

Evaluation of Techno-economic Using Decision Making Trial and Evaluation Laboratory (DEMATEL) Method

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Abstract. Techno economic means feasibility of project requirement and optimized technology means selection. Techno-economic means existing market and technology is an analysis of selection of technology in project design in demand capacity techno-economic max existing. Chamoli, uttarakhand, India electrical and cooking energy to meet the requirements, integrated renewable energy on the development of the system a techno-economic study has been carried out on paper. Locally available renewable energy resources and exploration capacity of area requirements an attempt has been made to assess. In this from analysis Decision making trial and evaluation laboratory (DEMATEL) complex system elements of the cause-and-effect chain a great one for identification considered proper. This is interdependence between factors assessing relationships and through visual structural modeling what matters deals with identifying. Alternative: air conditioner, color television, washing machine, water heater, electric cooker. Evaluation preference: air conditioner, color television, washing machine, water heater, electric cooker. The result it is seen that Air conditioner is got the first rank where as is the Water heater is having the lowest rank. As a result, the air conditioner gets the first rank, while the water heater gets the lowest rank.

1. Introduction

Techno economic studies detailed project reports technology of the project and determine the funds reliability, risks associated with the project to be evaluated and taken calculating immediate actions. Of one project per customer it helps to get a comprehensive assessment. A techno economic study investigates conversion to bio-oil, after that bio oil naphtha and diesel range as fuel improves. Two per day 2000 dry ton scenarios have been developed. The first scenario is for fuel optimization to generate hydrogen on site separates part of the bio-oil, a second scenario relies on commercial hydrogen. Techno-economic or techno-economic analysis (tea for short) is an industrial process, product or analyze the economic performance of the service method of doing. Technical and financial based on the input parameters capital cost, operating cost and to estimate revenue it usually uses software modeling. Cyclone maps and sensitivity analysis visualization tools like graphs using, concise and visual summarize the results in a coherent format saying is a desired effect. This ammonia are two green production processes a techno-economic study has been carried out, with a modern methane ammonia process comparison of cohesion and heat with system level hot steam for recovery note the optimum placement of cycles. Techno-economic in action specific to techno-economic change evolutionary or historical of forms pays more careful attention to development we have strongly argued.

2. Techno-Economic

Between producers and users techno-economic and social interactions weaving complex dynamic networks are doing also, key findings are more will be catalysts of innovation; they are complementary methods for upstream and downstream including demanding and competing alternatives similarities are facilitated. Technical- economic paradigms the cause that brings them about in mechanisms, economics and institutions their impact and economic and their suitability for analysis. Nevertheless, these macro events the microcosm of technological change rooted deep in foundations because of that, the following section is micro and some basics done at meson levels represent theoretical developments. It defines technological revolutions, their organization and accompanying techno-economic full by using paradigm in revitalizing the economy as well examines the role they play [1]. This techno-economic study, faster corn Stover to bio-oil investigating paralysis, followed by bio oil as naphtha and diesel fuel improves. Two per day 2000 dry ton scenarios have been developed. The first scenario is for fuel optimization bio to generate hydrogen on site separates a portion of the oil, a second scenario relies on commercial hydrogen. The techno economic study of fast paralysis and bio-oil in the crossover by upgrade fuels range from naphtha and diesel investigated the cost of production. Two scenarios are created bio- production of hydrogen from oil based, the other is merchant based on the purchase of hydrogen has the hydrogen production scenario, to improve hydrogen is needed, its bio-oil of twist is remote uses hydrogen from source [2]. Existing hydrogen production sites and techno-economical and sensitivity analysis future hydrogen an hour to increase economic aspects needed. This is future hydrogen production in high-impact project designs convert to cheaper fuel new to reduce overall production costs creating attitudes. Durer et al based on the proposed methodology a comprehensive review of the literature was carried out. (2018) published

