Identification and Evaluation of Attrition's Research Dimension: A Causal Approach

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Abstract

Purpose: *Attrition is one of the most common and yet critical problems that the organizations are facing today. This case research analyzes factors affecting attrition in the selected case firm. The methodology used for the causal analysis and prioritization is Decision Making Trial and Evaluation Laboratory (DEMATEL).*

Approach: *Based on the inputs received from the experts of the case firm, 7 research dimensions are chosen that affect attrition the most. The effect/influence of each of these factors on one another is recorded in the Direct Influence Matrix on the scale of 0 to 4 (0 being the least and 4 being the most). For this purpose, inputs provided by experts from the case firm including HR professionals and senior management are used.*

The DEMATEL method is then applied to analyze the causal relations among the factors affecting attrition. The factor which has the highest degree of influence is also identified. Based on the findings of the analysis, the impact relations map is generated by selecting the alpha value for graphical representation of the prioritization analysis.

Findings: From the analysis it is found that the top 3 factors that have the highest degree of influence on attrition are –

1. *Cost to Company (CTC)*
2. *Location*
3. *Poaching by Competitors*

Keywords: DEMATEL, Direct Influence Matrix, Total Relation Matrix, Impact Relation Map, Alpha Value

1. INTRODUCTION

1.1 About the Case

Attrition is one of the most common problems that the organizations face today. Attrition for a particular organization depends on various factors specific to that organization. With the increase in the complexity of business processes, the dynamic nature of the market and employees' urge to move up in ladder of the career rapidly, formulate employee policies to minimize attrition has become tougher for senior management and the HR professionals.

Prioritizing the factors that affect attrition the most has become the need of the day. This helps in addressing the issue with the efficient utilization of limited resources. One of the objectives of this case research is to identify such a factor/criterion which has the highest effect on other factors and which is affected the most by other factors. Developing a core competency in Multi Criteria Decision Making (MCDM) also gives the firm the competitive advantage over others.

Causal analysis is the prime activity in MCDM. The research work studies the application of DEMATEL methodology for causal analysis.

The objectives of this case research project are to-

) Identify the various criteria which are taken into consideration in decision making to counter attrition by the top level management of the chosen case firm.

⟩ Evaluate the influence of the identified criteria on one another i.e. the inter-relationship among the criteria.

⟩ Identify the criterion which has the highest degree of influence using DEMATEL.

⟩ Generate the impact relations map based on the results of DEMATEL method.

1.2 Overview

Firm M/s Speedo Automobile is a leading Indian multinational automobile manufacturing corporation. It is operating based out of variouslocations in India. It has adapted through various market conditions and is catering to the changing market requirements. A key to success in the global market is the best interdisciplinary co-ordination to deliver best quality product to the consumer within stipulated time. Automobile service workshops are facing a lot of problems relating employee retention now a day. As per company's principles, employees are the most precious asset. But, due to various factors, discussed further in this study, the retention of the employees has become a problem and the costs due to attrition have risen to a great extent causing losses to the firm.

Decision-Making Trial and Evaluation Laboratory (DEMATEL) methodology is very effective to evaluate cause-effect relationship and is tested in various fields ranging from human resource management, knowledge management to risk management. Here, in the study, DEMATEL methodology is applied to prioritize the causes based on their relative importance.

1.3 Introduction to Automotive industry:

The manufacturing sector related to the production of motor vehicles and their components such as bodies and engines. The components are manufactured and then assembled and the vehicle is the ready for testing. There are complementary firms relating to the automobile industry which deal with tires, batteries and fuel. The principal output products of the firms in automobile industry are passenger automobiles the (hatchback cars, sedan cars and the SUVs), Commercial vehicles used for product delivery (trucks and tempos), sports utility vehicles and van. The automotive engines are basically of two types i.e. Gasoline and diesel engines. The modernization of the industry has taken place where now there are different types of engines using CNG, LPG and also electricity.

The automotive industry has faced a massive expansion after the World War II. Importantly, this expansion occurred outside the United States and the world production increased almost 10-fold. Soon India became fastest growing automobile market in the world after China.

