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Research Article

EXPLAINING THE RELATIONSHIP BETWEEN THE CHARACTERISTICS OF ADMINISTRATIVE BUREAUCRACY AND JOB EXHAUSTION OF NATIONAL BANK CITY OF GORGAN

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ABSTRACT
This study aims to determine the bureaucracy level by using burnout factors of Melli Bank staffs in Gorgan province thorough rough sets. This research is a descriptive applied research. Research statistical sample was 317 employees of Melli Bank in Gorgan Province in 2010. Study sample was estimated 169 by using Kerjesi-Morgan table and Cochran formula. Data gathering tool was Meslesh burnout inventory and bureaucracy characteristics researcher-constructed questionnaire that their validity was determined with the help of Cronbach alpha as (α=0.781) and (α=0.872), respectively. Rough set theory (RST) was used in this study in order to augmenting data and concluding that after determining the maximum and minimum scores of respondents and decision variable, decision tables was formed and then compatible and incompatible cases were identified and augmenting table was formed. Results showed that if emotional burnout is in the lower level, bureaucracy is certainly low in the organization and when the personality metamorphosis variable is in average level, bureaucracy is in average level and if lack of personal success was high in organization, bureaucracy is in high level in the organization.

Keywords: *Bureaucracy; Burnout, Rough Sets Theory (RST)*

INTRODUCTION
Employment is one of the most basic activities of human life and each individual should work much of his time for living and life continue. Employment is directly related to person's physical and mental health and is ground of his spiritual needs (Shafi, 2004).
The job, irrespective of financial offer can satisfy some of the basic needs of man such as physical and mental stimulation, social contact, self- esteem, confidence and ability. However, job can also be a major source of psychological stress. According to Freudenberger (1975), if psychological stress is low it will act as a motivational force and increase business stress. But if the stress is too much, it will create disturbances in the person performance. Psychological stress is a type of occupational stress that cause job dissatisfaction and cause a negative impact on personal, social and family life (Khalifeh, 2002).
Many studies have been done on the study of mental health of practitioners indicate that the bad conditions of working environment have negative effects on mental health of employees that these adverse effects can be considered in family life of staff (Schaufeli *et al.*, 2005).
One of the concepts that has attracted in recent years, industrial- organizational psychologists is coming down, the spirit falls, lethargy, sluggishness and apathy of job managers that colloquially it is known as exhaustion (Saatchi, 2008). Although there are positive aspects in bureaucracy system, but bureaucracy can have negative effects on the organization and human resources, as the demand for employment and entering administrative offices especially public offices as a result of employment security and social prestige increases in our community.

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So human as a complex entity, his consistence with the surroundings and effort in meeting his needs in social environment and job, has to endure restrictions and stresses, then it is possible that a job be a source of dissatisfaction and conflict over time and this can cause a person go out of his normal routine and may be suffering from job exhaustion, thus, given the important role of banks in communities, according to mental health of staff in organizations, in this study we will examine job exhaustion and administrative bureaucracy features.

Research Literature

Bureaucracy

Bureaucracy term (bureaucratic) was used for the first time in 1745 by someone called "M.Degournay ". He added Greek word of "Cracy" means ruling to "Bureau" means office and desk in order to extract concept of " officials government " (Khani, 2000). Bureaucracy is expressed as a social phenomenon for the first time according to scientific application (Max Weber) (Niruman and Masjediyan, 2004).

Peter Blau defines bureaucracy in terms of achieving the aims, based on this definition, bureaucracy "is an organization or entity that provides maximum performance or an institution that promotes social behavior in order to give a boost administrative efficiency "(faqihi and DanayiFard, 2006). There is bureaucracy concept in depth of Weber thought that is, an optimal organizational form that is reasonably designed, highly efficient, and adhere the principles of logic and order and be established on the basis of legitimate authority (Rezayian, 2011).

Bureaucracy Effects

Ideal model Weber has been the target of much criticism and some have considered it too simplistic and inadequate pattern and without experimental validity. Feredreakh believes that study models should be designed from the mental organization based on empirical data. Wankins that has the same opinions of Fered reakh points to isolating feasible ability defect of selected characteristics and attempt in establishing phenomenon causal relationships (Zomorodian, 1999). On the other hand, bureaucracy supporters while approving criticisms have defended Weber efforts. Daft is among the experts who looks bureaucratic system functions in administrative and service organizations positively. Weber belief is the main target of bureaucratic regulations and procedures, standardization and monitoring employee behavior. Robins agrees with Weber opinion and says: if bureaucracy is an ideal type, i.e. it is based on logic and rational organization it will be effective. Clear objectives and organizational positions in hierarchy facilitate issues (Siyadat *et al.*, 2009).

