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Estimation of Freight Distribution Concept Selection using Decision Making trial and Evaluation Laboratory (DEMATEL) Method

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Abstract

Goods or cargo transported by ship, rail, truck or air. 2: Transport of goods from one place to another is sent by order consignment. 3: Amount paid for carriage of goods. 4: Freight train. Supply is where a product or service is needed make it available to a consumer or business user is the process. It is directly from the producer or service May be done by the provider or distributors or Indirect channels can be used with intermediaries. Alternative: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities Evaluation Preference: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities. From the result it is seen that Make the decision to outsource or buy and is got the first rank whereas is the Outsourcing provider selection problem got is having the lowest rank. The value of the dataset for Freight Distribution Concept Selection in DEMATEL shows that it results in Make the decision to outsource or buy and top ranking.

Keywords: Distribution logistics, Freight Distribution Concept, DEMATEL

Introduction

Distribution logistics, also known as sales logistics, Planning, realization of movement of materials and deals with control. it is a It is an inter-organizational logistics Organization, which aims to create a logistics channel efficient - especially in terms of costs and efficiency - from supplier to customer. Freight is generally used for commercial purposes as it involves the transportation of large quantities of goods. On the other hand, shipping can be used for commercial or non-commercial purposes and is usually used by private individuals or small and medium-sized businesses. By reducing inventory and from manufacturers to end users Distribution to increase inventory efficiency by moving goods efficiently Chain management helps. Manufacturers to finalists From users to consumers, products are called distribution channels Marketing goes through a series of companies. Major influencing factors are transportation reliability, on-time delivery and freight rates. It has identified various factors like flexibility, speed of delivery, accuracy of delivery, environmental issues, cost related choice of transport mode, reliability etc. In this study, Fuzzy DEMATEL method, construction and Processes are used to assess causal relationships of accidents. This combination is applied to the imprecise and subjective nature of human judgments. Fuzzy set theory is space rather than real numbers Uses packages. Linguistic terms are converted to fuzzy numbers. Gray DEMATEL method of each factor in the system Used to determine the status and their influence on each other, thus green Determines the most influential factors of innovation. DEMATEL method is used to determine the state in the system each factor and their influence on each other. Distribution in logistics is from development to sales Supervises the movement of goods up to the point Refers to overall management. This includes transportation, Packaging, inventory, stock control and site and area It can cover anything from research to information manipulation. Freight is the amount you are charged for transporting goods or goods carried by truck or other means of transportation. An example of freight transport is the transportation of lumber from a lumber mill to a furniture factory. Between logistics and distribution A major difference is that movement of goods, Around storage and inventory control Logistics with overall planning and organization of relation, whereas distribution is of goods relative to the actual location. Decision Testing And the evaluation laboratory DEMATEL is a complex system A to identify cause-effect chain elements Considered to be an effective method. This is Estimating correlations between factors and Identify what is important through a visual structural model to see The Decision Testing and Evaluation Laboratory (DEMATEL) complex and Analyze and solve interrelated problem groups proposed because it variables and between Checks for interdependencies in tries to improve them by providing a specific diagram.