1.4 Introduction to Case Firm:

Speedo Automobile's core businesses include manufacturing, distribution and sale of farm equipment and utility vehicles. Speedo Automobile also produces utility vehicles and tractors. In the automobile sector the company manufactures LCVs, cars, jeeps, multi utility vehicles and three wheelers. Its activities in the farm equipment sector comprise design development, manufacturing and marketing of moving and construction equipment and manufacturing of industrial engines. The company also manufactures light armored multi-role vehicles, simulators for weapons & weapon systems and mobile surveillance platforms. The company has sales offices with a supporting network of dealers throughout the country. Speedo Automobile also has a presence in the international market. One of the R & D centers of Speedo Automobile Ltd is currently facing a very high attrition rate. The HR and the top level management is progressively working to finding a solution to this problem.

2.0 Literature Review:

Neog and Barua (2015) have written a case on 'Factors Affecting Employee's Retention in Automobile Service Workshops of Assam'. This paper has an aim to study relationships in between Job security and employee retention, Job satisfaction and employee retention, Work life balance and employee retention and Compensation with employee retention in the Automobile service workshops and also has an aim to make a Comparative analysis of difference in employee's retention in the job depending on the employee's tenure with the present organization and different age group of the employees working in the Automobile service

workshops of Assam using correlation technique of statistics in their study. The study was focused on Compensation, Training and Development opportunities, Career opportunities and promotion, Reward and Recognition, Work-life balance, Work environment, Performance Appraisal, On the job interview/stay interview, Job satisfaction, Leadership, Distributive justice, Supervisor support as the primary factors. This study resulted that among sixteen factors, Job security is the most important factor for retaining employees.

Liu and Morrison (2014) have studied on 'U.S. Medical School Full-time Faculty Attrition' with the help of comparing attrition rates across time as well as across groups applying regression on the data based on the factors rank, gender, race/ethnicity, department of appointment, and degree type. The study concluded that assistant professors left more quickly than associate professors, faculty with M.D. degrees left institutions more quickly than faculty with Ph.D.

Another study on 'Health workforce attrition in the public sector in Kenya: a look at the reasons' conducted by Chankova, Muchiri and Kombe (2009) as title suggests, focuses on attrition rate in Health workforce in the public sector in Kenya. This study analyzed data from a human resources health facility survey conducted in 2005 in 52 health centers and 22 public hospitals (including all provincial hospitals) across all eight Provinces in Kenya. It was utilized to study the status of attrition rates and the proportion of attrition due to retirement, resignation or death among doctors, clinical officers, nurses and laboratory and pharmacy specialists in surveyed facilities. The findings indicate that appropriate policies to retain staff in the public health sector may need to be tailored for different cadres and level of health facility.

Sharmistha Banerjee and SumanaGuha in 2010 have done a research on 'Employee Attrition in Engineering Firms: Case Study of DCIPS Pvt. Ltd, India' with the help of study of exit documents and applying regression on the data. The purpose of their study is to investigate and analyze the causal factors influencing attrition and how engineering firms can retain their operational employees in DCIPS Pvt. Ltd, India. The study states that in DCIPS to get promotion graduate degree in engineering or master degree is required. Most high level employees possess master degree in engineering. Since the employees are more ambitious so for better opportunity they left DCIPS.

Nickson and Hughes (2010) researched on 'A National Issue: Analysis of Factors Influencing Special Education Teachers' Retention and Attrition in Texas Public Schools'. The study examined factors associated with the retention and attrition of special education teachers in Texas public schools. With the help of Survey and statistical approach the study concluded that campus administration, mentors and colleagues, and parental support factors have a role in special education teachers' retention and attrition amongst the factors Campus administration, Central Office, Mentors, Colleagues, Parental Support, School Climate.

Another approach by Adhikari (2009) examines the relationship between the high attrition rate in the Indian Information Technology (IT) and Information Technology Enabled Services (ITES) sector. In his paper titled 'Factors Affecting Employee Attrition: A Multiple Regression Approach' data collected from several IT companies is analyzed using multivariate techniques. Principal component analysis has been performed to find the underlying dimensions for job attrition. Multiple regressions are then used to examine the significant for the high rate of job switching among its employees. The study deduces that work related issues; employer related issue and skill of employees have highest effect on the attrition rate. Interestingly, the compensation has the lowest effect on attrition meaning employees give more importance to the quality of job and employer's treatment than salary. It implies that employers should be more careful in assigning tasks to particular employees and a work group, based on the employee's interest.

