



Evaluation of High-Tech Industry Using Fuzzy ARAS Method

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Abstract. In this article, High technology capacity planning and related to management we review the literature. Using the backdrop of the competitive. Strategic, tactical and operational perspectives. In the field of high technology Product innovation for a sample of 121 firms and the relationship between firm survival. To choose their freight delivery concept can be used by companies it provides a method. Advanced Extension of Additional Rate Assessment (ARAS) Method Rake distribution concept was developed to solve Exam problem. implementation of Based in Czech Republic tire manufacturing company is taken as a case. Despite the study, the proposed picture denouncing the ARAS method is general and any other company can use it. To verify the novel image denouncing the ARAS method, with nine state-of-the-art image fuzzy multi-criteria decision-making methods a comparative analysis is presented. Alternatives is Technological factors (TF), Economic factors (EF), Social (personnel) Factors (SF). Evaluation Parameter is biomedical micro electro-mechanical systems (BioMEMS) (C1), Nano technology (C2), Biotechnology (C3), Biomedical engineering (C4). In this type of analysis, Fuzzy ARAS methods determine for the best solution to the negative Short distance and very long distance to settlement, but Comparison of these distances doesn't underestimate the importance. As a result, Technological factors (TF) is first rank, and Social (personnel) Factors (SF) is lowest rank.

Keywords: MCDM, Technological factors (TF), Economic factors (EF), Social (personnel) Factors (SF).

1. Introduction

India's software industry from emerging economies Compete Internationally Makes the case for a high-tech sector. As export-oriented firms form a cluster, human capital accumulates rapidly. High-tech industrial groups Contributes to human capital accumulation Create agglomeration economies. Using a convenience sampling method, listed in high technology sector for a sample of 686 firms A questionnaire was sent. "Largest 1000 Companies in the Common Wealth Ranking". Target Survey Respondents in the high tech sector Managers of companies. Follow-up telephone calls were made with the questionnaire to encourage participation. In the field of high technology R and D compensation policies and by determining procedures Some of these issues boston area Consisting research and development divisions a number of hypotheses have been postulated from the data collected are tested empirically. Technological advances and Innovations as it plays a major role, Incentive pay innovation and should be based on concrete performance, Use of incentive schemes and Between profit and loss One can expect a positive relationship. The fuzzy ARAS-H method describes the criteria for expressing model weights. The proposed model of Discuss the possibilities Held in Sfax, Tunisia an empirical study will be presented. A conclusion will be presented with our main overview. This study presents will be traded on the TSE in automotive and parts manufacturing for assessment of financial performance of listed companies A fuzzy hybrid approach during 2002-2011. First the FAHP main criteria and sub-criteria then fuzzy ARAS will be companies of the traded vehicle group. Two fuzzy MCDM methods were used for the evaluation of twenty-four companies in this study. First FAHP was used to determine the weights of the main criteria and sub-criteria and then the researcher used Fuzzy ARAS to rank the companies based on best financial performance. Using fuzzy MCDM methods Their study on the evaluation of Financial performance of firms, FAHP and Fuzzy VIKOR, to find the weights fuzzy ARAS and fuzzy COPRAS Selects the best alternative among six Iranian companies using FAHP.

2. High Tech Industry

High-tech industry in China is a strategic leading industry, and its development is China's economic infrastructure development and growth performance. Efficient innovative operation in view of reality for competitive advantage Being the main source. The high-tech industry with market knowledge and in activities related to customer knowledge management Pay more attention. Having adequate information about the market environment, especially in Taiwan's high-tech industry, market needs and Competitors' strategies can be effective help companies achieve sustainable growth by Improving innovation performance and Creating competitive advantages. In particular, high-tech industries Less production than before Life cycles and Experiencing high levels of competition, Market oriented companies to customer demands to create complementary products Integrate customer feedback. Second, in product innovation performance Potential barriers to market orientation as this study shows, High tech industry On how to address these limitations Pay attention. In terms of customer orientation, Companies satisfy existing customers Focusing only on developing new products, but to fix new products from existing dissatisfied customers Inviting comments simultaneously at the same time expand to different potential customers. Quantitative studies above Focusing on only three types of companies. Most of these companies were in the manufacturing sector. To achieve and sustain growth