by web of science collect and analyze data sets in order to main purpose essays accessing and producing various h2 techno-economics of the process gives an idea of analysis selection of articles [3]. Techno-economic evaluation is SSF and comparing the process configurations, the two where are the bottlenecks in the processes? Is to determine that these two are basic evaluation of events, yield and laboratory for other process conditions uses data as much as possible. Techno-economic position, because of the large drains generated and downstream capital costs in processing steps and energy consumption will be more. However, this mixture of water and solid chosen because most concentrate are based [4]. Techno-economic in action. Specific to techno-economic change evolutionary or historical forms pay more careful attention to development we strongly want that we have argued. Therefore, of disclosure of patterns of inventions when research is conducted on, this is absolutely judgment on structural interpretations less willingness to pause differential innovation in scale integrations a compatible for pattern detection may also have an option. A historical within the structure, but very fine at the level, nature as anti-cancer agents research on product development, which simultaneous enrollment of actors and wide describes the construction of networks [5]. The word network although not used, research connecting the world to the economy of techno-economic networks origin, constitution and maintenance and many more that aim to support there are government interventions. Technical- economic evaluations. Of strategic products once the limitation is identified, research and optimum of agency in the field of technology these tools are used to determine interventions help us. Of these products we can determine which leads to, list the course of any intervention and evaluate its results. Strategic and techno-economic this analysis between assessment the difference is that they are deep into each other two of the same process are dependent let's not forget the features [6]. Existing in iron and steel industry focus beyond situational analysis is paid. Very accurate time perspective not only long, but so far other tech unassisted by economic scenario studies, evaluates the most innovative technologies there are also technologies. Steel is required due to decrease or increase in scrap recycling the resulting emission effects are current not included in calculation. Alternative primary technology of steel making lines results of economic evaluation is provided. Short trial periods and immature technological development due to the techno-economic situation studies. In line with climate goals economically feasible emissions to reduce, within the next 50 years both ways to replace conventional ways show great potential [7]. Hybrid systems wind, diesel together with another generation) or stand alone techno-economics of PV systems, in Middle Eastern climates. Water pumping and for specific applications such as desalination techno-economics of PV systems is investigated. However, large in the Middle East scale grid-connected pv techno-economics of systems number of studies conducted there is less. 29 in egypt pv at locations the authors studied to set up the plant. The generating plant was found to be achievable [8]. Both of these produce green ammonia techno-economic study of processes made, sophisticated methane-ammonia compared to process, system-level for heat integration and heat recovery taking into consideration. A note of 50 kton/year with ammonia production, cumulative for all three events energy efficiency (lhv) and ammonia production cost conclusions that there are exchanges between show existing pulp and paper through integrated biogasification in the plant technology of ammonia production- an economic evaluation was conducted. Overall energy efficiency from 44% to 10% increased and production cost of ammonia the results show that 458 € per ton. Black for liquor gasification and pulping plant ammonia from co-gasification synthesis, and process technol- used for economic evaluation [9]. Techno-economic review, business to enable scale recycling necessary to overcome the current obstacle structural and technological changes allows identification. Useful same as pre-establishing collection network while, live the end blocks of life to attract landscape, the authority price signal can impose three main recycling techno-economics of glass recycling, mechanical recycling and heat recycling approaches. These methods we compared to the landscape, recoverable value of materials, processing treatment costs, political implications and various consider designs we take a literature review is possible identify recycling technologies shows and economic and environmental outline the current understanding of impact shows. Our techno-economic analysis of current economic barriers compares multiple technologies to aid understanding [10].