Freight Distribution Concept Selection

Companies can do their inventory distribution in three different ways. The first feedback is internal feedback, from manufacturing to retailers or from the warehouse Transportation to customers is a company's own resources and Refers to the use of knowledge to organize. Hiring suppliers A counter-point to outsourcing logistics distribution activities to third parties. The third concept represents a combination of the previous two. [1] This is To improve the efficiency of rail freight delivery in large freight cycle mode One of the main problems. Global supply chains are increasing Energy prices are driven by business cycles and fiat currency systems Related to Volatility, Strategies of Global Freight Forwarders Forecasting future inventory demand is difficult due to uncertainties and complexities. and security issues [2]. Significant economic and political efforts are currently underway The existence, Number of dry ports in many countries and Applicability, especially crowded ones As far as possible for ports located in urban areas should be extended. More interest in dry-port systems However, the literature on logistics management Strategic, tactical and operational. lack of contributions to solving problems. [3]. One important difficulty is dealing with uncertainty. There are several risk models that incorporate uncertainty in the location selection of cargo villages. in the middle These models are stochastic location selection mode heuristic optimization models [4]. Urban freight delivery is a completely different road Classified by traffic. This kind of Transport concepts and environmental sustainability are similar, and transit time or Good service optimization is more important than vehicle efficiency. [5]. With timing features that can increase transit distance Excellent performance. Also, by chain and load Reduction in number of trips positioning [6]. To be implemented in a specific context Appropriate urban freight distribution initiatives Deciding A complex and challenging task. A specific Analytical policy or strategy Decision makers have good knowledge to make decisions and Detailed information is required. [7]. Intermodal Transportation System Modeling. cargo Intermediate transport system for distribution By modeling this line key variables and Implements controls. [9]. Overall, the domestic option looks very favorable. The following sections discuss the relationship between the port city and the cargo distribution system, grouping the key issues under subheadings from the framework. [10] The substantial growth of e-commerce has led to increased logistics operations. Because of this, Governments and logistics providers to reduce traffic congestion to improve the quality of life of citizens Great efforts have been made. Controlling the movement of large vehicles in the city and Small and eco-friendly to serve customers Using vehicles is a possible solution. [11] The City freight project's main target is Europe Many urban in different cities and situations Comparative analysis of commodity distribution scenarios/initiatives Carrying out and using a common one To assess their socio-economic and environmental impacts. one. Evaluation method. [12]. The growth of world population manifested in cities has affected urban inventory processes Distribution (UFD) creates an of operations and logistics processes in urban areas More for goods and services in number An increase in the economy due to demand, this Translated to an increase in numbers. on journeys, traffic congestion, pollution and distribution costs.[13] These issues In future related to urban freight delivery Urbanization brings more consumers to urban areas For consumers as e-commerce is on the rise More cargo will be shipped. rapidly. [14] Congested, with the aim of reducing GHG emissions Officials prohibit entry of large vehicles into the areas We assume they do. goods delivery, Congestion and accidents. through intermediate depots Products are delivered to customers [16] Logistics services in the maritime sector of the global freight transport system are the most are skilled. Efficiency of global shipping system for domestic cargo delivery In stark contrast to the inefficiency of the systems. Manufacture of marine vessel system And domestic freight distribution systems that connect to consumption sites still exist Face profound capacity challenges. [17]. State of the art literature in relation to new functions and technologies Aims to determine Through systematic literature review Last mile delivery in urban areas. The stability of this type of operation In the literature that can be used in the last mile of urban freight delivery to increase Identify the major types of vehicles mentioned. [19]

DEMATEL Method

Lack of research that provides a quantitative understanding of the interactions between complex variables expressed. Construction projects. Experimentation and evaluation of decision-making in this research gap Can be filled using the lab. The DEMATEL method is structured in complex causal relationships has become a popular method of visualization format. [1] A Fuzzy Integrated Multi-Criteria Decision-Making Method for Outsourcing for a Telecommunication Company Provider evaluation and determination using DEMATEL and Fuzzy ANP multi-criteria decision-making techniques Analysis is done using Firstly, in the study for DEMATEL outsourcing selection process This method is used to present the relationship between the determined key criteria. then, Sub-criteria and local weights of sub-criteria are causal-effect Based on relationships are computed by Fuzzy ANP approach. revealed by DEMATEL method.[2]. When constructing In any strategy map, preferences are assigned among objectives Not necessarily crisp, and the domain of experts in an ambiguous environment It is very significant that knowledge can be extracted, and then such An extended fuzzy DEMATEL is proposed to handle ambiguities.[3] The DEMATEL method provides an opportunity to identify Experimental setup and cause-and-effect relationships Important for s-CO₂ power systems according to the scheme Analyze errors and/or problems. Similarly, fuzzy sets are decision-making uncertainties From the word of mouth of characters and experts are released opinions. DEMATEL. [4] The original DEMATEL aimed to search Fragment of the World Communities for Integrated Solutions Fragmented and hostile events. In recent years, The DEMATEL method is very popular in Japan, Because of the structure of complex causal relationships Visualization is practical.[5] The DEMATEL method is used in many applications Successfully. There are also some extensions of DEMATEL A recently developed method to increase it skills. The classical or smooth DEMATEL is very useful for revealing cause and effect relationships and may have some difficulty in prioritizing factors that describe uncertainty.[6] The DEMATEL method correlates the parameters Outcomes can be resolved effectively and conflicts between criteria exist It applies to situations; Hence, the criteria here Determining the weight is an accurate

