacation

TABLE 3. Criterion Weights

Criterion Weights	
Medium	**(3, 5,7)**
High	**(7,9,1)**
Very High	**(9,1,1)**

TABLE 4. Formula for criterion weight

	C1	C2	C3	C4
A1	M	H	H	VH
A2	H	M	VH	H
A3	VH	M	H	H

Table 2 above shows the code for C1, C2, C3, and C4. The column of each criterion index is modified to the value of Table 1 above each column of Table 2. Here C1 stands for working vacations, C2 stands for Random vacations, C3 stands for Bernoulli vacation, C4 stands for single vacation.

TABLE 5. Solved value of l', l, m, u', u

l	l'	m	u'	u
3	5.738794	7.663094	8.87904	10
3	3.979057	6.082202	7.883735	10
7	7.611663	9.321698	10	10
7	7.611663	9.321698	10	10

Table 3 shows the value that the table 1 substituted in table 2. The **l** column mentions that minimum of first value of all the criterion weight which the value substituted in the table 2. As same as the **l'** mention cube root of product of the first value substituted in the table 2. **M** mentions the cube root of product of the second value substituted in the table 2. **u'** mention the cube root of product of the third value. **U** mentions that maximum of third value of all the criterion weight which the value substituted in the table 2.

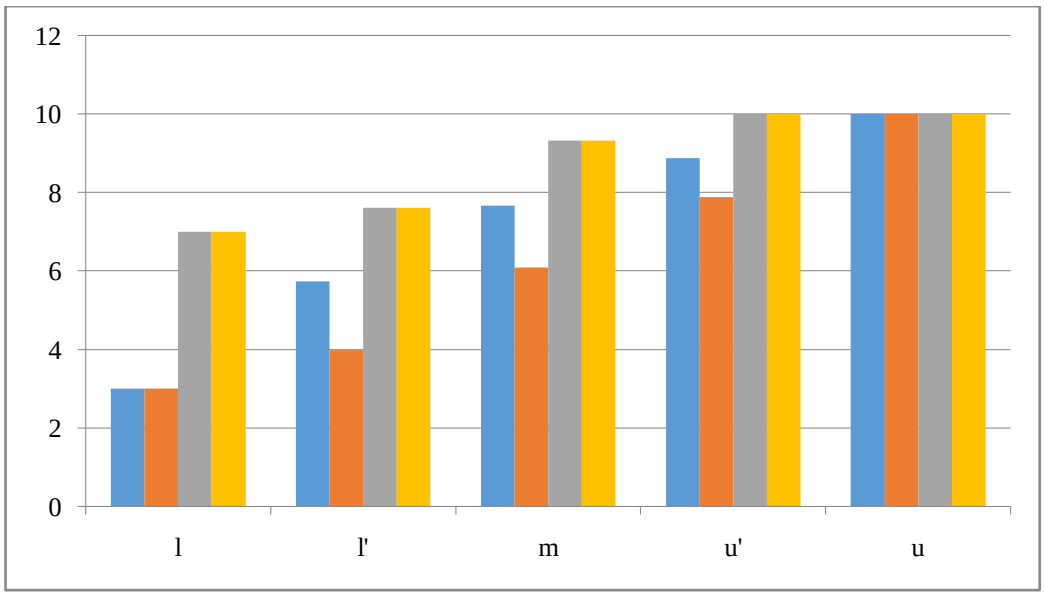

FIGURE 1. Criterion Weights

Figure 1 shows the pictorial representation of the Table 5. It shows that the all the u in C1,C2,C3,C4 has the same value 1. C1 has the major criterion weight when compare to all other.

TABLE 6. Performance Rating

Performance Rating	
MG	5,7,9
G	7,7,1
VG	9,1,1
F	3,5,7

Table 4 shows the performance rating of F, MG, G, and VG. F represent fair, MG represent medium good, G represent good, VG represent the Very good. All the above value mentions the rating of the performance.

TABLE 7. Number for place which represent the column and row of the above tabulation

Optimal	**C1**	**C2**	**C3**	**C4**
A1	1,1	1,2	1,3	1,4
A2	2,1	2,2	2,3	2,4
A3	3,1	3,2	3,3	3,4

Table 5 shows the number of the place which represents the column and row of the above tabulation.