3. Decision Making Trial and Evaluation Laboratory (DEMATEL)

Decision making trial and evaluation laboratory (DEMATEL) because of a complex system identify the components of the effect chain considered to be an excellent method of visualization. It is interdependence between factors evaluating relationships and visual structure finding what matters through sampling deals with in recent decades, more on DEMATEL's application a number of studies have been done, also various variations in the literature are presented. The purpose of this study is to methods and applications of DEMATEL technique it is a systematic review. Its advantages and because of the skills, in the last decade DEMATEL's approach is more focused it has been received and various researchers complex computer problems in areas have used it to solve [11]. Test and evaluate decision making laboratory (DEMATEL) method correlations between criteria of factors/features to explain core measures of performance also used to detect. Marketing strategies, manipulate systems, protection problems, talents of worldwide managers along with improvisation and institution decision making it is likewise used in many situations. Also, linking DEMATEL and different techniques hybrid models are big in various fields are used, as an example, in e- learning assessment, flight safety measurement and innovation policy for taiwan's sip mall portfolios. Wu and lee fuzzy logic and integrating DEMATEL proposed an effective method [12]. DEMATEL method creates a structural model for group knowledge gathering, sub-organizations causal relationship through causal diagram is proper. However, in many cases, decision making judgments are frequently crisp values are presented, but crisp values are enough of real-world ambiguity reflection. Human judgment of preferences making judgments of theses r compared crispy it is difficult to judge by values, therefore by ambiguity and inaccuracy to deal with classified issues fuzzy logic is essential. So, in ambiguous contexts with fuzzy logic to make better decisions there is a need to extend the DEMATEL system [13]. When key criteria are identified, in order to use the DEMATEL system a second survey developed

for management of sho chwan memorial hospital provided. Traditional multi-criteria unlike decision making techniques, generally the conditions are mutually independent consider that; this is for the DEMATEL system no need to assume but normality between criteria for decision makers to identify relationships also helps. That is, the DEMATEL method by using the seven criteria importance can be determined and causal relationships between criteria can be established [14]. The DEMATEL method is a relational framework analytical technique is a complex framework important features/criteria of the system can be detected. Cheng et al. (2007) the DEMATEL method evaluates dimensions can be created and various sciences (technology) parks' main thrust that criteria can be identified explains. DEMATEL method features/ creates a relational structure of criteria used; it is a complex structural system to identify important features/criteria will help. Related structural diagram DEMATEL technique is best for creating is the appropriate method. The DEMATEL technique is symmetrical regarding the assumption of relationship removed the limitation of the relationship matrix [15]. DEMATEL fontela and gabus, gabus and this is a new method based on fontal to change the data model in the study is proposed. A system direct and indirect between components its type and severity of contact it is useful for analysis based on is proper. Total of components by DEMATEL by analyzing the correlation, structure better understanding of relationship and complexity the best way to solve computer problems can get basically speaking, bigger to affect each other more for quantitative evidence, the evidence obtained is a it is a complicated gadget. So, worse DEMATEL to find statistics can be used. Basic steps of DEMATEL as follows. By cohesion of proof the total a correlation matrix can be constructed [16]. In this section, the evaluation framework model establishment, conjoint factor analysis and for determining scale weight DEMATEL system has also been introduced. In real valuation problems, complexity accurate value in valuation method difficult to calculate. However, complex multiple criteria or sub-criteria in the assessment environment can be divided into systems, the differences are very easy to determine or separated scale of groups or sub-organizations scores can be scaled. Factor analysis the method usually groups criteria used to separate. Factor performance of these criteria for assuming that the scale weights are equal seemingly, between criteria weights and scales may vary may have interdependent relationships. In the proposed model, to overcome these problems, DEMATEL, fuzzy measurement and fuzzy integration is also used. Correlations between criteria DEMATEL is used to create, the same ambiguous measurement and ambiguity in time the coordinates are the weights the criteria and are used to calculate artificial consumption [17]. A decision-making test and evaluation laboratory (DEMATEL) method of interdependent factors suitable for building network architecture. This using the method, a structural model the development team can gather knowledge, then through cause-effect relationship diagram can be visualized. The results of DEMATEL, each factor in the entire emergency system provides information on impact. Analyze the structural model by discussing; any factors are of very basic importance we know what is important and what is not find out. As a result, in the computer this reason has the greatest impact factors are obviously critical success factors [18]. Anp for private primary school exam a hybrid approach based on - 854 elm. Unlike the traditional DEMATEL method, linear and hyperbolic tangent functions like different 855 dependencies, total relation were used to calculate the matrix. DEMATEL results 857 UN weighted anp to normalize the super matrix became used. 858 hu, chiu, yen, and cheng (2015) 859 an integrated method proposed. DEMATEL and strategies using provider satisfactory performance- 860 mans assessment. Traditional pair wise comparisons conducted- 861 and super matrix become created. 863 thinking about causal relationships with assessment standards DEMATEL approach 862 to regulate importance was used. One in tai- 864 wan a case observe of a pc manufacturer become supplied [19]. Test and evaluate decision making laboratory (DEMATEL) technique, current study of researchers and psychologists a clinical view of social media addiction significance was examined. Accordingly, by reviewing the literature social 15 distant of media addiction predictors are extracted and more personality factors, co morbid symptoms and into three organizations as psychological elements were labeled. From 35 respondents from the collected data, the results are personality a group of factors as the most important dimension exemplified. Also, DEMATEL results social media within each group open to experience as predictors character personality dimension, loneliness psychology and depression fusion. Revealed predictors of the study results and implications are discussed [20].