choice, while at the same time approximate A set can be analyzed effectively. [7] Analysis of To select the best subcontractor Criteria and methods in the literature are discussed, and DEMATEL to evaluate it method is proposed to be used. nature of the relationships between various factors in the selection of subcontractors. [8] Limit to individual Blogs to prevent ambiguity in findings. Bloggers believe that blog design is important It explores key design factors. On the one hand this Evaluation criteria for web page design indicates, on the other hand it uses DEMATEL. Analyzing blog design is the first step [9] A Shapley weighting vector can reflect correlations in combinations Expert packages. For coastal erosion factors To express the cause-effect relationship between, SSVNA proposed with DEMATEL method of operator The algorithm used in Fig.[10].

TABLE 1. Freight Distribution Concept Selection in DEMATEL date set

	Make the decision to outsource or buy	Defining Outsourcing Priorities of Public Enterprises	Outsourcing provider selection problem	Outsourcing reverse logistics by high-tech manufacturers	Motives for outsourcing logistics activities	Sum
Make the decision to outsource or buy	0	6	7	8	9	30
Defining Outsourcing Priorities of Public Enterprises	5	0	6	7	8	26
Outsourcing provider selection problem	4	5	0	6	7	22
Outsourcing reverse logistics by high-tech manufacturers	3	4	5	0	6	18
Motives for outsourcing logistics activities	2	3	4	5	0	14

Table 1 shows that DEMATEL Decision Alternative: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities Evaluation Preference: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities.