TABLE 8. Formula to calculate the Performance rating

	C1	C2	C3	C4
A1	MG, G,VG	F,MG,G	MG,VG,F	F,MG,VG
A2	F,VG,MG	G,MG,VG	VG,MG,G	VG,MG,G
A3	F,G,MG	MG,VG,G	VG,G,MG	MG,G,F

Table 6 represent the formula for each box in the table by substituting the table 5 value in table 6 .By continuing this process for each row and column the next value will be found.

TABLE 9. Solved value of l', l, m, u', u for Performance rating

		l	l'	m	u'
1,1	5	6.804092	7.883735	9.654894	10
1,2	3	4.717694	6.257325	8.572619	10
1,3	3	5.129928	7.047299	8.572619	10
1,4	3	5.129928	7.047299	8.572619	10
2,1	3	5.129928	7.047299	8.572619	10
2,2	5	6.804092	7.883735	9.654894	10
2,3	5	6.804092	7.883735	9.654894	10
2,4	5	6.804092	7.883735	9.654894	10
3,1	3	4.717694	6.257325	8.572619	10
3,2	5	6.804092	7.883735	9.654894	10
3,3	5	6.804092	7.883735	9.654894	10
3,4	3	4.717694	6.257325	8.572619	10

Table 7 shows the value that the table 5 substituted in table 6. The **l** column mentions that minimum of first value of all the criterion weight which the value substituted in the table 6. As same as the **l'** mention cube root of product of the first value substituted in the table 6. **m** mentions the cube root of product of the second value substituted in the table 6. **u'** mention the cube root of product of the third value. **u** mention that maximum of third value of all the criterion weight which the value substituted in the table 6.

TABLE 10. Sum of solved value of l', l, m, u', u

A01	5	6.804092	7.883735	9.654894	10
A02	5	6.804092	7.883735	9.654894	10
A03	5	6.804092	7.883735	9.654894	10
A04	5	6.804092	7.883735	9.654894	10

Table 8 shows the Maximum of each box with respect to the table 5. The maximum of all row and column are considered.

TABLE 11. Normalized Matrix C4

A0	5	6.804092	7.883735	9.654894	10
M1	3	5.129928	7.047299	8.572619	10
M2	5	6.804092	7.883735	9.654894	10
M3	3	4.717694	6.257325	8.572619	10

Table 9 shows the Normalized matrix of C4. In Normalized matrix the sum of u of the C8, this sum is divided for each value normalized matrix this process is continues for all other C1, C2, and C3. From the normalized matrix is calculated by the weighted normalized matrix.

TABLE 12. Weighted normalized matrix C1

A0	0.375	0.676847	1.102431	1.902916	2.5
M1	0.375	0.676847	1.102431	1.902916	2.5
M2	0.225	0.510307	0.985467	1.689606	2.5
M3	0.225	0.469299	0.875	1.689606	2.5

Table 10 represents the value calculation of the c1 from all the other calculation done on the above. It shows the weighted normalized matrix of C1 which represent Economic distribution.