Table 1: Positive and negative effects of bureaucracy (Siyadat *et al.*, 2009)

Positive Effects	Negative Effects
1) Institutional and administrative system stability	1) The rigidity of the system
2) Ensuringjob security	2) Anxiety and Fear
3) Applying logic in the implementation of activities	3) Depression and solidity of character
4) Explicitlyof target	4) displacement of organizational goals
5) Ccontribution of democracy establishment	5) Beingself-centered
6) Expertise increase and(specialization)	6) Restrictions onjob classification
7) Removing inappropriateterms and relationships in recruiting and selecting staff	7) customer frustration
8) Increase justice in the administration of issues and fair treatment of employees	8) The establishment of the concentration of power indifferent categories of managers
9) Removing family and friends managers relationships in appointment of(favoritism)	9) Personalized and in appropriate application of different regulations

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On the other hand, some scholars view the bureaucracy due to its complexity and problematic nature of responding it as the canceling power of employees. Some explain bureaucracy as a problem as they see that some exert power over their lives without to be selected (Avon, 2007).
Robert Merton believes that abiding the rules and regulations without dispute has unforeseen consequences, including loss of performance (Ibid, p 63).
Contemporary authors believe that bureaucracy is not suitable for non-repetitive activities that require innovation and creativity and the private sector goes away from formal bureaucratic structures and approaching to decentralization, delegating the actual power to lower levels to various profit centers, greater flexibility in the structure and staffing, and greater emphasis on performance and fast response, rather than hierarchical structures (Ibid, p 65).
Most organizations are managed by bureaucratic ways and it is likely that employees working in these organizations over time are subject to absolute bureaucracy expectations governing these organizations. However, job exhaustion may damage each employee of organization. Employees who suffer from job exhaustion are less motivated and have less activity. They are psychologically indifferent, depression, fatigue and Irritable. They fuss all aspects of their environment including colleagues and react negatively to the suggestions of others. If the quality of their work is not effected the quality of their work will be reduced. The staff's job exhaustion will significantly reduce their happiness (Volpin and Barkrogrin, 2010).

Job Exhaustion

Job exhaustion is defined as a state of physical and emotional exhaustion that includes negativity towards the job, retiring from work and having negative feelings towards the consumer and the client. In other words, this syndrome is associated with physical problems, mental health and job performance variables such as job dissatisfaction, absenteeism and performance (Kounenou *et al.*, 2010).

Job exhaustion causes an emotional and affective resource to finish. Today, it is estimated that 3% to 7% of working population around the world are suffering from job exhaustion. In addition to chronic work stresses, some job characteristics such as high workloads, contradictory roles, role ambiguity, low participation in the affairs, lack of social supports and injustice in organization as backgrounds for the occurrence of job exhaustion (Ahola *et al.*, 2010).

Job exhaustion often occurs in jobs that staff spends a lot of time in direct contact with clients and in direct contact with the customers (Clutterbuck, 2009). A person who has been exposed to job exhaustion feels that he is not fun of job and it has not efficiency and usually states that it plans to leave his job in the near future (Evers and Tomic, 2003). Job exhaustion has been recognized as an occupational disease that is detected due to stress in the workplace in service jobs due to it physical and emotional exhaustion is created in employees (Iglesias *et al.*, 2010). According to Maslash (1981) job exhaustion is a multidimensional construct and includes Depersonalization, Professional Inefficacy and Emotional Exhaustion (Ahmadi and Khalifeh, 2002).

Based on the multi-dimensional theory of Maslash exhaustion, job exhaustion syndrome is defined as:
1) Emotional Exhaustion: A dimension of job exhaustion that shows the basis of individual stresses and refers to emotions that if it is prolonged it will reduce the emotional and personal initiatives.

2) Depersonalization: It is related to less negative responses and more than individual's job different situations that creates a negative attitude, a sense of inappropriateness and finally creation of gaps between individual and his job.