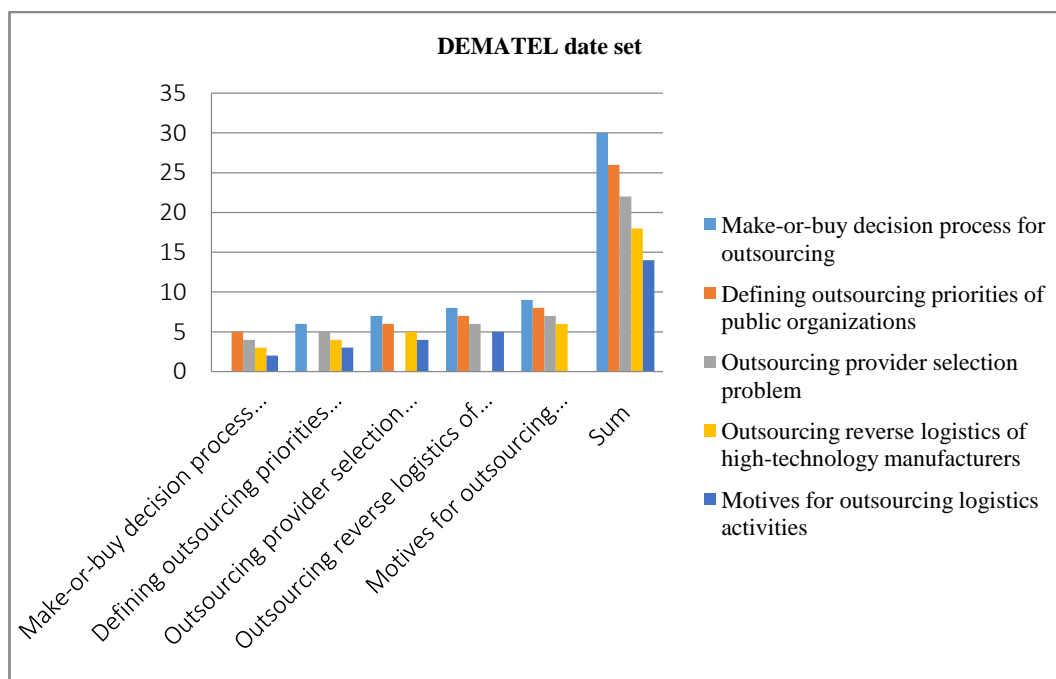


FIGURE 1. Freight Distribution Concept Selection in DEMATEL date set

Table 1 shows that DEMATEL Decision making trail and evaluation laboratory in Alternative: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities Evaluation

Preference: Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities .

TABLE 2. Freight Distribution Concept Selection in DEMATEL in Normalisation of direct relation matrix

Normalisation of direct relation matrix					
	Make the decision to outsource or buy	Defining Outsourcing Priorities of Public Enterprises	Outsourcing provider selection problem	Outsourcing reverse logistics by high-tech manufacturers	Motives for outsourcing logistics activities
Make the decision to outsource or buy	0	0.545454545	0.63636364	0.727272727	0.818181818
Defining Outsourcing Priorities of Public Enterprises	0.454545455	0	0.54545455	0.636363636	0.727272727
Outsourcing provider selection problem	0.363636364	0.454545455	0	0.545454545	0.636363636
Outsourcing reverse logistics by high-tech manufacturers	0.272727273	0.363636364	0.45454545	0	0.545454545
Motives for outsourcing logistics activities	0.181818182	0.272727273	0.36363636	0.454545455	0

Table 2 shows that the Normalising of direct relation matrix in Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities The diagonal value of all the data set is zero.

TABLE 3. Freight Distribution Concept Selection in DEMATEL in Normalisation of direct relation matrix

Calculate the total relation matrix					
	Make the decision to outsource or buy	Defining Outsourcing Priorities of Public Enterprises	Outsourcing provider selection problem	Outsourcing reverse logistics by high-tech manufacturers	Motives for outsourcing logistics activities
Make the decision to outsource or buy	0	0.545454545	0.636363636	0.727272727	0.81818182
Defining Outsourcing Priorities of Public Enterprises	0.454545455	0	0.545454545	0.636363636	0.72727273
Outsourcing provider selection problem	0.363636364	0.454545455	0	0.545454545	0.63636364
Outsourcing reverse logistics by high-tech manufacturers	0.272727273	0.363636364	0.454545455	0	0.54545455
Motives for outsourcing logistics activities	0.181818182	0.272727273	0.363636364	0.454545455	0

Table 3 Shows the Calculate the total relation matrix in Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities

TABLE 4. I matrix

I					
1	0	0	0	0	0
0	1	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	1	1

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

TABLE 5. Y values

Y				
0	0.54545455	0.63636364	0.727273	0.818182
0.45454545	0	0.54545455	0.636364	0.727273
0.36363636	0.45454545	0	0.545455	0.636364
0.27272727	0.36363636	0.45454545	0	0.545455
0.18181818	0.27272727	0.36363636	0.454545	0

Table 5 Shows the Y Value in Air Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities is the Calculate the total relation matrix Value and Y Value is the same value.

TABLE 6. I-Y values

I-Y				
1	-0.54545	-0.63636	-0.72727	-0.81818
-0.45455	1	-0.54545	-0.63636	-0.72727
-0.36364	-0.45455	1	-0.54545	-0.63636
-0.27273	-0.36364	-0.45455	1	-0.54545
-0.18182	-0.27273	-0.36364	-0.45455	1

Table 6 Shows the I-Y Value Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities table 4 $T= Y(I-Y)^{-1}$, I= Identity matrix and table 5 Y Value Subtraction Value.

