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Estimation of Automotive Parts and Manufacturing Company Using ELECTRE Method

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Abstract: Discussions about remanufacturing was pioneered in the early 1900s by the first remanufacturing association, the Automotive Parts Remanufacturers Association (APRA), active since 1941.Since then, auto parts remanufacturing has gone through many evolutions and spread all over the place, growing and growing countries. Although the rules and regulations were enacted as early as 1940, history reveals that Robert Lund was the pioneering researcher in reproduction due to his major contributions to the field. Lund (1996) surveyed remanufacturers and found that tires, toner, cartridge, electrical equipment and auto parts dominate. Relative to cost and availability of replacement parts to auto parts remanufacturing, design issues, product diversity, clean efficiency, and workforce efficiency were considered, along with obtained through detailed discussions and studies among the breeders in Florida. Major acquisition planning in car parts remanufacturing is investigated through a comprehensive study among US auto parts remanufacturers to balance customer service avoid supply chain complexity Operations uncontrolled key inventory situations. Multi-criteria decision making (MCDM) is one of several decision-making methods used to select the best alternative based on several alternatives on some criteria; One of the methods that can be used is the Law of Elimination ET tests. The Realize (ELECTRE) comments that the method works users pair-wise comparisons of appropriate criteria based on each alternative. User values and speed ranking process, selection web-based application, because there is a lot of research about the decision support system, but only some are used for the application, and this research tries to use the ELECTRE method for web-based application.The alternatives are rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4). The Evaluation Parameter are Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), Continuous improvement manager (DM5).

1. Introduction

In this paper, the proposed approach is applied to a company active in the auto parts industry. P.P.T began operations in 1994 in the northern region of Tamil Nadu with the goal of creating industrial moulds and plastic components. After some time, we were allowed to access Iran's auto parts market. This company grew quickly and became a good corporation because to its ongoing efforts, which include updating equipment, depending on skilled human resources, and specialists, as well as adopting unique customer requirements and building new quality management systems. Known companies, manufacturers of components and polymer composites in the automotive industry Tamil Nadu. What is significant is that business has made a contribution to independence, decreased reliance, and increased domestic output through effective planning and current knowledge application. a 3D scanning and measurement device using a computer. The technology is made to scan car parts like pillars, doors, and mirrors.The system can create an outline surface point cloud and calculate an error distribution map relative design surface. The structure is built with aluminum T-slots. Four pairs of commercial projectors and high resolution commercial monochrome CCD cameras are mounted below the vehicle area sensors to measure the upper beams. A pair of sensors form a camera and a projector. This framework was created for in-depth geographic investigations. Four sensor pairs can measure the whole area because the inspection field is each little larger than a quarter of a huge vehicle area. The projected surface is fired by the projector. The height and curve of the surface distort the pattern. A camera records these aberrations, which are then utilised to build a 3D point cloud. The four patches are point clouds put together to depict the final complete area of a huge area after each sensor frame inside the point cloud is converted into a common frame. Because of the obvious benefits of auto parts remanufacturing, many companies in developed countries are effectively implementing remanufacturing. They breed inside their affiliates in various geographic locations around the world. The study considers the UK a leading organization with more than 30 facilities in 14 countries. They are involved in remanufacturing vehicle various products in developed countries and they started one of their companies in India. Henceforth we represent this firm as our suit firm. They are not new to the Indian environment as they have been active since 2007, but there are still significant differences between developed and developing environments. In India, they were unable to use the same strategies they had previously used in their other branches, so they eagerly approached our research team to help implement replication. They manufacture a variety of products including automotive components (brakes, calipers,

clutches, discs and flexible couplings), industrial brakes, wind power products and limit switches. Originally, they were used to remanufacture drive shafts from EOL vehicles as they were ready. The stems are collected through garages and collection centers through various strategies such as return policy, reverse logistics etc. Our research team recommends that we first assess the barriers to auto component remanufacturing for the Indian context. Our research team, through management-level discussions with some seniors, explained positive evaluations of the effects of the ban on the case company and they accepted our study. Although they are interested in reflective research and development projects, they have trouble understanding which steps to start. Therefore, this study is a pioneering approach to reproducibility from the perspective of their organization.