and performance Contribution of high technology sector National economies increasingly recognize Taiwan's high-tech industry High product quality and Has a reputation for high innovation performance. We need to further confirm TQM, organizational learning and Between Innovation The proposed relationship is that of Taiwan Is it applicable to high tech Yu Zhou Beijing's Zhongguancun (ZGC) Hi-Tech Area A very detailed and readable account. Economists, Geologists and Chinese economy and Including students of technological development The book is written for a wide audience. Due to In the high-tech sector and Interconnected and Market demand for interoperable products, High technology means that unique products are interdependent. What a company does technically, many companies to change their products there is no other field buyers occupied with such interconnected and interoperable Concerns. Release of Microsoft Windows 95 Thousands of software and Affected the products of hardware companies. Statistical limitation of Chinese high technology the industry consists of five segments: Manufacture of instruments and meters. High-tech industries are important, because they are the world's economic system, Political affairs and Driving military competition. Development of high technology sector A country or It has become a concrete manifestation of the strength of the region. Since the implementation of 'Torch Scheme' (National Hi-Tech Industry Development Programme), China's high-tech industry has made remarkable achievements. An assessment of the competitiveness of the provincial high-tech industry for National Institute of Hi-Tech Industries It has become the basis for decision making. Also, such assessment of Chinese high-tech industries Geographical distribution and Expands our understanding of developmental stage and their development and Provides rational advice for planning.

3. Fuzzy ARAS

The proposed system is in the Czech Republic for a tire manufacturing company The inventory distribution concept is applied to the selection problem. criteria, Sub-criteria and Expert assessments of inventory delivery alternatives denoted by PFSs, thus their attitudes are precisely expressed Information loss can be minimized. Contains nine state-of-the-art image deblurring MCDM methods A comparative analysis is presented to validate the novel image fuzzy ARAS method. Finally, Spearman's rank correlation coefficients were developed using the image fuzzy ARAS method and based on available PFS are calculated to check the stability of MCDM methods. [29] Expert views on Personal interviews and Fuzzy AHP and by filling out questionnaires on ambiguous ARAS Different criteria and alternatives were obtained. The survey was conducted during [30]. A new integrated method FMCDM calculated based on the subjective judgments of the decision-making team from the sample organization relative to the weight of each criterion. Secondly, The ARAS-F method, depending on each criterion For each alternative green supplier performance was used to obtain the approximation coefficient. This technique is traditional scale Instead of expression Using the linguistic variable, It is unknown and To handle complex situations A very useful concept Fuzzy logic and A combination of the ARAS technique, Called Fuzzy ARAS, It will be used to solve the above problems A strategic method. used to formulate various aspects of priority problems. that it does not take into account the interdependencies between evaluation criteria and creates a decision-making problem. [32] Electricity generation in Lithuania AHP-ARAS approach to evaluating technologies. enterprises Fuzzy ARAS method was used. [52] to select the best IT professional Combined SWARA and gray ARAS methods. [53] to evaluate oil and gas well drilling projects used the interval-valued fuzzy ARAS method. Fuzzy Delphi and SWARA criteria and respectively were used to identify and determine the weights. [31] However, AHP requires multiple pairwise comparisons. Consequently, using Continuity of Fuzzy AHP Fuzzy ARAS is Minimizes the gather expert judgment. As far as we know, FMC Management refers to Currently there are no documents. [35] Abdullah and Najib on the framework of IVIF AHP method to suggest a new priority level They came up with a new system. For the first time in the literature with this article This combination appears. IVIF stands for ARAS A unique approach, its effectiveness are related to transportation, economy, technology etc Used successfully in many fields. Sustainable development and construction. Among many notable applications of ARAS, some can be attributed to the financial assessment of Iranian companies. In performance in CEO selection with the extension of a brand, the Air by Chattered and Bose Selection of vendors and A selection of deep-sea ports in the eastern Baltic Sea is proposed. For evaluation and selection of conveyors Provides an integrated MCDM framework. By combining it has its own unique merits. [37] The remainder of this study is organized as follows. Section 1 Green Supplier Selection Criteria Reviews section 2 FAHP, ARAS-F and Introducing the MSGP system. Part 3 is for the green supplier selection problem with a numerical example uses an integrated method. Finally, the last section provides conclusion and recommendation for future research. [31].