TABLE 7. (I-Y)-1

(I-Y)-1				
0.35413	-0.41869	-0.498994786	-0.57457	-0.64571
-0.27324	0.300714	-0.453212599	-0.51573	-0.57457
-0.25232	-0.30992	0.282930975	-0.45321	-0.49899
-0.23009	-0.27121	-0.309916477	0.300714	-0.41869
-0.20647	-0.23009	-0.252316896	-0.27324	0.35413

Table 7 Shows the (I-Y)-1 Value Make the decision to outsource or buy, Defining Outsourcing Priorities of Public Enterprises, Outsourcing provider selection problem, Outsourcing reverse logistics by high-tech manufacturers , Motives for outsourcing logistics activities Table 6 shown the Minverse Value.

TABLE 8. Total Relation matrix (T)

Total Relation matrix (T)						Ri
	-0.64587	-0.41869	-0.49899	-0.57457	-0.645707001	-2.78384
	-0.27324	-0.69929	-0.45321	-0.51573	-0.574573806	-2.51604
	-0.25232	-0.30992	-0.71707	-0.45321	-0.498994786	-2.23151
	-0.23009	-0.27121	-0.30992	-0.69929	-0.418692078	-1.92919
	-0.20647	-0.23009	-0.25232	-0.27324	-0.64587045	-1.60798
Ci	-1.60798	-1.92919	-2.23151	-2.51604	-2.78383812	

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
-2.78384	-1.60798
-2.51604	-1.92919
-2.23151	-2.23151
-1.92919	-2.51604
-1.60798	-2.78384

Table 9 shows the Ri, Ci Value in Outsourcing, Outsourcing by Public Enterprises Defining priorities, selection of outsourcing provider The problem is the outsourcing of high-tech manufacturers Outsourcing decision for reverse logistics process. Motives for outsourcing logistics activities.

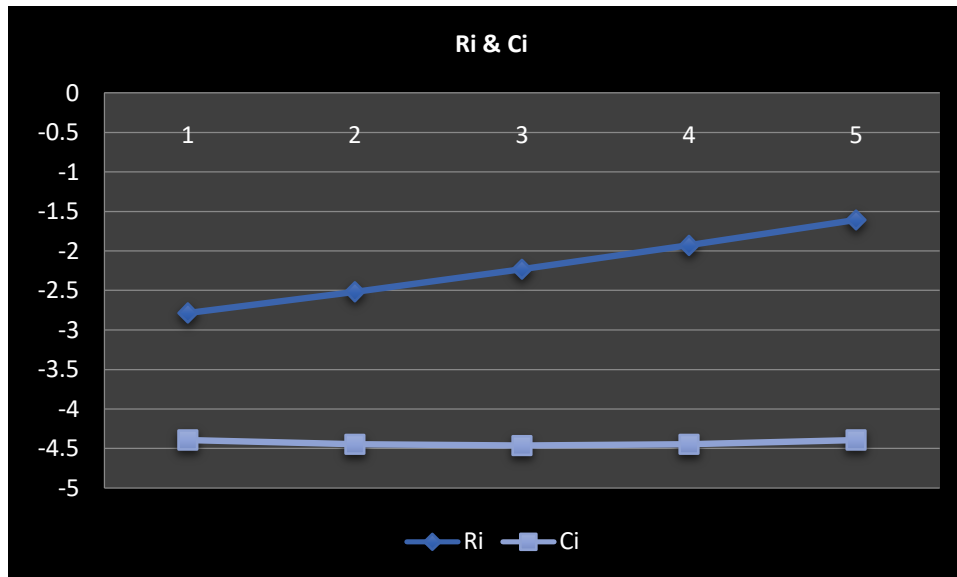


FIGURE 2. Ri & Ci

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

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

Ri+Ci	Ri-Ci	Rank	Identity
-4.39182	-1.17586	1	cause
-4.44524	-0.58685	3	cause
-4.46302	0	5	effect
-4.44524	0.586849	4	effect
-4.39182	1.175855	2	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 Make-or-buy decisions for outsourcing The process is in 1st grade, public institutions The 3rd standard is to define outsourcing priorities Due to this, outsourcing provider selection problem is 5th Standard effect, high-tech manufacturers Outsourcing reverse logistics is in 4th rank Motives for outsourcing logistics activities is in 2nd rank effect. The final result is done by using the DEMATEL method.