2. Materials and Method

ELECTRE is a one-time system to assist multi-criteria decisions. Elimination Et Choix Traduisant la Realit is where the name ELECTRE originates (Elimination and Choice Express Reality). Pairwise comparisons can also be used to assess and rank qualities and demerits using the ELECTRE method. When there are numerous possibilities yet particular criteria must be met, the ELECTRE method is utilised. If one or more criteria (relative to the criteria of other options) and the remaining criteria are equal, an alternative is said to dominate other alternatives in order to make the ELECTRE method's operation more straightforward. The main objective of this method is to select the preferred alternative that satisfies both the unity of multiple top option evaluation criteria and the priority criteria given under the conflict option. ELECTRE is typically comprised of three concepts: similarity index, contrast advantage index, and threshold value. In this study, our model Fuzzy ELECTRE decision maker is used by the team with feedback.

3. Result & Discussion

TABLE 1. AUTOMOTIVE PARTS MANUFACTURING COMPANY

	Supply chain manager (DM1)	**Production manager (DM2)**	**Shipping manager (DM3)**	**Shipping supervisor (DM4)**	**Continuous improvement manager (DM5)**
rajsriya automotive industries PVT. Ltd	45	34	30	27	23
Numann Auto Products Pvt. Ltd.	48	35	28	25	20
Sundram Precision Components Ltd	42	33	29	23	24
Prabha Automotive Engineers Pvt Ltd.	48	37	32	22	25

Table 1 Shows the Automotive Parts Manufacturing Company for analysis using the ELECTRE Method. Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), Continuous improvement manager (DM5) and rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4) it seen also for Data set of the value.

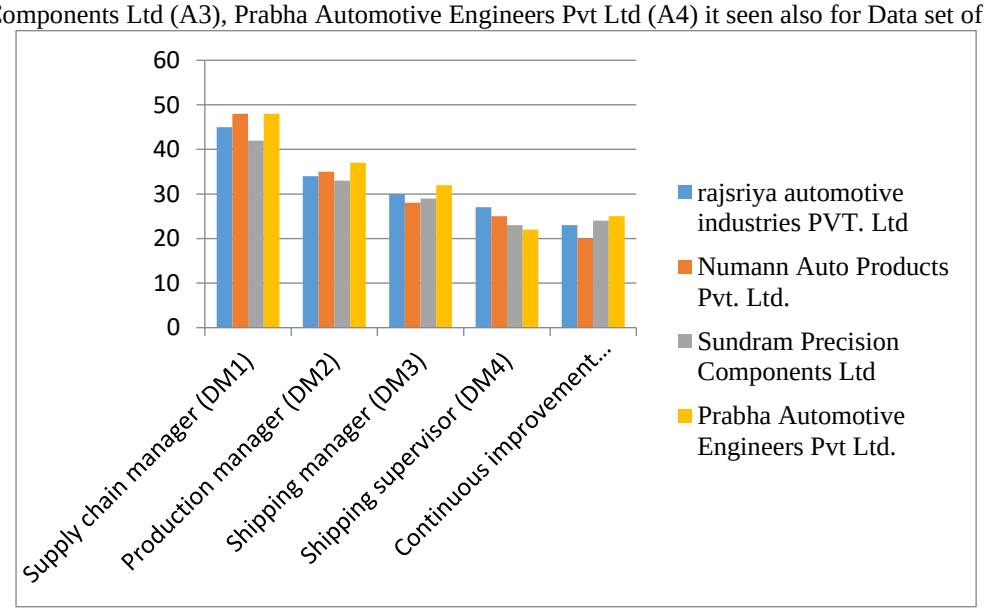

FIGURE 1. Automotive Parts Manufacturing Company

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TABLE 2. Automotive Parts Manufacturing Company Sum & Sqrt

	Supply chain manager (DM1)	**Production manager (DM2)**	**Shipping manager (DM3)**	**Shipping supervisor (DM4)**	**Continuous improvement manager (DM5)**
rajsriya automotive industries PVT. Ltd	2025	1156	900	729	529
Numann Auto Products Pvt. Ltd.	2304	1225	784	625	400
Sundram Precision Components Ltd	1764	1089	841	529	576
Prabha Automotive Engineers Pvt Ltd.	2304	1369	1024	484	625
SUM	8397	4839	3549	2367	2130
SQRT	91.6351461	69.56292	59.573484	48.65182422	46.15192304

Table 2 shows the Automotive Parts Manufacturing Company SUM & SQRT value of Alternative rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4). Evaluation Parameters in Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), and Continuous improvement manager (DM5). This table mention the SUM & SQRT value in Memory management is showing the highest value for Database management is showing the lowest value.