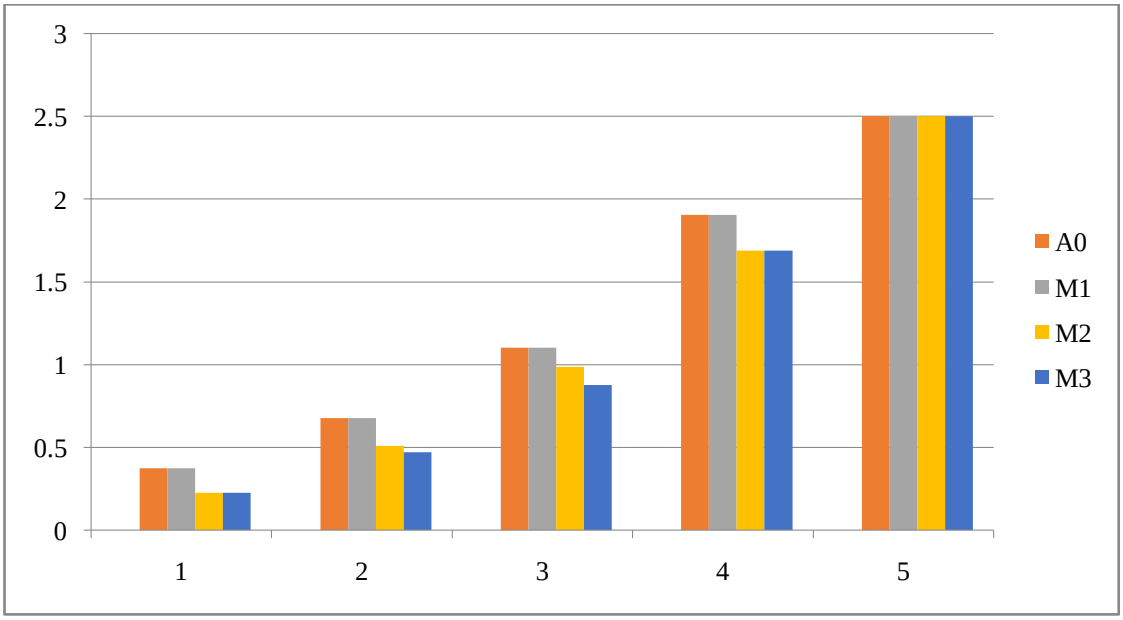

FIGURE 2. Weighted normalized matrix C1

In Figure 3 the series 1 represent the **l**, the series 2 represent **l', the** series 3 represent the **m** , the series 4 represent the **u'** , the series 5 represent **u**. the u line lies in the same value 1. Series 1 is low when compare to all others. the u line lies in the same value 1. Series 1 is low when compare to all others.

TABLE 13. Weighted normalized matrix C2

A0	0.375	0.676847	1.102431	1.902916	2.5
M1	0.225	0.469299	0.875	1.689606	2.5
M2	0.375	0.676847	1.102431	1.902916	2.5
M3	0.375	0.676847	1.102431	1.902916	2.5

Table 11 represents the value calculation of the C2from all the other calculation done on the above. It shows the weighted normalized matrix of C2 which represent social distribution.

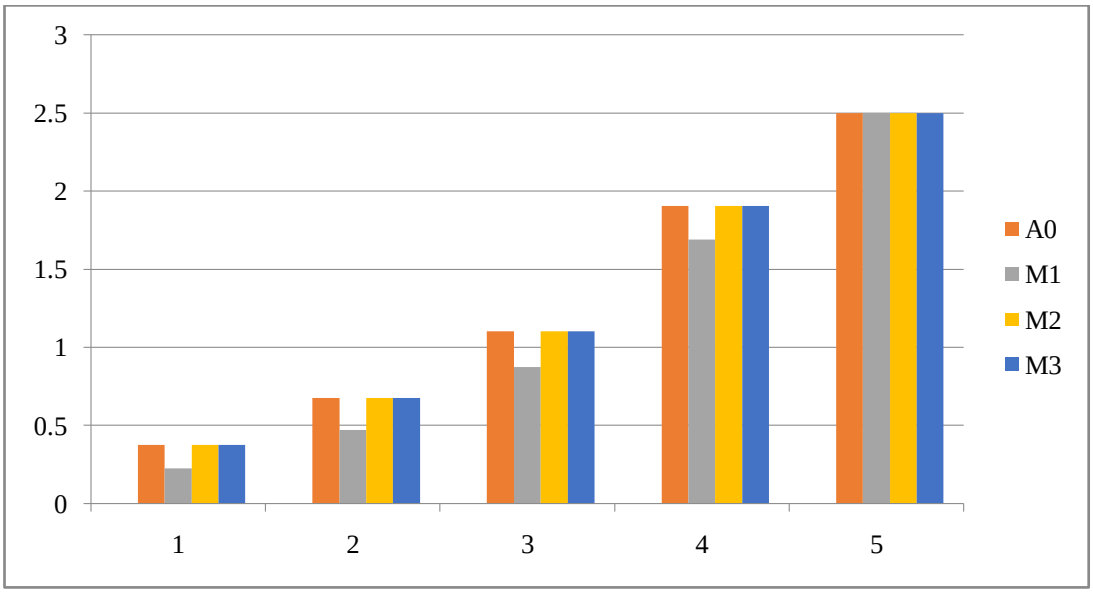

FIGURE 3. Weighted normalized matrix C2

In Figure 4 the series 1 represent the **l**, the series 2 represent **l',** the series 3 represent the **m** , the series 4 represent the **u'** , theseries 5 represent **u**. the u line lies in the same value 1. Series 1 is low when compare to all others. the u line lies in the same value 1. Series 5 is high when compare to all others.

TABLE 14. Weighted normalized matrix C3

A0	0.375	0.676847	1.102431	1.902916	2.5
M1	0.225	0.510307	0.985467	1.689606	2.5
M2	0.375	0.676847	1.102431	1.902916	2.5
M3	0.375	0.676847	1.102431	1.902916	2.5

Table 12 represents the value calculation of the C3 from all the other calculation done on the above. It shows the weighted normalized matrix of C3 which represent air pollution.