3) Decreased Professional Efficacy: It is related to the lack of capacity and lack of success and efficiency in job (DehBozorgi and Hadaeg, 2006).

Three components of this concept can be classified using three broad categories as a sign of psychological stress namely (1) physical symptoms (such as physical exhaustion like headaches, stomach aches, etc.), (2) attitudinal and emotional symptoms (e.g., emotional exhaustion) and (3) severe metamorphosis of identity and behavioral symptoms (e.g., lack of career success) (Kalimov, 2005).

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Emotional exhaustion dimension is recognizable easily through physical, mental and emotional states and several studies have shown that emotional exhaustion precedes depersonalization and feelings of incompetence (Kang *et al.*, 2010).

Although researchers work on job exhaustion for more than three decades but there is still some ambiguity in this area, for example, some mistakenly believe it depression or stress while researchers have defined job stress as too much pressure that is imposed on person while working and exceeds one's, job exhaustion is practical pattern of response to work stress makers. Job exhaustion is different from depression because job exhaustion is related to work while depression affects all aspects of life (Swider and Zimmerman, 2010).

But evidences show that during this period, pressure resulted from machine work, intensive labor division, complexity, diversity and tasks broadness has increased the importance of this issue (Badri, 1995).

Factors Affecting Job Exhaustion

Factors make stress and psychological stresses that have a huge role in job exhaustion are as below:

1. Individual factors
2. Organizational factors
3. Environmental factors

Therefore, as it is considered, one of the causes of job exhaustion is related to organizational factors, since in the present world that organizations have covered everywhere, and a lot of people provide services to organizations to earn for living, most stress factors and psychological stress has organizational origin. So, these factors may have a great role in development of job exhaustion, although personality factors are effective (Bahramzade and Khedmatgozar, 2002).

Based on the ideal type of bureaucracy, using certain behavioral patterns we can lead formalized and great organization activities that are most efficient. This type of organizational structure, despite all the advantages, in some cases it may cause human or organizational issues. Including psychological pressure and consequently it can cause problems for employees. Bureaucratic organizations, regardless of the fact that organizational goals are as means for the welfare of workers and improvement of human relations, demand obedience of commands and the legal obligations by individuals that are incompatible with human desires and needs such as security, relationships, freedom and self-discovery. The bureaucracy has a tendency to direct people towards subordination and submission and playing apparent role, the formal enforcement of contracts, freezing thinking, innovation and creativity (Nikooeqbal, 2009). According to the above study, the conceptual model can be outlined as follows:

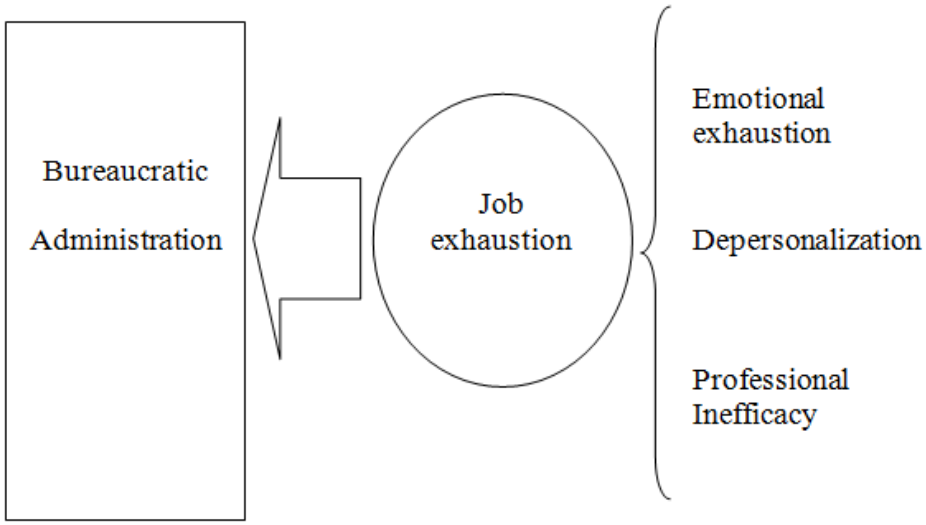

Figure 1: Conceptual model

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Research Question

Features burnout how they determined the level of administrative bureaucracy.