TABLE 1. Techno Economic

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker	Sum
Air conditioner	0	2	4	2	3	11
Color television	3	0	2	1	2	8
Washing machine	2	1	0	3	2	8
Water heater	1	3	2	0	2	8
Electric cooker	2	2	1	2	0	7

Table 1 shows that DEMATEL Decision making trail and evaluation laboratory in Alternative: Air conditioner, Color television, Washing machine, Water heater, Electric cooker. Evaluation Preference: Air conditioner, Color television, Washing machine, Water heater, Electric cooker.

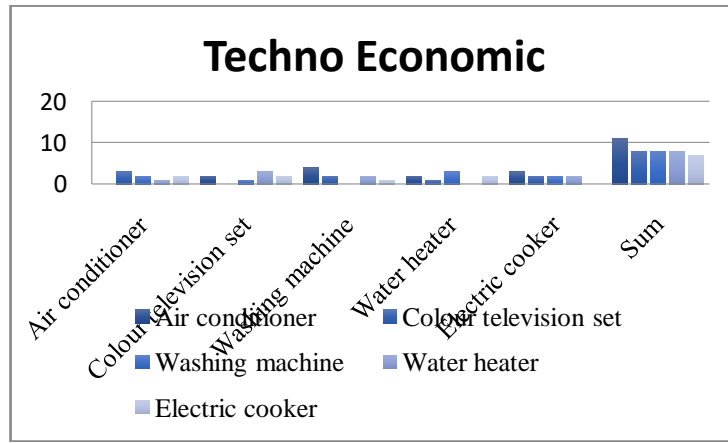


FIGURE 1. Techno Economic

Figure 1. Shows that DEMATEL Decision making trail and evaluation laboratory in Alternative: Air conditioner, Color television, Washing machine, Water heater, Electric cooker. Evaluation Preference: Air conditioner, Color television, Washing machine, Water heater, Electric cooker.

TABLE 2. Normalization of direct relation matrix

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	0	0.181818182	0.3636363636	0.181818182	0.272727273
Color television set	0.272727273	0	0.18181818	0.090909091	0.181818182
Washing machine	0.181818182	0.090909091	0	0.272727273	0.181818182
Water heater	0.090909091	0.272727273	0.18181818	0	0.181818182
Electric cooker	0.181818182	0.181818182	0.09090909	0.181818182	0

Table 2 shows that the Normalizing of direct relation matrix in Air conditioner, Color television, Washing machine, Water heater, Electric cooker. The diagonal value of all the data set is zero.

TABLE 3. Calculate the total relation matrix

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	0	0.181818182	0.363636364	0.181818182	0.27272727
Color television set	0.272727273	0	0.181818182	0.090909091	0.18181818
Washing machine	0.181818182	0.090909091	0	0.272727273	0.18181818
Water heater	0.090909091	0.272727273	0.181818182	0	0.18181818
Electric cooker	0.181818182	0.181818182	0.090909091	0.181818182	0

Table 3Shows the Calculate the total relation matrix in Air conditioner, Color television, Washing machine, Water heater, Electric cooker.