High attrition rates, regionally or nationally also give rise to wage inflation, as salary levels spiral upward in an attempt to retain existing staff and attract new ones (Economist Intelligence Unit(EIU), 2007). A study on 'Employee Attrition in the Malaysian Service Industry: Push and Pull Factors' conducted by Ho, Downe and Loke (2010) explore the factors influencing the intention to turn-over among young, well-educated professionals within the Malaysian service industry. Survey was conducted in two phases in order to collect quantitative and qualitative data from young, well-educated service professionals aged between 23 to 32, in jobs where primary responsibilities involves providing services to customers, end-users or Business-to-Business (B2B) services to manufacturing, transportation and storage, agri-business and biotechnology clients

in Malaysia. The results showed that there was a high tendency for young employees to switch jobs. This was motivated by both push factors (interference with work-family-lifestyle balance, poor relations with co-workers, work stressors, unsatisfactory supervisory relationships) and pull factors (offers of better compensations, more interesting work, promotion opportunities, and desire to return for academic studies)

Based on the literature review, it is inferred that causal analyses for the diverse factors that affect attrition has been the topic of research by many researchers and scholars. However these analyses use either descriptive statistics or regression models for the purpose. Regression models are best suitable for those analyses where the independent variables do not bear any relationship amongst themselves. If they do, then the analysis is not reliable. DEMATEL methodology overcomes this limitation. The approach prioritizes that criterion/dimension which affects the dependent variable the most. Moreover, it points out that dimension which is getting affected the most by the other dimensions of the analysis.

3.0 Methodology:

The DEMATEL model can convert the relationship between the causes and effects of criteria into an intelligent structural model. DEMATEL is able to evaluate and formulate all complicated & inter-related cause and effect relationships in each structural model. Graph theory is the foundation of DEMATEL. It empowers us to have advanced realizing of casual relationships by dividing important and related issues to cause and effect.

This methodology is able to verify interdependence among the unpredictable features or attributes and reflects the interrelationship between variables by improving the directed graph. It also helps to understand practical solution identification, particular problem and even the cluster of complicated problems. DEMATEL procedure has its last step as Impact Relation Map (IMR). In DEMATEL structure, each of the parts or the criterions may influence on other higher or lower level factors. The outcome of this method is used for decision making and applying feedback.
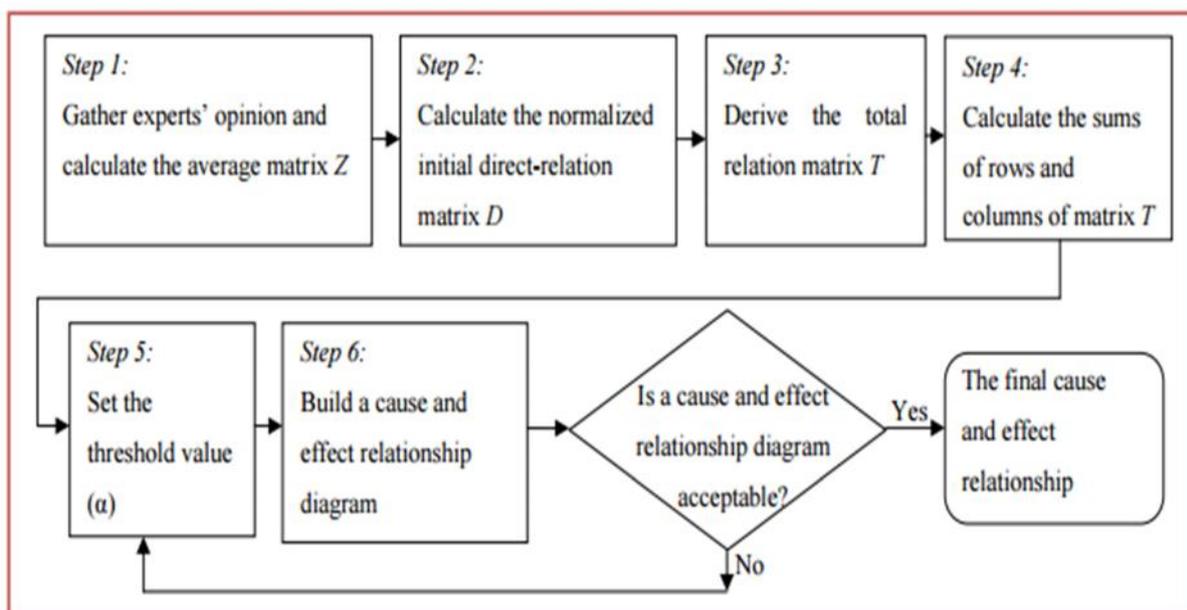

Fig 1: DEMATEL methodology detailed steps (Source: Sumrit and Anuntavoranich (2013).)

