



Evaluation of Marine Currents Energy Plant Using DETMAL MCDM Method

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Abstract. The world has an increasing demand for energy; Natural building blocks include air, sunlight, hydrogen and water As a result of changes in kinetic energy, Renewable energy sources Directed countries to use This orientation focuses on technology, creativity, research, improved development and compatibility. As research into renewable energy production continues to grow, methods are being developed to mitigate the harmful effects of nature. This study is about the problem with the site selection where the first marine power plant is planned to be set up. The DEMATEL approach collects collective expertise to capture causal relationships between strategic criteria. This model is especially sensible and can be useful for visualizing the shape of complex causal relationships with measurements or diagrams. This illustration gives a vague DEMATEL model beneath the panel choice to solve the Power Area choice trouble, in which opinions of diverse alternatives underneath specific subjective houses and all residence outstanding weights are anticipated in linguistic values denoted by means of ambiguous numbers. To make a few compatibility with the linguistic exams of subjective attributes, the target attributes are transformed into dimensionless symbols. Installation costs (C1), Maintenance costs (C2), Impacts on maritime transport (C3), Impacts on water quality (C4), Impacts on marine life (C5), Seismic risk (C6), Water velocity (C7) and Proximity to town(C8) is taken for evaluations parameters. Since the DEMATEL method is used, the alternatives are the same parameter. From this analysis DEMATEL method is the best solution. Determines the short distance and a long way from the negative-optimal solution, but the comparison of these distances was not considered significant. It seems from the result that Impacts on maritime transport is got the first rank whereas Impacts on marine life has the lowest rank.

1. Introduction

Ocean energy is ocean waves, tides, salinity and represents the energy caused by variations in ocean temperature. Homes use some of this energy; to generate electricity for transportation and businesses. The term ocean energy includes wave energy; it derives from the energy of surface waves and tidal energy, the kinetic energy of large bodies of moving water. Offshore wind farms are a form of ocean energy, because even when wind turbines are placed over water, wind energy is derived from the wind. Oceans have enormous potential, and they are more populous, closer to many if not more. Ocean energy is a significant amount worldwide and it has the potential to provide new renewable energy. Temperature, wind, salinity, bathymetry Strong ocean currents form from a combination of wind and Earth's rotation. Sun acts as prime mover, Causes wind and temperature variations. Current speed without any change in direction and since there are only minor fluctuations in the current location, Ocean currents are like turbines Might be the best place to use energy extraction devices. Ocean currents influence climate in many parts of deciding the world plays an important role. Ocean currents on the effects of removal While little is known, Effects of current energy removal on remote environments May be a significant environmental concern. Regular with blade strike, sea creature problem and sound effects Turbine problems still exist; however, it uses ocean currents for migratory purposes, these can be enlarged by various marine organisms. Locations can also be coastal; therefore the electromagnetic emission affects the marine environment Long power cables are required. DEMATEL Specific cause to be used, decision making based on perceived and distinct techniques All Classical DEMATEL Studies. According to the specific software of the DEMATEL approach, three of the modern-day classical DEMATEL studies Can be categorized into lessons: first kind Between elements or standards Is to make clean relationships; The 2nd type, of causal relationships and the connection amongst them the fundamental factors in terms of duration Identification; The 1/three kind, of criteria of interconnectedness and effect Criteria with the aid of analyzing portions Is to decide weights. The talents of the DEMATEL method approach have ended in its extensive utility in diverse studies fields. To the first-rate of our understanding, however, there may be no look at inside the literature that has used this approach within the context of social media dependency and the related predictors. With the hierarchical system established, it is essential to recognize the way to obtain IDR metrics to examine key elements inside the original DEMATEL. The IDR matrix, which includes degrees of direct impact on all paired factors, is offered with the aid of DEMATEL professionals ranging from zero-four by way of definition. Indirect effects between factors that don't want to be determined in DEMATEL are taken into consideration to be not often given as a likely motive for the violation of subjective cognitive skills. As a result, it's far reasonable to make judgments about relationships which have direct implications for hierarchical DEMATEL. Regular DEMATEL some of the countless series of fashionable effects the use of Circumstances do no longer merge. Infinite this is a sufficient condition for the collection to merge Identified on paper. Based on such a sufficient situation, we proposed a new version of DEMATEL, which ensures the convergence of the limitless series. DEMATEL to identify the cause-effect chain elements of a complex system is considered a better method. It is an assessment of interrelationships

between factors and deals with identification of importance through visual system modeling. The most important part of the DEMATEL system is to create relationships between property criteria. To obtain a suitable impact-relationship diagram, Adequate for analysis and decision making, a suitable threshold value is also required to obtain the information.