4. Result and Discussion

TABLE 1. Criterion Weights

Criterion Weights	
Technological factors (TF)	(4.7,6.2,8.7)
Economic factors (EF)	(7.9,9.3,2.3)
Social (personnel) Factors (SF)	(3.9,5.8,7.1)

Table 1 shows the Criterion Weights for Technological factors (TF), Economic factors (EF), Social (personnel) Factors (SF) is Value.

TABLE 2. Formula for criterion weight

	C1	C2	C3	C4
TF	TF	EF	EF	SF
EF	EF	TF	SF	EF
SF	SF	TF	EF	EF

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) Evaluation Parameter is biomedical micro electromechanical systems (BioMEMS), (C2) Nano technology, (C3) Biotechnology, (C4) Biomedical engineering.

TABLE 3. solved value of l', l, m, u', u

	.l	l'	m	u'	u
C1	3.9	5.251256	6.941194	5.217973	8.7
C2	4.7	6.644322	8.124298	3.583645	8.7
C3	3.9	6.243665	7.945684	3.348919	7.1
C4	4.7	5.58823	7.097228	5.5837	8.7

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.

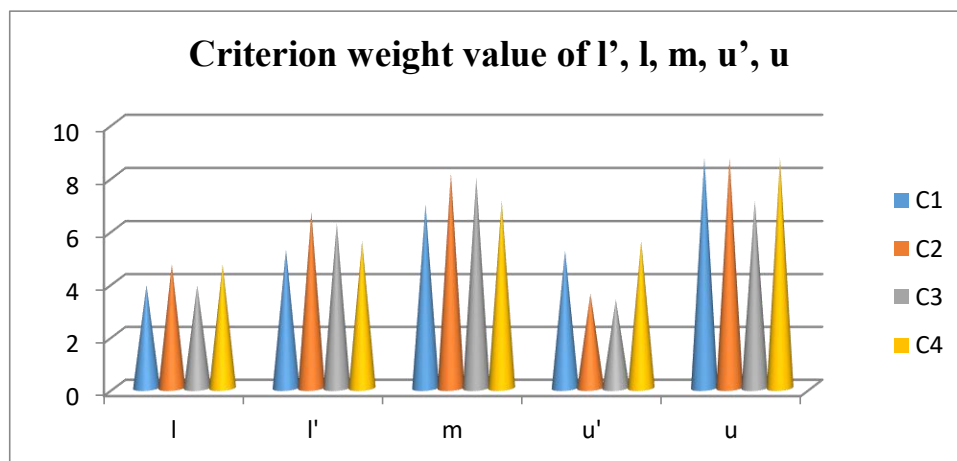


Figure 1. criterion weight value of l', l, m, u', u

Figure 1. criterion weight value of l', l, m, u', u, 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.

TABLE 4. Performance rating

Performance Rating	
TF	4.7,6.2,8.7
EF	7.9,9.3,2.3
SF	3.9,5.8,7.1
F	4.7,6.2,8.7

Table 4 shows the performance rating of TF, EF, SF represent very poor, Technological factors (TF), Economic factors (EF), Social (personnel) Factors (SF). All the above value mentions the rating of the performance.

TABLE 5. 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. A1 Technological factors, A2 Economic factors, A3 Social (personnel) Factors.

TABLE 6. Formula to calculate the Performance rating

	C1	C2	C3	C4
M1	EF,SF,TF	SF,SF,TF	EF,TF,EF	SF,MG,SF
M2	SF, SF, SF	TF,TF,EF	TF,TF,SF	G,G,MG
M3	TF,EF,SF	EF,SF,EF	F,EF,MG	SF,EF,EF

Table 6. Formula to calculate the Performance rating 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 7. Solved value of l', l, m, u', u for Performance rating

		l	l'	m	u'
1,1	3.9	5.251256	6.941194	5.217973	8.7
1,2	3.9	4.150264	5.93038	7.597639	8.7
1,3	4.7	6.644322	8.124298	3.583645	8.7
1,4	3.9	4.150264	5.93038	7.597639	8.7
2,1	3.9	3.9	5.8	7.1	7.1
2,2	4.7	5.58823	7.097228	5.5837	8.7
2,3	3.9	4.416587	6.063692	8.130157	8.7
2,4	4.7	6.644322	8.124298	3.583645	8.7
3,1	3.9	5.251256	6.941194	5.217973	8.7
3,2	3.9	6.243665	7.945684	3.348919	7.1
3,3	4.7	5.58823	7.097228	5.5837	8.7
3,4	3.9	6.243665	7.945684	3.348919	7.1