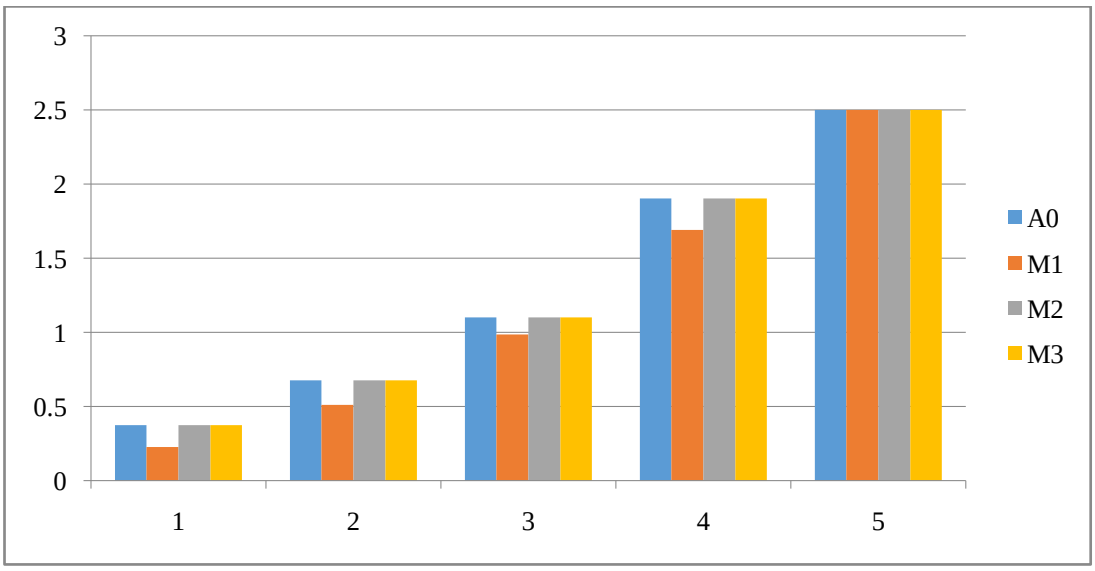

FIGURE 4. Weighted normalized matrix C3

In Figure 5 the series 1 represent the **l**, the series 2 represent **l',** the series 3 represent the **m,** the series 4 represent the **u',** theseries 5 represent **u**. the u line lies in the same value 1. Series 1 is low when compare to all others. the u line lies in the same value 1. Series 1 is low when comparing to all others and series 5 is high.

TABLE 15. Weighted normalized matrix C4

A0	0.375	0.676847	1.102431	1.902916	2.5
M1	0.225	0.510307	0.985467	1.689606	2.5
M2	0.375	0.676847	1.102431	1.902916	2.5
M3	0.225	0.469299	0.875	1.689606	2.5

Table 13 represents the value calculation of the C4 from all the other calculation done on the above. It shows the weighted normalized matrix of C4 which represent water pollution.

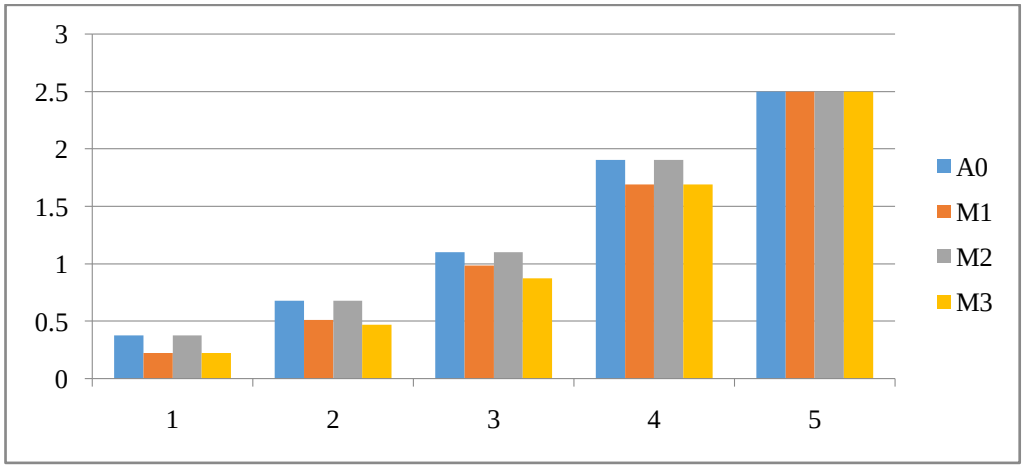

FIGURE 5. Weighted normalized matrix C4

In Figure 6 the series 1 represent the **l**, the series 2 represent **l',** the series 3 represent the **m,** the series 4 represent the **u',** the series 5 represent **u**. the u line lies in the same value 1. Series 1 is low when compare to all others. The u line lies in the same value 1. Series 1 is low when comparing to all others and series 5 is high.