2. Marine current energy plant

To convert wave currents into electricity, wave current converters are placed in the wave current, where they use the kinetic energy of the moving water. Unlike traditional hydropower production, they do not require dams or stagnation. In-stream tidal is a form of renewable energy. Like renewable energy sources such as wind, sunlight or wave, in-stream tidal is an intermediate resource. However, unlike wind, solar and wave energy, wave power generation is highly predictable in the future. Where wind, sun, and wave energy depend on weather forecasting (its accuracy extends to future days), the waves in the Earth's oceans are controlled by Gravitational force of the moon and sun. For this reason, wave energy generators can sell electricity as tangible power to the power grid, thus avoiding the need for expensive and environmentally friendly reserve power sources. Installation costs the cost of installing the facility is high. With the pre-installation research and development phase, this facility includes field tests, material cost, electrical batteries and has multiple outputs including power transmission lines. In addition, due to high traffic in the strait Delays in the installation phase may result in additional costs. Maintenance Costs The maintenance costs of the facility are very low. Apart from general system control No additional cost after installation. Impacts on sea transport Sea hydro power generation facility, should be located near power transmission lines, thus the generated energy can be transported at low transportation cost. Projected impacts on water quality the impact of a power generation facility on water quality is significant and negative of the facility in tourism and fishing Aims to prevent consequences. Effects on marine life for oil type and power generation facility Used to increase the efficiency of turbines used for equipment. Paints Turbine Farm is located where the area should not contain any chemical composition that destroys natural habitat function. This is a very important criterion for renewable energy sources, its main purpose is to respect nature, and it also removes existing pollution. Seismic risk of offshore power facilities planned to be installed in the country all alternate locations are under the influence of seismic fault lines. Planning and construction process Risk-adjusted and managed during a disaster; against problems in the areas where this power plant operates Additional precautions should be taken. Water speed uses the effect of ocean currents on eddy currents and higher current provides higher power output. For this reason, for the plant planned to be installed, areas with high current should be given priority. Currents are mainly influenced by ocean temperature, are caused by differences in salinity and altitude. As the proposed power generation facility is located near the city, It can be assumed that economic structures can be established near power transmission lines. The generated energy can be easily and cheaply used by converting it into a suitable voltage value for the city. will taken Installation costs (C1), Maintenance costs (C2), Impacts on maritime transport (C3), Impacts on water quality (C4), Impacts on marine life (C5), Seismic risk (C6), Water velocity (C7) and Proximity to town (C8) is evaluations parameters. Since the DEMATEL method is used, the alternatives are the same parameter shown in Table 1.

TABLE 1. Give in parameters criteria

Parameter	criteria
Installation costs	C1
Maintenance costs	C2
Impacts on maritime transport	C3
Impacts on water quality	C4
Impacts on marine life	C5
Seismic risk	C6
Water velocity	C7
Proximity to town	C8

3. DEMATEL

Between 1972 and 1976 DEMATEL (Decision-making Testing and Evaluation Laboratory) system, The Program in Science and Human Affairs at the Battelle Memorial Institute in Geneva was created to research and address complex and interrelated problem groups. DEMATEL is one of the multi-criteria decision makers. To extract the complex structure of a complex problem DEMATEL method is widely used. The objective of DEMATEL is to scale from a complex system and the relationship between causal dimensions it is to model the understandable structure of that system. When measuring complexity, the cause and effect relationship of the criteria can be clearly seen. The final product of the DEMATEL process is a visual representation of a personal map of the mind; through him the responder organizes his own action in the world. When measuring complexity, the cause-effect relationship of the criteria can be clearly seen. It depicts the basic concept of Indicates the strength of the influence of numbers the contextual relationship between the elements of a system. The DEMATEL technique was used to identify causation and relationships between factors and ancillary factors. The purpose of

this article is to analyze the causal relationship structures between the dimensions of a seawater power plant using the DEMATEL method. In doing so, we integrate the size of the previously used ocean current power plant and identify and classify the defining components of each. In this study, the scope of offshore power plants is limited to human, structural and related capital. Data were collected using the DEMATEL questionnaire, which was structured around pre-tested quantitative items of human, structural and relational capital. The main contribution of this paper is as follows: This paper uses the DEMATEL method to reveal the causal relationship structures between the dimensions of an offshore wind farm. The study suggests various avenues for future research that could continue to extend the ocean current power plant theory to the context of developing countries by researchers in the field of marine current power plant research.