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 8. Sum of Solved Value Of L', L, M, U', U

A01	3.9	5.251256	6.941194	7.1	8.7
A02	4.7	6.243665	7.945684	7.597639	8.7
A03	4.7	6.644322	8.124298	8.130157	8.7
A04	4.7	6.644322	8.124298	7.597639	8.7

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

Figure 2 shows that performance rating of the above value. 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.

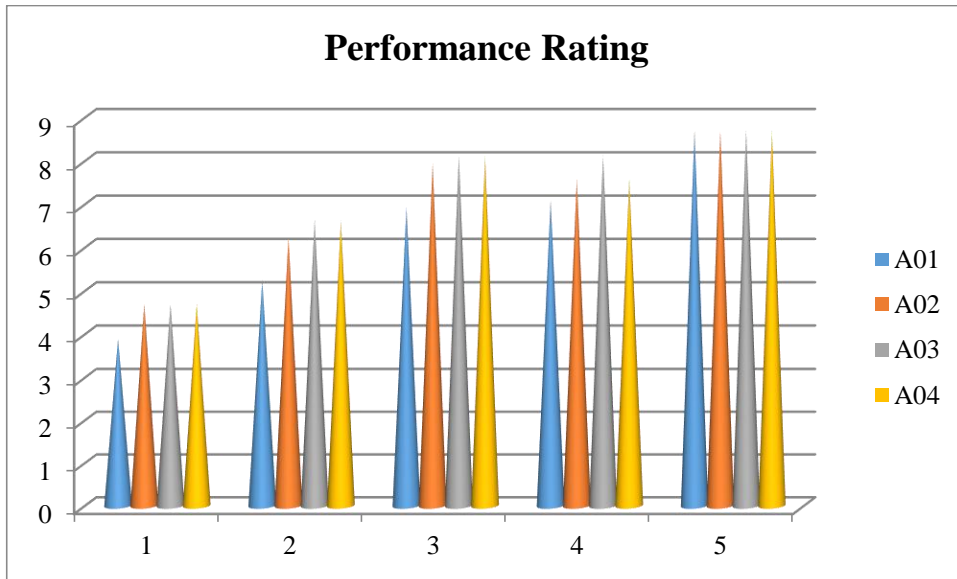


FIGURE 2. Performance rating

TABLE 9. Normalized Data Matrix

A0	1.175	1.661081	2.031075	1.89941	2.175
M1	0.975	1.037566	1.482595	1.89941	2.175
M2	1.175	1.661081	2.031075	0.895911	2.175
M3	0.975	1.560916	1.986421	0.83723	1.775

Table 9 shows the Normalized matrix of C5. In Normalized matrix the sum of u of the C5, this sum is divided for each value normalized matrix this process is continues for all other C1, C2, C3, C4, and C5. From the normalized matrix is calculated by the weighted normalized matrix.