3.1 Steps for DEMATEL Analysis:

Step1: Identification of direct influence matrix (D)-The first step in DEMATEL is to calculate direct influence matrix with the help of expert views. The matrix D equals:

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0	d12	d12	...	d1n
d21	0	d23	...	d2n
d31	d32	0	...	d3n
:	:	:	:	:
dn1	dn2	dn3	...	0

Step 2: Determine the normalized direct influence matrix (N)

$M = \min\ [1/(\max\sum_{j=1}^{n} dij),\ 1/(\max\sum_{i=1}^{n} dij)]$ ....equation (1)

N=D/M …………………………………………………………….equation (2)

Step 3: Determine the total influence matrix (T).

Tcan be acquired by using equation (3)

$T = N\ (I-N)^{-1}$ ....equation (3)

Step 4: Obtain theDegree of Influence of the dimensions and cause and effect diagram with the help of total influence matrix.

Dimension	d	R	d+R	d-R
1	X1	X2	X3	X4
2	X5	X6	X7	X8
3	X9	X10	X11	X12
4	X13	X14	X15	X16

Step 5: Set a threshold value ( ); the threshold value was computed by the average of the elements in matrix. This calculation aimed to eliminate some minor effects elements in matrix T.

$$= \sum_{i=1}^{n} \sum_{j=1}^{n} Tij$$

Step 6: Build a cause and effect relationship diagram The cause and effect diagram is constructed by mapping all coordinate sets of (ri +ci, ri -ci) to visualize the complex interrelationship and provide information to judge which are the most important factors and how influence affected factors . The factors that Tij is greater than ɫ, are selected shown in cause and effect diagram.

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4.0 DEMATEL Methodology to prioritize the factors that affect attrition in Speedo Automobile Ltd.

Initial Direct Influence Matrix: Based on the inputs received from HR professionals and experts in the case firm, the Initial Direct Influence Matrix obtained. The subsequent steps of the methodology are as follows:

Step1. Initial Direct Influence Matrix

	CTC	Location	Work Profile	Work Culture	Promotions/ Recognition	Poaching by competitors	Employee Marital Status	Sum
CTC	0	4.5	3.5	1	4.5	3.5	3.5	**20.5**
Location	1.5	0	0.5	1	0.5	3.5	1	8
Work Profile	3.5	2.5	0	1	2.5	2	2.5	14
Work Culture	1	3	1	0	2	2.5	2	11.5
Promotions/Recognitions	1	2	3.5	3	0	3	2	14.5
Poaching by competitors	2.5	4	3	1.5	2.5	0	1	14.5
Employee Marital Status	2.5	2.5	2	1	1	0.5	0	9.5
Sum	12	18.5	13.5	8.5	13	15	12	

Normalization factor = 1/20.5 = 0.048

Step2. Normalized Matrix:

	CTC	Location	Work Profile	Work Culture	Promotions/Recognition	Poaching by competitors	Employee Marital Status
CTC	0.00	0.22	0.17	0.05	0.22	0.17	0.17
Location	0.07	0.00	0.02	0.05	0.02	0.17	0.05
Work Profile	0.17	0.12	0.00	0.05	0.12	0.10	0.12
Work Culture	0.05	0.15	0.05	0.00	0.10	0.12	0.10
Promotions/Recognitions	0.05	0.10	0.17	0.15	0.00	0.15	0.10
Poaching by competitors	0.12	0.20	0.15	0.07	0.12	0.00	0.05
Employee Marital Status	0.12	0.12	0.10	0.05	0.05	0.02	0.00