4. Proposed Solution Methodology with Combination of DEMATEL

TABLE 2. Give in data set

	C1	C2	C3	C4	C5	C6	C7	C8	Sum
C1	0	8	7	5	4	9	7	3	43
C2	6	0	7	9	2	4	5	8	41
C3	3	4	0	6	7	8	4	2	34
C4	5	4	8	0	4	7	6	8	42
C5	6	2	5	4	0	7	8	7	39
C6	4	3	2	1	5	0	4	7	26
C7	7	5	7	5	8	7	0	5	44
C8	8	6	5	7	3	4	9	0	42

TABLE 1 shows that DEMATEL in Marine current energy plant of Installation costs (C1), Maintenance costs (C2), Impacts on maritime transport (C3), Impacts on water quality (C4), Impacts on marine life (C5), Seismic risk (C6), Water velocity (C7) and Proximity to town (C8). Sum of all parameters given in high value. The table 2, given 44 is highest value.

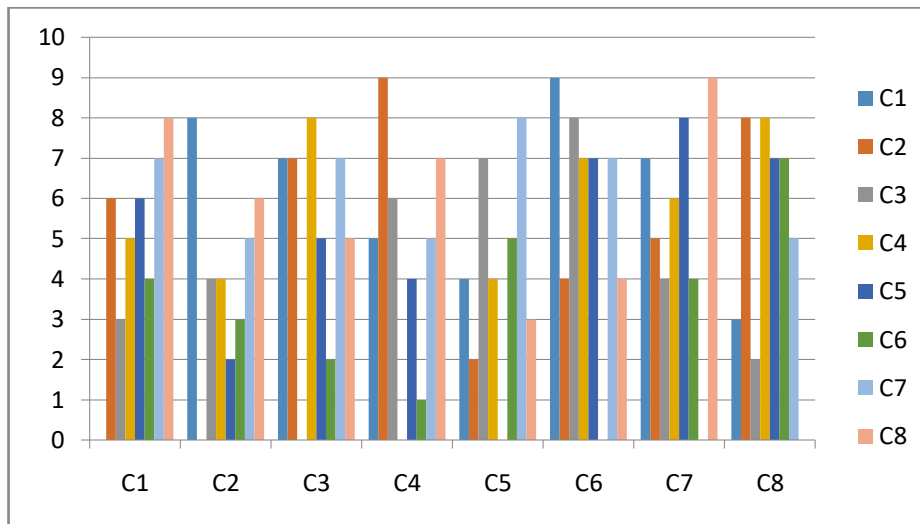


FIGURE 1. Shows the chart of Marine current energy plant

FIGURE 1 shows that DEMATEL in Marine current energy plant of Installation costs (C1), Maintenance costs (C2), Impacts on maritime transport (C3), Impacts on water quality (C4), Impacts on marine life (C5), Seismic risk (C6), Water velocity (C7) and Proximity to town (C8). It is the rating and comparison of any two-facility location. Comparing the Marine current energy plant with the eight parameters they will be varied.