TABLE 3. Normalized Data Matrix

	Supply chain manager (DM1)	**Production manager (DM2)**	**Shipping manager (DM3)**	**Shipping supervisor (DM4)**	**Continuous improvement manager (DM5)**
rajsriya automotive industries PVT. Ltd	0.491078	0.488766	0.50358	0.554964	0.498354
Numann Auto Products Pvt. Ltd.	0.523816	0.503142	0.470008	0.513855	0.433351
Sundram Precision Components Ltd	0.458339	0.474391	0.486794	0.472747	0.520022
Prabha Automotive Engineers Pvt Ltd.	0.523816	0.531893	0.537152	0.452193	0.541689

Table 3. Shows the Normalized Data Matrix of Alternative rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4). Evaluation Parameters in Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), Continuous improvement manager (DM5) is Normalized Data Matrix value.

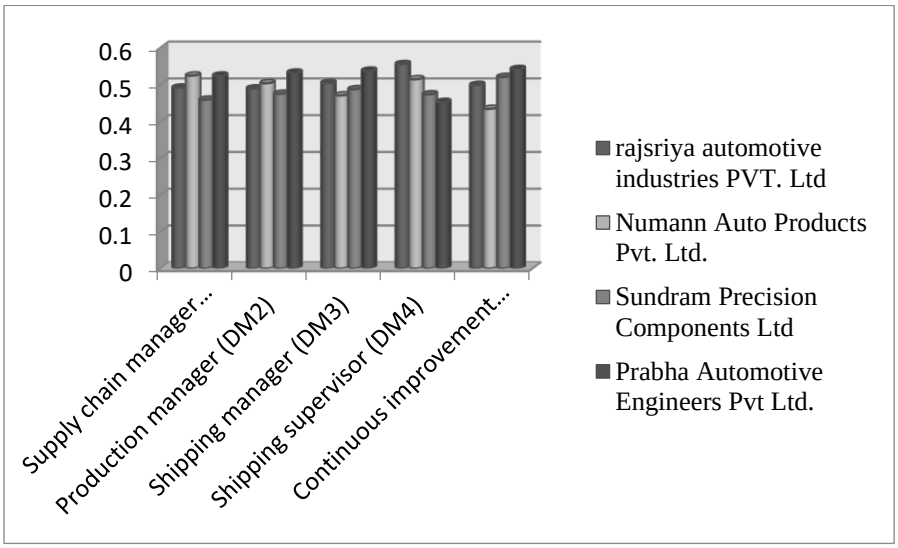

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TABLE 4. Weighted Normalized Matrix

	0.2336	0.1652	0.3355	0.1021	0.0424
	Supply chain manager (DM1)	**Production manager (DM2)**	**Shipping manager (DM3)**	**Shipping supervisor (DM4)**	**Continuous improvement manager (DM5)**
rajsriya automotive industries PVT. Ltd	0.114716	0.080744	0.168951	0.056662	0.02113
Numann Auto Products Pvt. Ltd.	0.122364	0.083119	0.157688	0.052465	0.018374
Sundram Precision Components Ltd	0.107068	0.078369	0.163319	0.048267	0.022049
Prabha Automotive Engineers Pvt Ltd.	0.122364	0.087869	0.180214	0.046169	0.022968

Table 4 Shows the Weighted Normalized matrix value of the rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4). Evaluation Parameters in Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), Continuous improvement manager (DM5) in Normalized Data Matrix multiplication criterion Weights this will be going to multiply again will be constant Weighted Normalized matrix value.

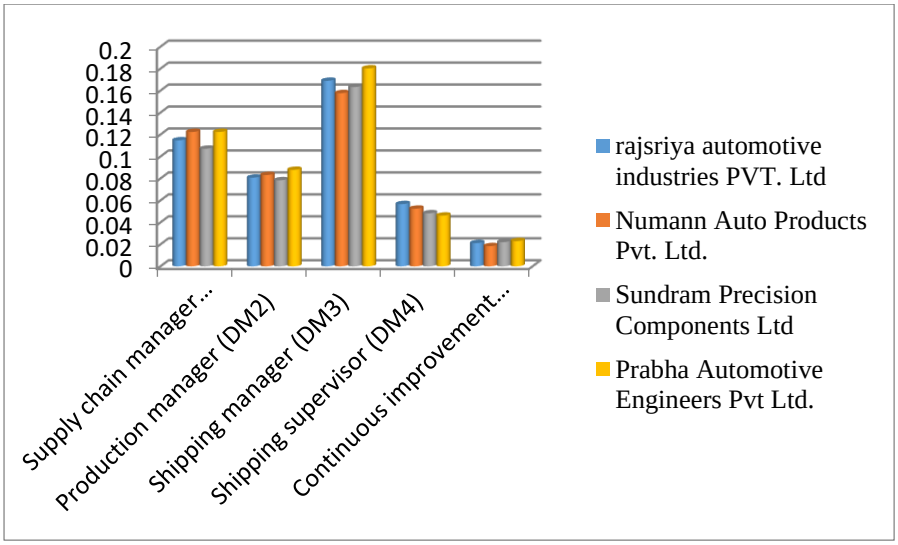

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TABLE 5. Concordance Interval Matrix &Amp; Discordance Interval Matrix