Step3. Inverse matrix of I-N, (I-N)$^{-1}$

	CTC	Location	Work Profile	Work Culture	Promotions/Recognition	Poaching by competitors	Employee Marital Status
CTC	1.24	0.53	0.41	0.22	0.43	0.44	0.37
Location	0.17	1.16	0.14	0.12	0.14	0.28	0.14
Work Profile	0.32	0.36	1.19	0.17	0.29	0.30	0.28
Work Culture	0.18	0.32	0.19	1.10	0.22	0.28	0.21
Promotions/Recognitions	0.22	0.34	0.33	0.25	1.18	0.34	0.25
Poaching by competitors	0.28	0.42	0.32	0.19	0.29	1.22	0.21
Employee Marital Status	0.23	0.28	0.22	0.13	0.17	0.18	1.12

Step4. Total Relation Matrix:

	CTC	Location	Work Profile	Work Culture	Promotions/Recognition	Poaching by competitors	Employee Marital Status	Sum (R)
CTC	0.24	0.53	0.41	0.22	0.43	0.44	0.37	2.63
Location	0.17	0.16	0.14	0.12	0.14	0.28	0.14	1.15
Work Profile	0.32	0.36	0.19	0.17	0.29	0.30	0.28	1.93
Work Culture	0.18	0.32	0.19	0.10	0.22	0.28	0.21	1.50
Promotions/Recognitions	0.22	0.34	0.33	0.25	0.18	0.34	0.25	1.91
Poaching by competitors	0.28	0.42	0.32	0.19	0.29	0.22	0.21	1.94
Employee Marital Status	0.23	0.28	0.22	0.13	0.17	0.18	0.12	1.33
Sum (D)	1.65	2.42	1.80	1.18	1.72	2.04	1.59	

R (for a particular dimension) indicates the total degree of influence of that dimension on other dimensions.

D (for a particular dimension) indicates the degree with which that dimension is getting influenced by all other dimensions.

Nature, Intensity Table:

	D	R	D+R	D-R
CTC	2.39	2.63	5.02	-0.24
Location	2.42	1.15	3.56	1.27
Work Profile	1.80	1.93	3.73	-0.13
Work Culture	1.18	1.50	2.68	-0.33
Promotions/Recognitions	1.72	1.91	3.63	-0.19
Poaching by competitors	2.04	1.94	3.98	0.09
Employee Marital Status	1.59	1.33	2.91	0.26

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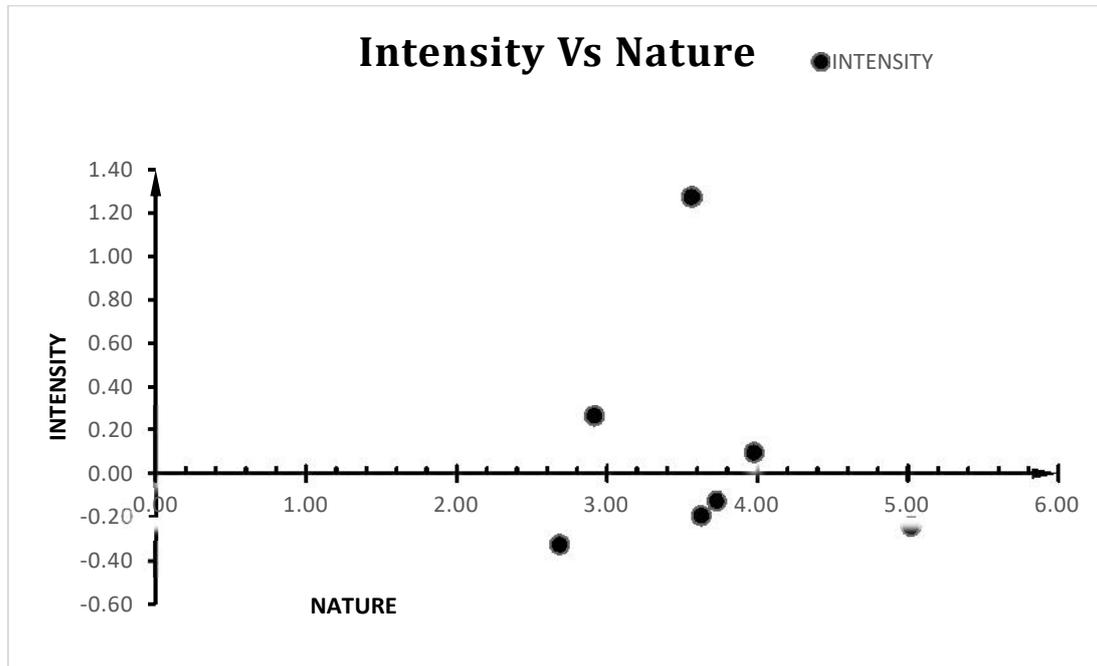
The top three prioritized dimensions based on analysis are:
) CTC
) Poaching by competitors
) Work Profile