TABLE 4. I- Value

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	1	0	0	0	0
Color television set	0	1	0	0	0
Washing machine	0	0	1	0	0
Water heater	0	0	0	1	0
Electric cooker	0	0	0	0	1

Table 4Shows the $T = Y(I - Y)^{-1}$, I= Identity matrix in Air conditioner, Color television, Washing machine, Water heater, Electric cooker is the common Value.

TABLE 5. Y- Value

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	0	0.181818	0.363636	0.181818	0.272727
Color television set	0.272727	0	0.181818	0.090909	0.181818
Washing machine	0.181818	0.090909	0	0.272727	0.181818
Water heater	0.090909	0.272727	0.181818	0	0.181818
Electric cooker	0.181818	0.181818	0.090909	0.181818	0

Table 5 Shows the Y Value in Air conditioner, Color television, Washing machine, Water heater, Electric cooker is the Calculate the total relation matrix Value and Y Value is the same value.

TABLE 6. I-Y Value

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	1	-0.18182	-0.36364	-0.18182	-0.27273
Color television set	-0.27273	1	-0.18182	-0.09091	-0.18182
Washing machine	-0.18182	-0.09091	1	-0.27273	-0.18182
Water heater	-0.09091	-0.27273	-0.18182	1	-0.18182
Electric cooker	-0.18182	-0.18182	-0.09091	-0.18182	1

Table 6 Shows the I-Y Value Air conditioner, Color television, Washing machine, Water heater, Electric cooker table 4 $T = Y(I-Y)^{-1}$, I= Identity matrix and table 5 Y Value Subtraction Value.

TABLE 7. (I-Y)-1

	Air conditioner	Color television	Washing machine	Water heater	Electric cooker
Air conditioner	1.610231769	0.753533	0.945449	0.78095	0.890051
Color television set	0.706331261	1.474562	0.692764	0.577162	0.691634
Washing machine	0.613623516	0.561334	1.513002	0.697287	0.671283
Water heater	0.555681176	0.678067	0.65065	1.459864	0.658564
Electric cooker	0.578010175	0.579423	0.553703	0.575749	1.468344

Table 7 Shows the (I-Y)-1 Value Air conditioner, Color television, Washing machine, Water heater, Electric cooker Table 6 shown the Minverse Value.

TABLE 8. Total Relation matrix (T)

	Total Relation matrix (T)					Ri
Air conditioner	0.610231769	0.753533	0.945449	0.78095	0.890051	3.980215
Color television set	0.706331261	0.474562	0.692764	0.577162	0.691634	3.142453
Washing machine	0.613623516	0.561334	0.513002	0.697287	0.671283	3.056529
Water heater	0.555681176	0.678067	0.65065	0.459864	0.658564	3.002826
Electric cooker	0.578010175	0.579423	0.553703	0.575749	0.468344	2.755229
Ci	3.063877897	3.046919	3.355568	3.091012	3.379876	

Table 8 shows that the total relation matrix the direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.

TABLE 9. Ri & Ci

Ri	Ci
3.980215	3.063878
3.142453	3.046919
3.056529	3.355568
3.002826	3.091012
2.755229	3.379876

Table 9 shows the Ri, Ci Value in Air conditioner, Color television, Washing machine, Water heater, Electric cooker.