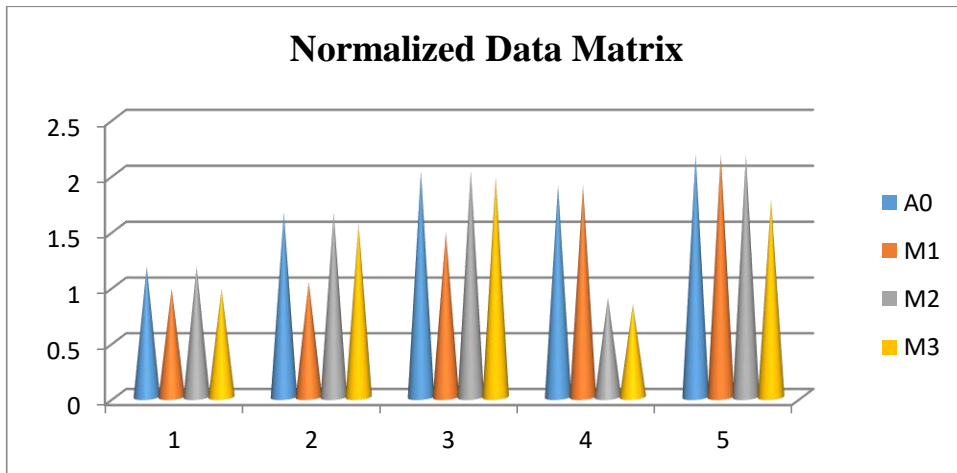


FIGURE 3. High tech industry for Normalized Data Matrix

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

TABLE 10. Weighted Normalized Matrix C1

A0	3.8025	6.893922	12.04505	9.261902	18.9225
M1	3.8025	6.893922	12.04505	6.80681	18.9225
M2	3.8025	5.119975	10.06473	9.261902	15.4425
M3	3.8025	6.893922	12.04505	6.80681	18.9225

Tables 10 represent 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 biomedical micro electromechanical systems (BioMEMS).

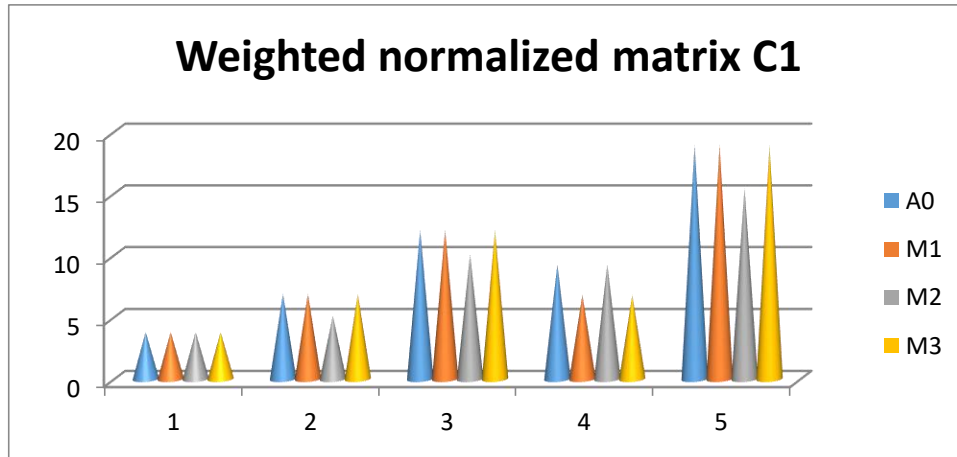


FIGURE 4. Weighted normalized matrix C1

Figure 4 show 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 11. Weighted normalized matrix C2

A0	5.5225	11.03675	16.50106	6.80681	18.9225
M1	4.5825	6.893922	12.04505	6.80681	18.9225
M2	5.5225	9.2825	14.415	5.0025	18.9225
M3	4.5825	10.37123	16.13828	3.000334	15.4425

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 Nano technology.

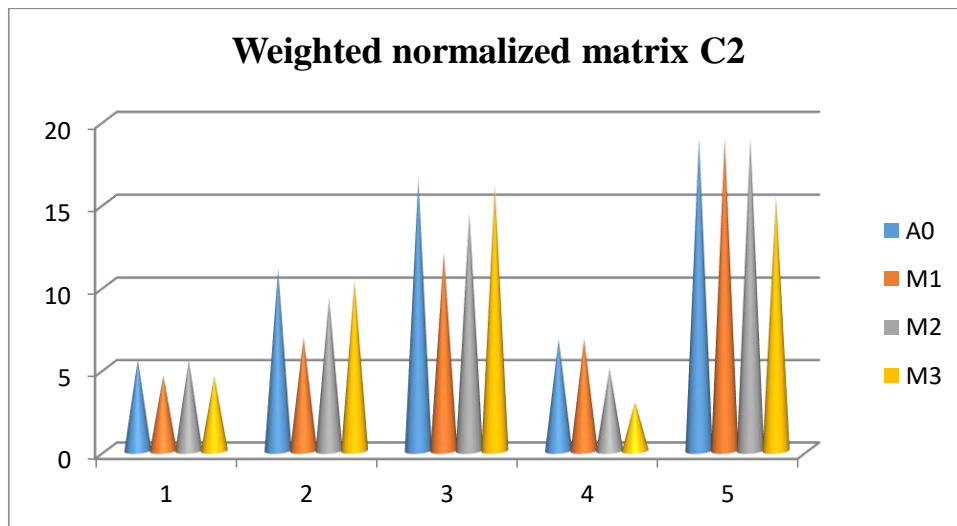


FIGURE 5. Weighted normalized matrix C2

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' , 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 5 is high when compare to all others.