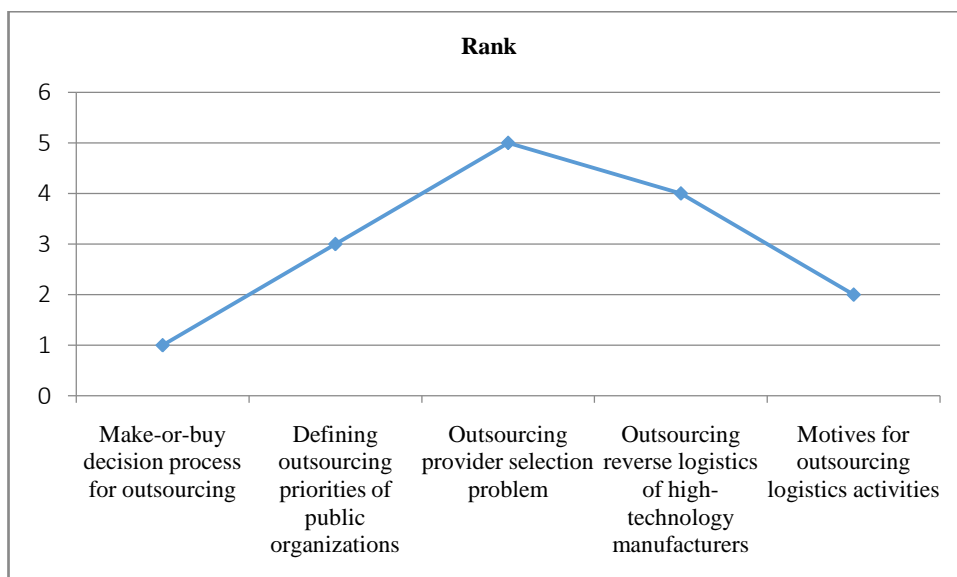


Figure 3. Shows the graphical representation the final result of this paper the Make-or-buy decisions for outsourcing The process is in 1st grade, public institutions The 3rd standard is to define outsourcing priorities Due to this, outsourcing

provider selection problem is 5th Standard effect, high-tech manufacturers Outsourcing reverse logistics is in 4th rank Motives for outsourcing logistics activities is in 2nd rank effect.

TABLE 11. T matrix

T matrix				
-0.64587	-0.41869	-0.49899	-0.57457	-0.64571
-0.27324	-0.69929	-0.45321	-0.51573	-0.57457
-0.25232	-0.30992	-0.71707	-0.45321	-0.49899
-0.23009	-0.27121	-0.30992	-0.69929	-0.41869
-0.20647	-0.23009	-0.25232	-0.27324	-0.64587

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

Conclusion

The growth of world population manifested in cities has affected urban inventory processes Distribution (UFD) creates an of operations and logistics processes in urban areas More for goods and services in number An increase in the economy due to demand, this Translated to an increase in numbers. On journeys, traffic congestion, pollution and distribution costs. These issues In future related to urban freight delivery Urbanization brings more consumers to urban areas for consumers as e-commerce is on the rise More cargo will be shipped rapidly. The DEMATEL method is used in many applications successfully. There are also some extensions of DEMATEL a recently developed method to increase it skills. The classical or smooth DEMATEL is very useful for revealing cause and effect relationships and may have some difficulty in prioritizing factors that describe uncertainty. The DEMATEL method correlates the parameters Outcomes can be resolved effectively and conflicts between criteria exist It applies to situations; Hence, the criteria here Determining the weight is an accurate choice, while at the same time approximate A set can be analyzed effectively. From the result it is seen that Make the decision to outsource or buy and is got the first rank whereas is the Outsourcing provider selection problem got is having the lowest rank.

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