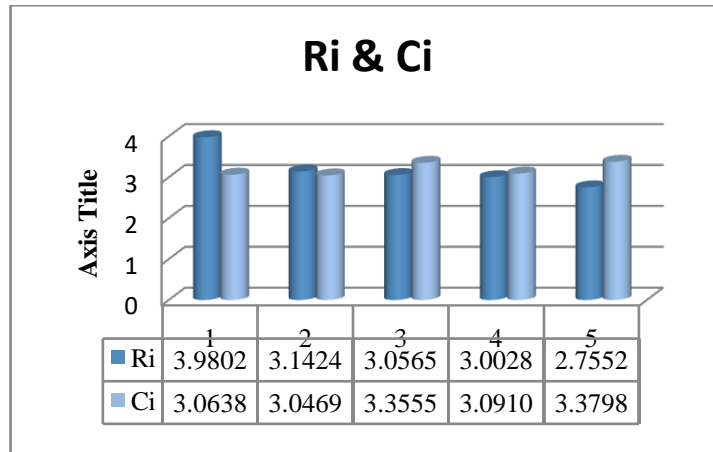


FIGURE 2. Ri & Ci

Figure 3. Shows the graphical representation Ri, Ci Value in Air conditioner, Color television, Washing machine, Water heater, Electric cooker.

TABLE 10. RI+Ci & Ri-Ci & Rank &Identity

	Ri+Ci	Ri-Ci	Rank	Identity
Air conditioner	7.044093	0.916337	1	cause
Color television set	6.189373	0.095534	3	cause
Washing machine	6.412097	-0.29904	2	effect
Water heater	6.093838	-0.08819	5	effect
Electric cooker	6.135105	-0.62465	4	effect

Table 10 shows the Calculation of Ri+Ci and Ri-Ci to Get the Cause and Effect. the final result of this paper the Air conditioner is in 1st rank cause, Color television is in 3rd rank cause, Washing machine is in 2nd rank effect, Water heater is in 5th rank effect and Electric cooker is in 4th rank effect. The final result is done by using the DEMATEL method.

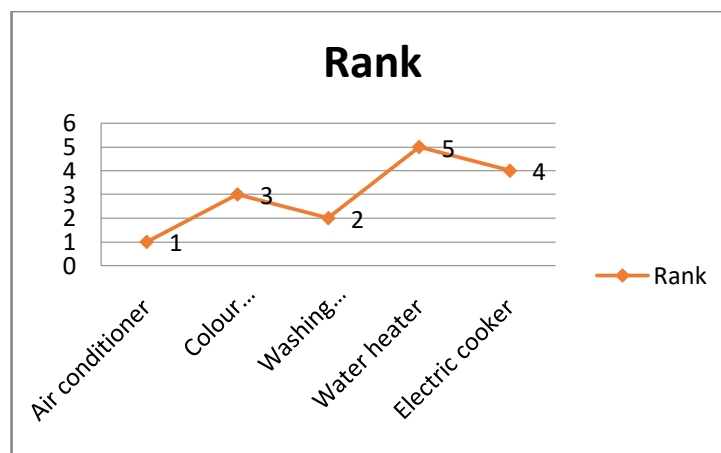


FIGURE 3. Rank

Figure 3. Shows the graphical representation the final result of this paper the Air conditioner is in First rank, Color television is in Third rank, Washing machine is in Second rank, Water heater is in Fifth rank and Electric cooker is in fourth rank.

TABLE 11. T matrix

T matrix				
0.610232	0.753533	0.945449	0.78095	0.890051
0.706331	0.474562	0.692764	0.577162	0.691634
0.613624	0.561334	0.513002	0.697287	0.671283
0.555681	0.678067	0.65065	0.459864	0.658564
0.57801	0.579423	0.553703	0.575749	0.468344

Table 11 shows the T Matrix Value calculate the average of the matrix and its threshold value (α) = Alpha 0.637490107
If the T Matrix value is greater than threshold value then bold it.

4. Conclusion

Techno economic means Feasibility of project requirement and optimized technology means selection. Techno-economic means existing Market and Technology is an analysis of Selection of technology in project design In demand capacity Techno-Economic Max Existing. It is a test of analytical decision-making and Includes Evaluation Laboratory (DEMATEL) complex system Elements of the cause-and-effect chain a great one for identification considered proper. This is Interdependence between factors assessing relationships and through visual structural modeling what matters deals with Identifying. From the result it is seen that Air conditioner has got the first rank where as the Water heater is having the lowest rank.

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