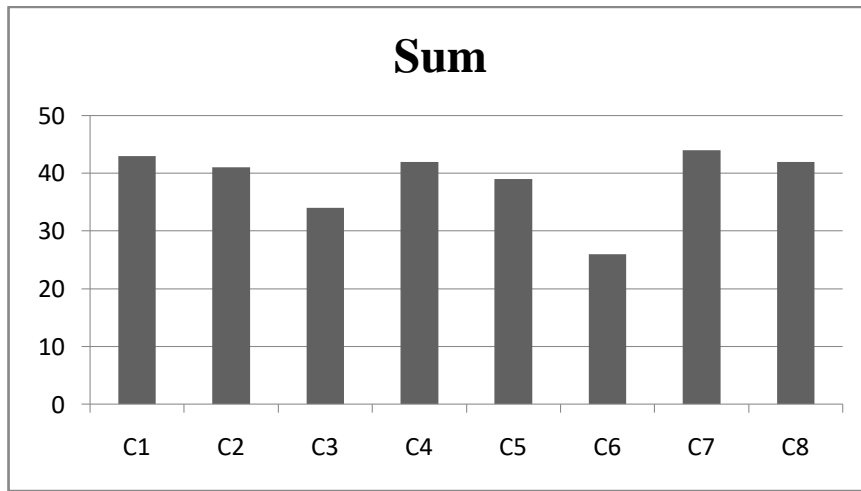


FIGURE 2. Sum of data set graph

TABLE 3. Normalization of direct relation matrix

	C1	C2	C3	C4	C5	C6	C7	C8
C1	0	0.7273	0.6364	0.4545	0.3636	0.8182	0.6364	0.2727
C2	0.5455	0	0.6364	0.8182	0.1818	0.3636	0.4545	0.7273
C3	0.2727	0.3636	0	0.5455	0.6364	0.7273	0.3636	0.1818
C4	0.4545	0.3636	0.7273	0	0.3636	0.6364	0.5455	0.7273
C5	0.5455	0.1818	0.4545	0.3636	0	0.6364	0.7273	0.6364
C6	0.3636	0.2727	0.1818	0.0909	0.4545	0	0.3636	0.6364
C7	0.6364	0.4545	0.6364	0.4545	0.7273	0.6364	0	0.4545
C8	0.7273	0.5455	0.4545	0.6364	0.2727	0.3636	0.8182	0

Table 3 shows that the Normalizing of direct relation matrix in Marine current energy plant of Installation costs (C1), Maintenance costs (C2), Impacts on maritime transport (C3), Impacts on water quality (C4), Impacts on marine life (C5), Seismic risk (C6), Water velocity (C7) and Proximity to town (C8). The diagonal value of all the data set is zero.

$$T= Y (I-Y)-1$$

TABLE 4. I= Identity matrix

	C1	C2	C3	C4	C5	C6	C7	C8
C1	1	0	0	0	0	0	0	0
C2	0	1	0	0	0	0	0	0
C3	0	0	1	0	0	0	0	0
C4	0	0	0	1	0	0	0	0
C5	0	0	0	0	1	0	0	0
C6	0	0	0	0	0	1	0	0
C7	0	0	0	0	0	0	1	0
C8	0	0	0	0	0	0	0	1

Table 4 given that the Identity matrix. The matrix diagonal line got values one other values is zero.

TABLE 5. Y value

	C1	C2	C3	C4	C5	C6	C7	C8
C1	0	0.7273	0.6364	0.4545	0.3636	0.8182	0.6364	0.2727
C2	0.5455	0	0.6364	0.8182	0.1818	0.3636	0.4545	0.7273
C3	0.2727	0.3636	0	0.5455	0.6364	0.7273	0.3636	0.1818
C4	0.4545	0.3636	0.7273	0	0.3636	0.6364	0.5455	0.7273
C5	0.5455	0.1818	0.4545	0.3636	0	0.6364	0.7273	0.6364
C6	0.3636	0.2727	0.1818	0.0909	0.4545	0	0.3636	0.6364
C7	0.6364	0.4545	0.6364	0.4545	0.7273	0.6364	0	0.4545
C8	0.7273	0.5455	0.4545	0.6364	0.2727	0.3636	0.8182	0

Table 5 shows Y value the value got in table 2 normalized data.

TABLE 6. Shows in I-Y value

	C1	C2	C3	C4	C5	C6	C7	C8
C1	1	-0.72727	-0.63636	-0.45455	-0.36364	-0.81818	-0.63636	-0.27273
C2	-0.54545	1	-0.63636	-0.81818	-0.18182	-0.36364	-0.45455	-0.72727
C3	-0.27273	-0.36364	1	-0.54545	-0.63636	-0.72727	-0.36364	-0.18182
C4	-0.45455	-0.36364	-0.72727	1	-0.36364	-0.63636	-0.54545	-0.72727
C5	-0.54545	-0.18182	-0.45455	-0.36364	1	-0.63636	-0.72727	-0.63636
C6	-0.36364	-0.27273	-0.18182	-0.09091	-0.45455	1	-0.36364	-0.63636
C7	-0.63636	-0.45455	-0.63636	-0.45455	-0.72727	-0.63636	1	-0.45455
C8	-0.72727	-0.54545	-0.45455	-0.63636	-0.27273	-0.36364	-0.81818	1

Table 6 calculated the I-Y value. All values are negative but diagonal line values are positive values.