Research Method

This research is practical from goal point of view. However, it is correlational research from methods point of view. Methods of data collection are field and library and its tools were three questionnaires and its validity has been confirmed using the Content method. Data analysis was conducted using descriptive and inferential statistical methods (Spearman correlation test, Chi square test). In the present study, three questionnaires were used to collect data: Maslash job exhaustion Inventory (MBI), Questionnaire Survey for characteristics of administrative bureaucracy.

Table 2: Characteristics of survey questionnaire

Questionnaire name	Number of items	The number of items for measured variables				
Job exhaustion	22Questions	-	-	18-22 individual success	10-17 depersonalization	1-9 emotional exhaustion
Characteristics of administration bureaucracy	29Questions	25-29 Recruitment based on merit	19-24 specialization	13-18 Impersonal	7-12 Terms and regulations	1-6 Hierarchy

The statistical population included all male and female and male staff working in the National Bank of Gorgan city that the total number is 317. Cochran formula is used for estimating sample size and Morgan and Kerjesi tables were used that 169 subjects were selected as sample size; sample selection was carried out by simple random sampling method. Considering the importance of each factor for attribute decision-making, data analysis was performed using software ROSE2.

Data Analysis

Rough Set Theory (RST)

Rough set theory was established by Professor Zedislav (1980). This theory deals with data table analysis. The main purpose of RST analysis is acquiring approximate concepts of acquired data. This theory is a robust mathematical tool for reasoning about vagueness and uncertainty which provides methods for eliminating and reducing irrelevant or extra knowledge from databases. With information augmenting, a set of brief significant data will be obtained which facilitates the work for decision-maker; therefore, regarding fast growth of data volume, RST can have a very effective role in decision support systems. Rough set consists of number of objects in a data table which is described by a set of characteristics. In this table, objects are in row and characteristics in the columns. Therefore, each object is described by the characteristics (Jackson *et al.*, 1996).

In 1998, using rough classification, a model has been presented for predicting purchase and discovering knowledge about customer behavior patterns (Mrozek, 1999). In a research titled the analysis of halo behavior of customers using net Merojan index and rough set theory, Iffat Mohammadi and Reza Sheikh considered this model. Here, we explain some essential concepts of rough theory:

Information Systems (Decision Table)

In computer science, rough set theory was first introduced by Polish scientist professor Zadislav Paolac in early 1980s. Finding an equivalent for the word "rough set" is very difficult. In dictionary, rough means coarse, large, approximate, impolite, fluctuating and un-smooth (Mrozek, 1999). Among these words, the word approximate has higher similarity with the concept considered by theory founder (Mrozeck, 1999). This theory deals with data tables that these data tables can be obtained by measurement of experts. The main purpose of rough analysis is obtaining approximate concepts of acquired data. This theory is a robust mathematical tool for reasoning about vagueness and uncertainty which provides methods for eliminating and reducing irrelevant or extra knowledge from databases. In this process, the elimination of

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extra data is done by training and without losing essential data in databases that as a result of information augmenting, a set of brief significant data will be obtained which facilitates the work for decision-maker. In fact, we can say that rough set draws a map from raw and guiding data in concepts' space (meaning) by reducing data spaces and selecting important expressions.

Therefore, concerning the explosive growth of data, rough sets can have more effective role in decision support systems because they can be used for extracting patterns and decision-making rules, reducing data and etc. by identifying partial and total dependencies and eliminating repeated data (Grzymala-Bussee *et al.*, 1995).

$U\neq\Phi$ set is a finite set of objects, elements or subjects. This set is known as universal set. If R be a family of defined equivalents for U, then K= (U, R) is equivalent space.

Let $A=\{a_1,a_2,\ldots\ldots a_m\}$ be a non-empty and finite set of attribute for ai€A,$1\leq i\leq m$,Ⱶai={ai(x)|x€u}, sum of a_i attribute for objects or subjects in u. an information system/pair decision I=(U, AUD) in which $U\neq\Phi$ is speech aware and $A\neq\Phi$ is a set of attributes $D=\{d_1,d_2,\ldots,d_r\}\neq\Phi$ is set of decisions or decision-making attributes which has single member and its subscription with A is empty. This system is typically shown by U{d}) I=(U,A) (Ziarko, 1989).