C12 ={2}	D12 = {1,3,4,5,6}
C13 = {3,5}	D13={1,2,4,6}
C14 = {2}	D14={1,3,4,5,6}
C21={1,3,4,5,6}	D21={2}
C23={1,3,5}	D23={2,4,6}
C24={1,4}	D24={2,3,5,6}
C31={1,2,4,6}	D31={3,5}
C32={2,4,6}	D32={1,3,5}
C34={1,2,4,6}	D34={3,5}
C41={1,3,4,5,6}	D41={2}
C42={2,3,5,6}	D42={1,4}
C43={3,5}	D43={1,2,4,6}

Table 5 shows the Concordance Interval Matrix &Discordance Interval Matrix is showing the Common Value.

TABLE 6. Concordance Value

0	0	1	1	1
1	1	1	1	0
0	0	0	1	0
1	1	0	0	0
1	1	0	1	0
1	0	0	1	0
0	0	0	0	1
0	0	1	0	1
0	0	0	1	0
1	1	1	0	1
1	1	1	0	1
1	1	1	0	1

Table 6 Shows the Concordance Value for Automotive Parts Manufacturing Company using the ELECTRE Method =IF (I12=I13,1,0) to =IF(N14=N15,1,0) is the Common Value.

TABLE 7. Concordance Interval Matrix

Concordance Interval Matrix						
	M1	**M2**	**M3**	**M4**		
M1	0	0.1652	0.3779	0.1652	0.7083	
M2	0.7136	0	0.6115	0.3357	1.6608	
M3	0.5009	0.2673	0	0.5009	1.2691	
M4	0.7136	0.5431	0.3779	0	1.6346	
	1.9281	0.9756	1.3673	1.0018	5	**0.5**

Table 7 Shows the Concordance Interval Matrix in shown the value Table 4 addition of I10 to N10.

TABLE 8. Concordance Index Matrix

CONCORDANCE INDEX MATRIX				
	M1	M2	M3	M4
M1	0	0	0	0
M2	1	0	1	0
M3	1	0	0	1
M4	1	1	0	0

Table 8 Shows the Concordance Interval Matrix in shown the value of Automotive Parts Manufacturing Company using the ELECTRE Method =IF(J29=0.5,1,0) to =IF(M32>=0.5,1,0) is the Concordance Interval Matrix.

TABLE 9. Discordance Value

D12	0.00692336	0.002157	0.0100598	0.003764095	0.002487908
	1				
D13	0.00692336	0.002157	0.0050299	0.007528191	0.000829303
	1				
D14	0.00692336	0.006472	0.0100598	0.009410238	0.001658605
	1				
D22	0.00692336	0.002157	0.0100598	0.003764095	0.002487908
	0.21446616				
D23	0.01384672	0.004315	0.0050299	0.003764095	0.003317211
	0.31162564				
D24	0	0.004315	0.0201197	0.005646143	0.004146513
	1				
D32	0.00692336	0.002157	0.0100598	0.003764095	0.002487908
	1				
D33	0.01384672	0.004315	0.0050299	0.003764095	0.003317211
	1				
D34	0.01384672	0.00863	0.0150898	0.001882048	0.000829303
	1				
D42	0.00692336	0.006472	0.0100598	0.009410238	0.001658605
	0.64339848				
D43	0	0.004315	0.0201197	0.005646143	0.004146513
	0.28062771				
D44	0.01384672	0.00863	0.0150898	0.001882048	0.000829303
	0.9176231				

Table 9 Shows the Discordance value of Automotive Parts Manufacturing Company Table 4 Weighted Normalized matrix and table 5 Concordance Interval Matrix & Discordance Interval Matrix or using the Formula =ABS(B43-B44) and Maximum is shown the operating system Value.