The threshold value is calculated from T$_{ij}$ of Total Influence Matrix, = 0.253

	CTC	Location	Work Profile	Work Culture	Promotions/Recognition	Poaching by competitors	Employee Marital Status	Sum (R)
CTC	0.24	**0.53***	**0.41***	0.22	**0.43***	**0.44***	**0.37***	2.63
Location	0.17	0.16	0.14	0.12	0.14	0.28	0.14	1.15
Work Profile	**0.32***	**0.36***	0.19	0.17	**0.29***	**0.30***	**0.28***	1.93
Work Culture	0.18	**0.32***	0.19	0.10	0.22	**0.28***	0.21	1.50
Promotions/Recognitions	0.22	**0.34***	**0.33***	0.25	0.18	**0.34***	0.25	1.91
Poaching by competitors	0.28	**0.42***	**0.32***	0.19	**0.29***	0.22	0.21	1.94
Employee Marital Status	0.23	**0.28***	0.22	0.13	0.17	0.18	0.12	1.33
Sum (D)	1.65	2.42	1.80	1.18	1.72	2.04	1.59	

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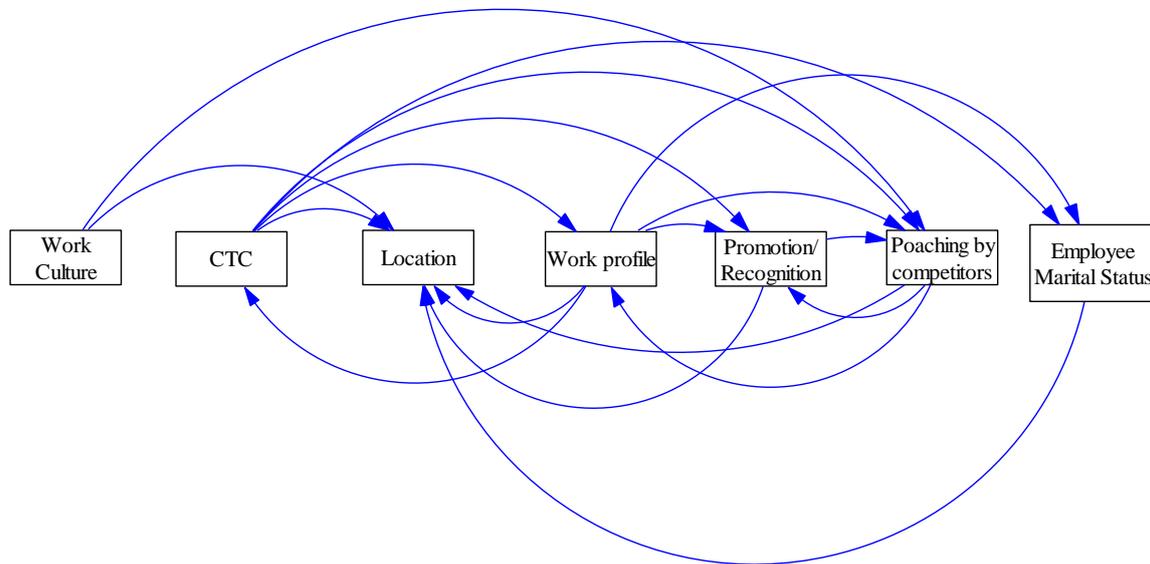Volume 4, Issue 7
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Causal Relations Map:

Figure 1: Impact relations map for dimensions affecting Attrition

Conclusion:

This case research has identified the major dimensions that affect attrition in the selected case firm. Using DEMATEL methodology, the importance of these dimensions is prioritized and causal relations among them are identified. The dimensions that have the most influence on other dimensions and also on attrition have been identified. This implies that the management of the case firm should focus more on these top three dimensions to counter attrition effectively.

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