Attributes of A set are known as conditional attributes and attributes or elements of D set are decision attributes. If $\Phi\neq B$ A be a non-empty set of A conditional attributes, then an indiscernible equivalent set IND (B) for U is defined as follows:

IND (B) = {(X, Y) €U^2|Ⱶa€B (a(x) =a(y)}

This equivalence is known as B indiscernible equivalence. Rank of X equivalence is shown as follows:

$X/IND(B) = X/B = [X]_B = \{Y€U|(X, Y) € IND(B)\} = \{Y€U|X\ IND(B)Y\}$

If $P \subset R$ and $P\neq Ø$ then subscription of all equivalent relations belonged to P is an equivalent relation which is shown by IND (P). Therefore, U/IND (P) or briefly U/P refers to a knowledge which deals with equivalent relations' family of P that the basic P knowledge in relation with U is called k dependence (Slowinski, 1995). It includes elements of U that with X in relation with attributes in B is indiscernible. In order to run rough sets, that information is used that is shown and smooth tables. Columns indicate attributes; rows indicate objects and cells include attribute values of each object. In rough set dictionary, these tables are called information systems.

Conditional attributes which influence the success of managers are:

a_1: emotional burnout

a_2: personality metamorphosis

a_3: individual success

Decision attribute is bureaucracy which is ranked as below:

Low [0,-0.33) =class 1

Average [0.33,-0.67) =class 2

High [0.67, -1) = class 3

If respondent gives 10 to all 22 questions, maximum score is 1.

If respondent gives 1 to all 22 questions, minimum score is 0.33.

If respondent gives 5 to all 22 questions, average score is 0.67.

$V_d=\{x,y,z\}$ ={high, average, low}

$C_1=\{X€U|d(x) =x\}$ $C_2=\{y€U|d(x) =y\}$ $C_3=\{z€U|d(x) =z\}$

By a1 and regarding analytical model and number of indices for measuring any feature, table 4 is set. For example, attribute of 22 questions was measured. Scores of this attribute for each object based on Likert scale is maximum 10 and minimum 1.

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Table 4: Scoring attributes

Feature	Number of questions	Minimum…maximum	Class code or measurement		
a_1	9	9----------90	0---0.33	0.33—0.67	0.67----1
a_2	8	8----------80	0---0.33	0.33—0.67	0.67----1
a_3	5	5----------50	0---0.33	0.33—0.67	0.67----1
D	22	1----------220	0---0.33	0.33—0.67	0.67----1

For example, for question 1 and from guarantee dimension, its scores are:
V_{ai}= {10,9,4,1,5,3,8,7,4,6,8,2}

$$a1(x1) = \frac{(\text{Score first question}) + (\text{S second question}) + (\text{S third question}) + (\text{S fourth question}) + (\text{S Fifth question}) + (\text{S sixth question})}{12} =$$

$$a1(x1) = \frac{10+9+4+1+5+3+8+7+4+6+8+2}{12} = \frac{5.58}{12} = 0.31$$

Therefore, because 0.31 is between 0 and 0.33 i.e. class 1 value, so $a_1(x_1)$ is in low limit. In table decision feature, column D is information related to the decision of respondents that values of this column is based on opinion of subjects about level and amount of managers' success.

Table 5: Information system

	a_1	**a_2**	**a_3**	**D**	**N**
X1	1	0.94	0.14	1	13
X2	0.9	1	0.14	1	11
X3	1	0.8	0.32	1	15
X4	1	0.94	0.14	1	9
X5	0.9	1	0.14	1	14
X6	1	0.5	0.32	0.67	8
X7	0.9	0.8	0.12	0.67	12
X8	1	0.94	0.14	1	20
X9	0.01	0.5	0.12	0.33	8
X10	1	0.5	0.32	0.67	11
X11	1	0.8	0.32	1	13
X12	0.9	1	0.14	1	6
X13	0.9	0.8	0.12	0.67	14
X14	1	0.8	0.32	1	10
X15	0.9	0.15	0.12	0.33	5

A set of same decision values forms conceptual subsets. For example:
X_0={x| d(x) = p f(x)=1} = {1,2,3,4,5,8,11,12,14}
X_1= {x| d(x) = p f(x) =0.67} = {6, 7, 10, 13}
X_2= {x| d(x) = p f(x) =0.33} = {9, 15}
U/D= { x_0,x_2 ,x_3}= { {1,2,3,4,5,8,11,12,14},{6,7,10,13},{9,15} }

In fact, X_0 conceptual set consists of members which considered the individual environmental and random factors effective on the success of managers. In fact, X_1 conceptual set consists of members which know influence of individual, environmental and random members in the success of managers as average.
In fact, X_2 conceptual set consists of members which know influence of individual, environmental and random members in the success of managers as very low.