TABLE 12. Weighted normalized matrix C3

A0	4.5825	10.37123	16.13828	6.36097	15.4425
M1	4.5825	10.37123	16.13828	3.000334	15.4425
M2	3.8025	6.893922	12.04505	6.80681	15.4425
M3	4.5825	8.722759	14.09808	4.67484	15.4425

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 Biotechnology.

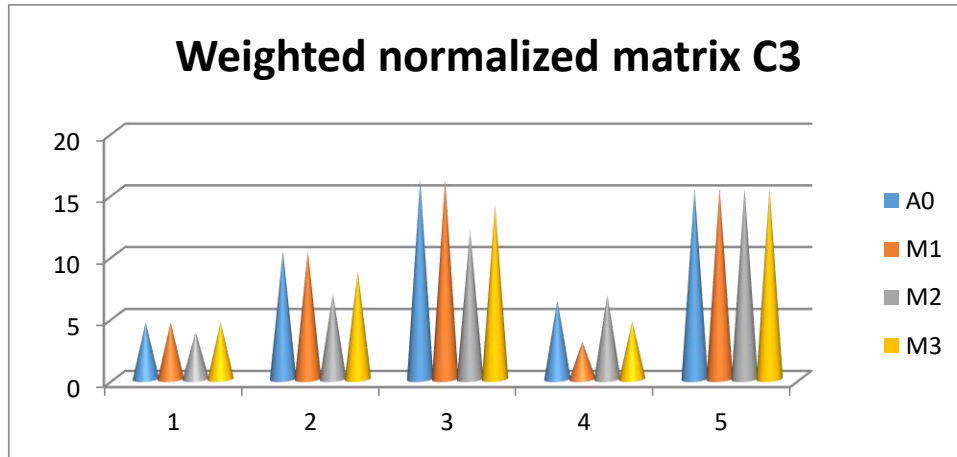


FIGURE 6. Weighted normalized matrix C3

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 compare to all others and series 5 is high.

TABLE 13. Weighted normalized matrix C4

A0	5.5225	9.2825	14.415	10.60574	18.9225
M1	4.5825	5.798157	10.52232	10.60574	18.9225
M2	5.5225	9.2825	14.415	5.0025	18.9225
M3	4.5825	8.722759	14.09808	4.67484	15.4425

Table 13 represent 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 Biomedical engineering.

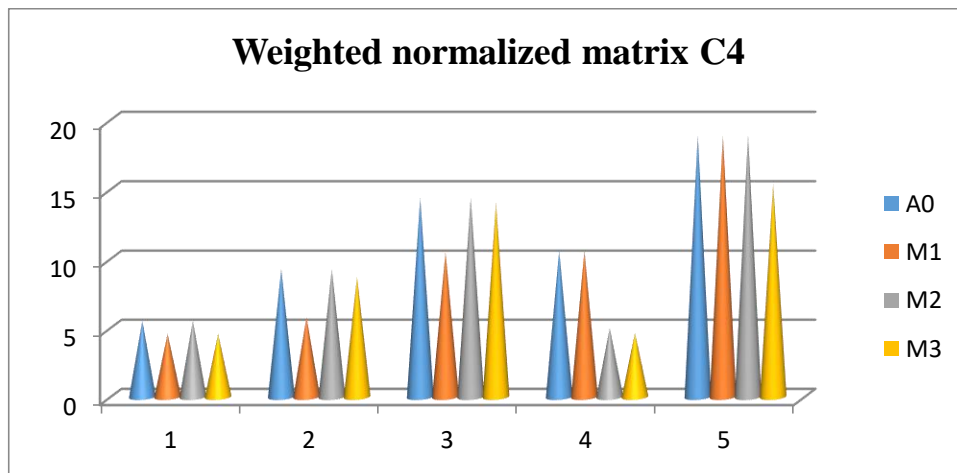


FIGURE 7. Weighted normalized matrix C4

In Figure 7 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 14. Sum of all weighted normalized matrix

	Sum of all weighted normalized matrix Si				
A0	19.43	37.58441	59.09938	33.03542	72.21
M1	17.55	29.95723	50.75068	27.21969	72.21
M2	18.65	30.5789	50.93978	26.07371	68.73
M3	17.55	34.71067	56.37949	19.15683	65.25

Table 14 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.