TABLE 7. Shows in (I-Y)-Ivalue

	C1	C2	C3	C4	C5	C6	C7	C8
C1	0.4883	-0.0041	-0.1128	-0.1465	-0.1771	-0.0862	-0.1701	-0.2418
C2	-0.1635	0.5850	-0.0702	0.0643	-0.3091	-0.3087	-0.2354	-0.0853
C3	-0.1934	-0.1464	0.5464	-0.0883	0.0409	-0.0163	-0.1655	-0.1836
C4	-0.1820	-0.1608	-0.0773	0.5393	-0.1692	-0.1653	-0.1706	-0.0789
C5	-0.0993	-0.2253	-0.1924	-0.2161	0.6003	-0.1274	-0.0485	-0.1043
C6	-0.0623	-0.0828	-0.2097	-0.2055	-0.0504	0.5558	-0.0853	0.0181
C7	-0.1203	-0.1500	-0.1387	-0.1887	-0.0148	-0.1589	0.4681	-0.2020
C8	-0.0859	-0.0670	-0.1634	-0.0564	-0.2533	-0.3063	-0.0972	0.4568

Table 7 calculated the (I-Y)-1 value. All values are negative but diagonal line values are positive values.

TABLE 8. Total Relation matrix (T)

	C1	C2	C3	C4	C5	C6	C7	C8
C1	-0.51173	-0.00415	-0.11283	-0.14647	-0.17714	-0.08622	-0.17013	-0.24182
C2	-0.1635	-0.41496	-0.07019	0.064315	-0.30914	-0.3087	-0.23541	-0.08527
C3	-0.19339	-0.1464	-0.45356	-0.08828	0.040891	-0.01627	-0.16546	-0.18361
C4	-0.18199	-0.16078	-0.07731	-0.46073	-0.16923	-0.16534	-0.17058	-0.07886
C5	-0.09927	-0.22531	-0.19237	-0.21614	-0.39975	-0.12743	-0.04855	-0.10428
C6	-0.06228	-0.08279	-0.20971	-0.20551	-0.05037	-0.44416	-0.08535	0.018076
C7	-0.12028	-0.14997	-0.13874	-0.18866	-0.01477	-0.15888	-0.53189	-0.20204
C8	-0.08592	-0.06702	-0.16339	-0.05644	-0.25326	-0.30632	-0.09718	-0.5432

Table 8 shows the total correlation matrix, the direct correlation matrix, Multiplied by the inverse of the direct correlation matrix value subtracted from the identity matrix. Calculate the average of the matrix and its threshold value (alpha) -0.1759

TABLE 9. positive value (Ri) and negative values (Ci)

	Ri	Ci
C1	-1.45051	-1.41837
C2	-0.89348	-0.70043
C3	-0.84074	-0.65721
C4	-1.05004	-0.54975
C5	-1.13283	-1.78613
C6	-0.61067	-1.68686
C7	-0.61242	-1.62457
C8	-0.62604	-1.50429

Table 9 shows the positive values and negative values. All values are negative values.

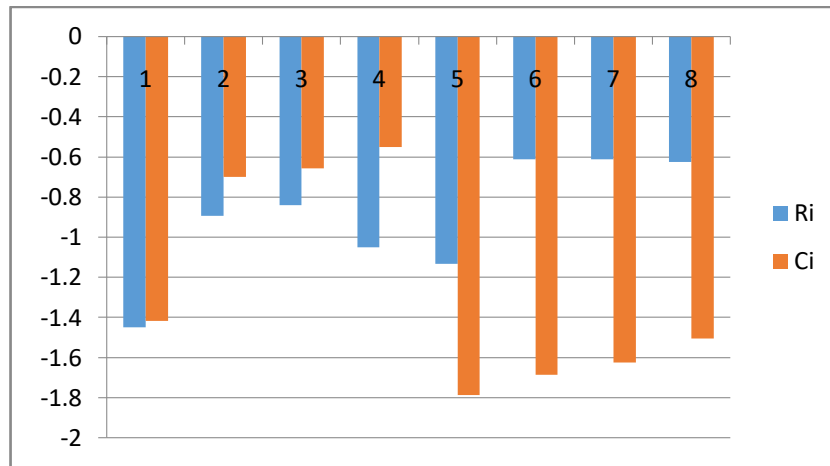


FIGURE 3. Graph shows in positive values and negative values

TABLE 10. Calculation of Ri+Ci and Ri-Ci to get cause and effect

Ri+Ci	Ri-Ci	Rank
-2.86888	-0.03214	7
-1.59391	-0.19305	2
-1.49795	-0.18352	1
-1.59979	-0.50029	3
-2.91896	0.653294	8
-2.29753	1.076182	6
-2.23699	1.012149	5
-2.13033	0.878251	4

From the TABLE 4 the Impacts on maritime transport is first rank , Maintenance costs is second rank, Impacts on water quality is third rank, Proximity to town is forth rank, Water velocity is fifth rank, Seismic risk is sixth rank, Installation costs is seventh rank and Impacts on marine life is final rank. From the table the majority need is availability of workers and transportation availability. Not most considered is community attitude.