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Note that information system table have contradicted and incompatible data. For example, data x_7 and x_{13} have similar conditional attributes but their decision attribute values are different. In these conditions, rough set theory suggests a simple and easy solution for measuring and distributing opposite data such that from two contradicted sets, that set is calculated and estimated which has definition ability. Therefore, the order of believable set is considered as low approximation and the other set as high approximation.

As seen, individuals 2 and 5 have similar values and are not indiscernible by these attributes. Generally, if A ={a_1,a_2,a_3}be set of attributes and $\emptyset \neq B \subseteq A$ be desired and non-empty of A, then this relation is called indiscernible relation of objects to B.

$$I_B = \{(x, y) \in U^2 \forall a \in B, a(x) = a(y)\}$$

In a simple world:

If x and y be two objects and for every attribute in B set, and the values of that attribute is same in both objects, then (x, y) have relation with IB and B-indiscernible. In most classification problems, the output is predetermined. Class label is known as decision attribute. Information system with decision attribute is decision system. In above table, column d is decision attribute. In these tables, individuals 7 and 13 have similar attributes but they are not same regarding decision variable. In other words, their decision attribute is different. In above table or decision system, exponential set of attributes without considering empty set is:

{{a1}, {a2}, {a3}, {a1, a2}, {a1, a3}, {a2, a1}, {a2, a3}, {a1, a2, a3}}

Number of non-empty subsets from conditional attributes set

N= $|\text{Sub (A)}|-1= 2^{|A|}=2^3 -1=7$

Note that for simplifying, Xi in U is shown by i.

If we assume B= {a1, a2}, then equivalent classes of indiscernible relation relative to this set of attributes are:

U/B = U/$I_{\{a1,a2\}}$={{1,4,8},{2,5,12},{3,11,14},{6,10},{7,13},{9},{15}}

Elements of objects set {1, 8, 4} in above equivalent class are as {a_1,a_2}-indiscernible. Some equivalent classes of indiscernible equivalent relations are as below:

U/$I_{\{a1,a2,a3\}}$={1},{2},{3},{1,4},{5,2},{6},{7},{1,4,8},{9},{10,6},{3,11},{2,5,12},{7,13},{3,11,14},{15}}

With an equivalent relation, we can infer a classification in a set. For this purpose, we consider those subsets which have same values regarding decision attribute.

Assume that there is an information system $\hat{S} = (U, A)$in which U is set of objects and A is the set of attributes. For $X \subseteq U$ and$B \subseteq A$, we define two sets as following:

$$\underline{B}X = \{x | [x]_B \subseteq X\}$$
$$\overline{B}X = \{x | [x]_B \cap X \neq \emptyset\}$$

Which are called B-lower approximation and B-upper approximation of X, respectively.

$BN_B(X) = \overline{B}X - \underline{B}X$ Is B-boundary region of X and includes objects which cannot definitely said that they are in X. if BNB(X)$\neq \emptyset$, then X is a rough set relative to B.

In this research, 1 = {x| d(x) =p f(x) = x_0}

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X_0 = {1, 2, 3, 4, 5, 8, 11, 12, 14}

This means that individuals with numbers 1, 2, 3,4,5,8,11,12,14 believe highly in the influence of individual, environmental and random factors.

Based on definition, $\underline{B}X$ and $\overline{B}X$sets are equal with:

$\underline{B}X$ = {1,2,3,4,5,8,11,12,14 }

$\overline{B}X$ = {1,2,3,4,5,6,7,8,10,11,12,13,14}

BN_BX_0 = {6, 7, 10, 13}

Then:

This set includes objects or individuals which did not definitely belong to X_1.

NEG_BX_0= U - $\overline{B}X$ = {9, 15}

External region includes all objects which did not definitely belong to X_0. In fact, rough set is a set that its boundary region is not empty, otherwise it is common set. Therefore, definition class X_0= {x|d(x) =p f(x) =1} is a rough set because its boundary region is non-empty.