TABLE 15. Si, Qi

	Si	Qi
A0	44.27184	1
M1	39.53752	0.893063
M2	38.99448	0.880796
M3	38.6094	0.872098

Table 15 Shown the Si, Qi value.

TABLE 16. Rank

	Rank
M1	1
M2	2
M3	3

Table 16. Rank Technological factors (TF) is first rank and Social (personnel) factors (SF) is the lowest Rank.

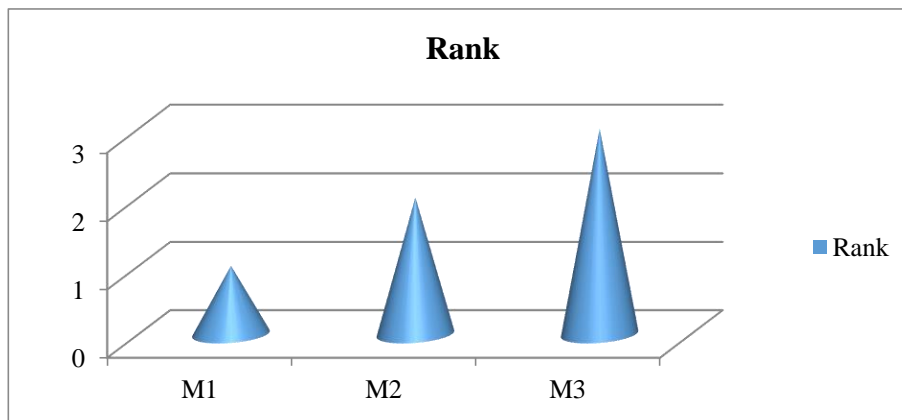


FIGURE 8. High-tech industries rank

Shows the figure 8 Technological factors (TF) is first rank and Social (personnel) factors (SF) is the lowest Rank.

5. Conclusion

This study is for two specific reasons focusing on high technology sector. First, high-tech components and In the production of products, the United States, Taiwan's high-tech industry is second only to Japan and Korea is in fourth place; So in Taiwan's economic development It plays a very important role The second is caused by rapidly changing technologies Due to short product life cycle, High technology sector A dynamic and Considered as a modern technology sector, It is closely related to the innovative movement Based on interviews with high-tech industry experts (including two senior managers of the semiconductor and three electronics sectors), most manufacturers in Taiwan have developed in advance to meet the rapidly changing needs of markets and customers. Creating not only networks to capture communication knowledge sharing. Through information systems of ERP, CRM, KM and SCM Downstream customers. Under the operation of knowledge management mechanism Integrate market and customer knowledge Usage provides important information for product development. Khalili Esbouei and Safaei Ghadikolaei (2013) Six value-based metrics and based on accounting metrics to rank ten parts manufacturing companies in their study FAHP. Using fuzzy MCDM methods in a study on fuzzy ARAS and fuzzy COPRAS Among the six Iranian Companies The weights were used to find the best alternative. We presented a procedure for the criteria for expressing the weights. Combined Gray ARAS methods for ranking structured traditional projects. Combine to evaluate the Chief Accounting Officers. Naikkar and Thobil for renewable technology AHP-ARAS approach was used for prioritization.

To assess life satisfaction levels used the fuzzy ARAS method. Structural elements of buildings can be analyzed using AHP and fuzzy ARAS methods and Fuzzy Multiplication A function. Renewable energy systems SWARA-ARAS approach was used for ranking. At that point, the decision makers switch to 'options series 1L, set 2L', three m, series 4 u' and series 5 u'. Technical Factors (TF) ranked first and Social (Staff) Factors (SF) ranked lowest.

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