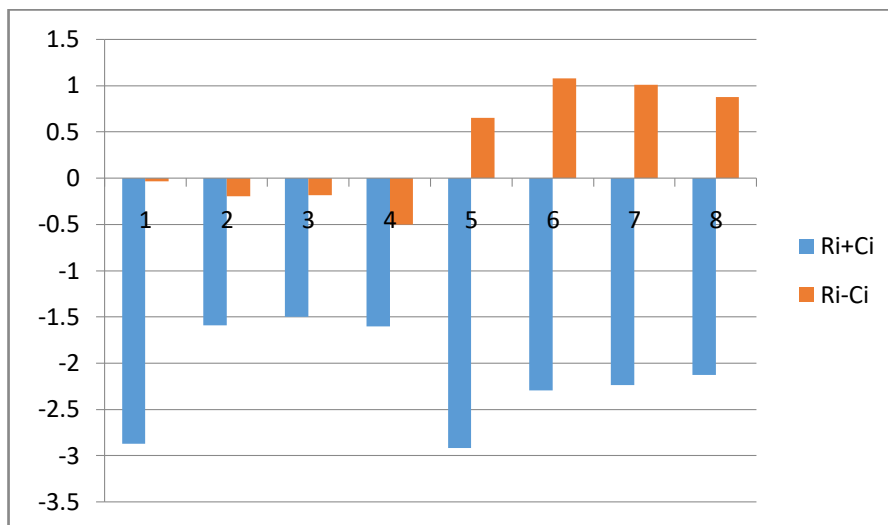


FIGURE 4. graph is shows in Ri+Ci values and Ri-Ci values

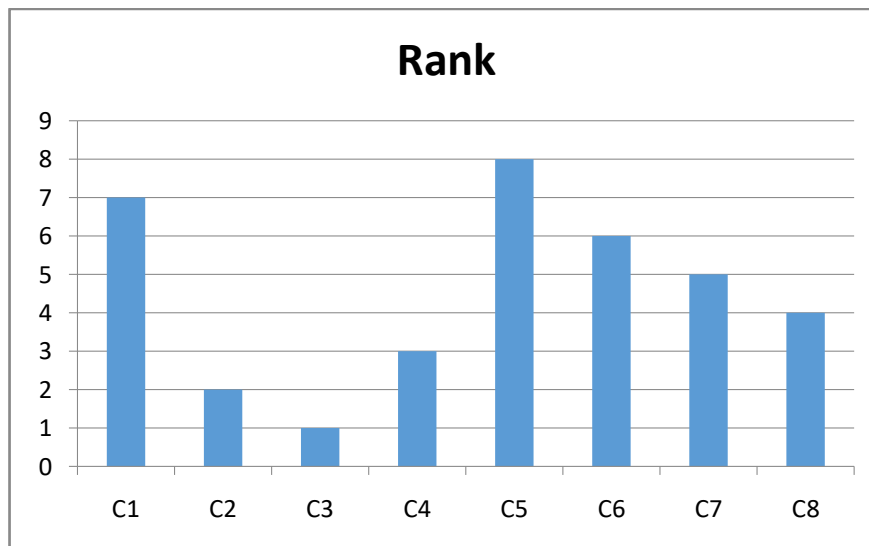


FIGURE 5. graph is shows in ranking

5. Conclusion

To convert wave currents into electricity, wave current converters are placed in the wave current, where they use the kinetic energy of the moving water. Unlike traditional hydropower production, they do not require dams or stagnation. In-stream tidal is a form of renewable energy. Like renewable energy sources such as wind, sunlight or wave, in-stream tidal is an intermediate resource. The purpose of C is to transform the relationship between criterion and causal dimensions from a complex system into an understandable structural model of that system. When measuring complexity, the cause and effect relationship of the criteria can be clearly seen. This article evaluates many packages of DEMATEL the use of awesome weight schemes and different distance measurements, and compares the results of different weights formerly used by DEMATEL techniques with a vast sort of data. DEMATEL methods are the best solution short Distance and negativity—determines the long-distance solution from the best solution, but the comparison of these distances is not considered significant. It is evident from the results Impacts on maritime transport is got the first rank whereas is the Impacts on marine life is having the lowest rank.

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