TABLE 10. Discordance Interval Matrix

Discordance Interval Matrix					
	M1	M2	M3	M4	
M1	0	1	1	1	3
M2	0.21446616	0	0.3116256	1	1.526091798
M3	1	1	0	1	3
M4	0.64339848	0.280628	0.9176231	0	1.841649292
	1.85786465	2.280628	2.2292487	3	9.36774109
				d bar	**0.780645091**

Table 10 show the Discordance Index matrix for Automotive Parts Manufacturing Company is using the Table 9 Discordance value.

TABLE 11. Discordance Index Matrix

Discordance Index Matrix				
	M1	M2	M3	M4
M1	1	0	0	0
M2	1	1	1	0
M3	0	0	1	0
M4	1	1	0	1

Table 11 show the Discordance Index matrix for Automotive Parts Manufacturing Company is using the Table 8 Discordance value.

TABLE 12. Final Result of Net Superior Value & Net Inferior Value

	Net Superior Value	Rank	Net Inferior Value	Rank
M1	1.9281	1	1.8578646	4
M2	0.9756	4	2.2806277	2
M3	1.3673	2	2.2292487	3
M4	1.0018	3	3	1

Table 12 Shows the Final Result of Net superior value & Rank of the Net Inferior Value (Concordance Interval Matrix) Supply chain manager (DM1), Production manager (DM2), Shipping manager (DM3), Shipping supervisor (DM4), Continuous improvement manager (DM5) and rajsriya automotive industries PVT. Ltd (A1), Numann Auto Products Pvt. Ltd (A2), Sundram Precision Components Ltd (A3), Prabha Automotive Engineers Pvt Ltd (A4). rajsriya automotive industries PVT. Ltd (A1), is showing the Highest Value for Net superior value and Numann Auto Products Pvt. Ltd (A2) is showing the Lower value. Prabha Automotive Engineers Pvt Ltd (A4) is showing the Highest Value for Net Inferior Value and rajsriya automotive industries PVT. Ltd (A1) is showing the Lower value.

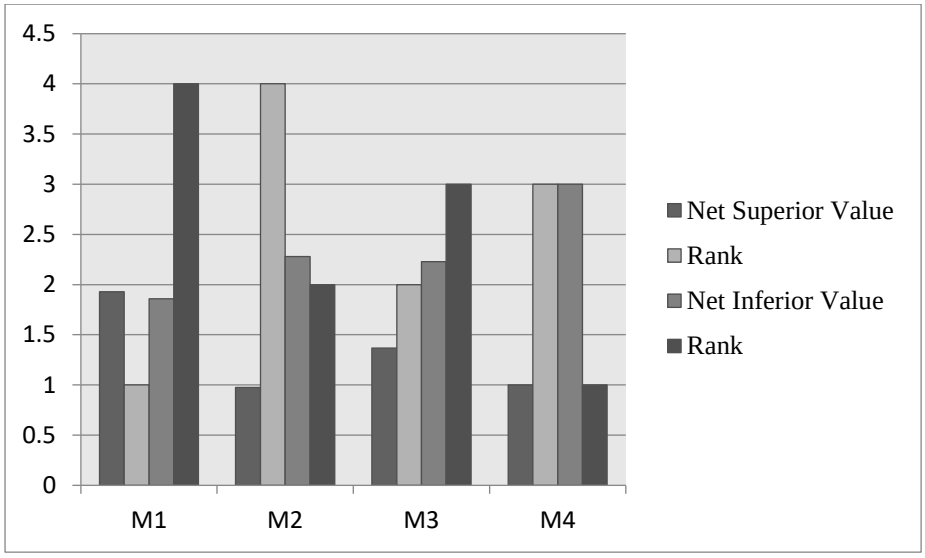

FIGURE 4. Shown the Rank

Figure 4 Final Result of Net superior value & Net Inferior Value Ranking of Operating system for analysis using the ELECTRE Method. Prabha Automotive Engineers Pvt Ltd (A4) is showing the first rank for Net Inferior Value and rajsriya automotive industries PVT. Ltd (A1) is showing the lowest rank.

4. Conclusion

A study has been conducted to find out the growth status of auto parts remanufacturing industry in Tamil Nadu. Tamil Nadu's industrial sector is expanding at the direction of the government and is impacted by both market laws and government regulations. According to research findings, there has been unfair competition for recycled materials as a result of subpar regulatory oversight. Businesses who engage in considerable criminal activity disturb the market's order by driving up the cost of used goods, tarnishing the reputation of recycled goods, endangering the interests of customers, and taking advantage of security flaws. The government must enhance policies, market oversight, and policy incentives in order to modify the situation. Manufacturing firms should increase system performance, tighten quality control, and strengthen product incentives.

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