TABLE 16. Sum of all weighted normalized matrix

	Si				
A0	1.5	2.707387	4.409724	7.611663	10
M1	1.05	2.16676	3.948365	6.971735	10
M2	1.35	2.540847	4.29276	7.398353	10
M3	1.2	2.292292	3.954862	7.185044	10

Table 18 shows the sum of all C1, C2, C3, C4 of all weighted normalized matrix with respect to all rows and column of each and every box in the tabulation. The M value show in the above table is taken from C*A which has been shown in the Table 6, Table 6 represent the formula for each box in the table by substituting the table 5 value in table 6.

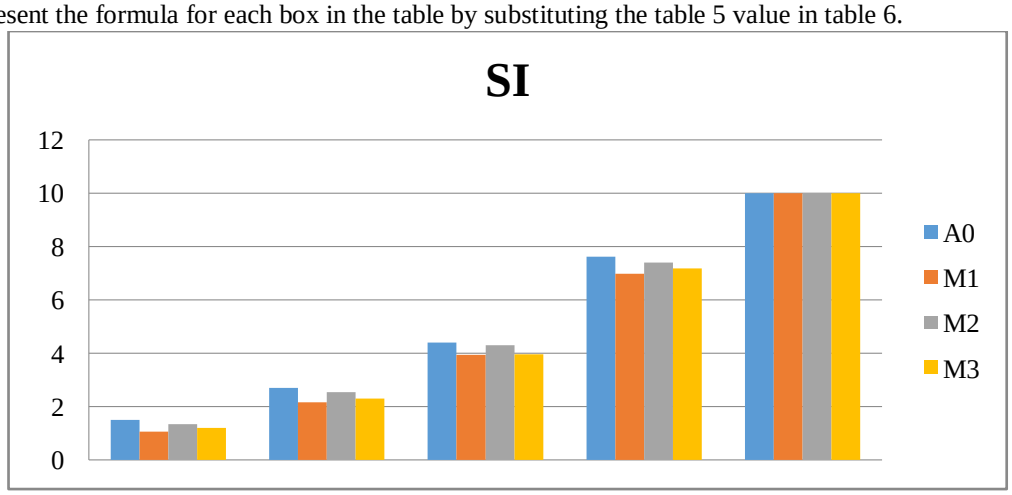

FIGURE 6. Sum of all weighted normalized matrix

Figure 11 shows the sum of all weighted normalized matrix it is the pictorial representation to show the easy way of all c1 to c4.

TABLE 17. Si, Qi

Si	Qi	Rank	
5.245755	1		
4.827372	0.92024355	3	M1
5.116392	0.97533956	1	M2
4.92644	0.93912887	2	M3

Table 19 shows the sum of the table 18 which is divided by five to give the rank of the all Si. The M2 is in the first rank and the M1 is on the last rank.

TABLE 18.Rank

M1	A single-server retrial G-queue	3
M2	unreliable retrial G-queue	1
M3	bath arrival retrial G-queue	2

Table 20 shows that the rank depends on the pollution. According to pollution level the unreliable retrial G-queue is in 1st rank, a single-server retrial G-queue is on 3rd rank, bath arrival retrial G-queue is on 2nd rank.

FIGURE 7. Shown in Rank

5. Conclusion

In the review system, server status and orbital clients' ignorance of each other Due to which the server will be idle before and after each service. Server idle by searching orbital customers Reduces time. Introduced by News et al. searching for customers after stopping a service By the way the authors explored the classical sequence. A recursive sequence with orbital search is considered. Although the ARAS system is a brand new technique in the MCDM literature, it is widely used by many authors to have the best judgment controllers or controls. Preference is given to alternative choices in the presence of ambiguous or inaccurate information a detailed analysis of the supply is carried out using the Fuzzy ARAS technique assists the team in decision making. As a result it seems unreliable retrial G-queue got the first rank where as is the Batch arrival Retrial G-queue is having the lowest rank.

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