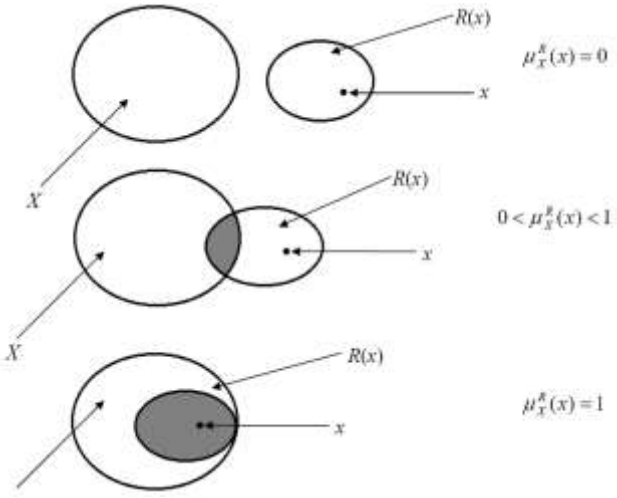
In which Cord (0) =|0| shows the integer number of (0) set.

$$Pos_c(D) = \cup_{X \epsilon U/D} |\underline{C}X|$$

And U/D is equivalent classes of ID equivalence in U.

Note that if $\mu(x)$ be equal with 1, object (individual) will be placed in $\underline{B}X$ set and if $\mu(x)$ be between 0 and 1, then object is in $\overline{B}X$set and if it be zero, it will be in BN_BX.

$$R_*(X) = \{ x \in U : \mu_X^R(x) = 1 \},$$
$$R^*(X) = \{ x \in U : \mu_X^R(x) > 0 \},$$
$$RN_R(X) = \{ x \in U : 0 < \mu_X^R(x) < 1 \}.$$



$$\alpha_B(X) = \frac{|\underline{B}X|}{|\overline{B}X|}$$

$\alpha_B(X)$ = 7.13

If $a_B(X)$ =1, our set is crisp and if $a_B(X)$ <1 it is rough set.

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	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
X1	ʎ														
X2	a_1, a_2	ʎ													
X3	a_2,a_3	a_1,a_2, a_3	ʎ												
X4	ʎ	a_1,a_2	a_2,a_3	ʎ											
X5	a_1,a_2	ʎ	a_1,a_2, a_3	a_1,a_2	ʎ										
X6	a_2,a_3	ʎ	a_2	a_2,a_3	a_1,a_2, a_3	ʎ									
X7	a_1,a_2, a_3	a_2,a_3	a_1,a_2	a_1,a_2, a_3	a_2,a_3	a_1,a_2, a_3	ʎ								
X8	ʎ	a_1,a_2	a_2,a_3	ʎ	a_1,a_2	a_2,a_3	a_1,a_2, a_3	ʎ							
X9	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_3	a_1,a_2	a_1,a_2, a_3	ʎ						
X10	a_2,a_3	a_1,a_2, a_3	a_2	a_2,a_3	a_1,a_2, a_3	ʎ	a_1,a_2, a_3	a_2,a_3	a_1,a_3	ʎ					
X11	a_2,a_3	a_1,a_2, a_3	ʎ	a_2,a_3	a_1,a_2, a_3	a_2	a_1,a_3	a_2,a_3	a_1,a_2, a_3	a_2	ʎ				
X12	a_1,a_2	ʎ	a_1,a_2, a_3	a_1,a_2	ʎ	a_1,a_2, a_3	a_2,a_3	a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2, a_3	ʎ			
X13	a_1,a_2, a_3	a_2,a_3	a_1,a_3	a_1,a_2, a_3	a_2,a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_1,a_2	a_1,a_2, a_3	a_1,a_3	a_2,a_3	ʎ		
X14	a_2,a_3	a_1,a_2, a_3	ʎ	a_2,a_3	a_1,a_2, a_3	a_2	a_1,a_3	a_2,a_3	a_1,a_2, a_3	a_2	ʎ	a_1,a_2, a_3	a_1,a_3	ʎ	
X15	a_1,a_2, a_3	a_2,a_3	a_1,a_2, a_3	a_1,a_2, a_3	a_2,a_3	a_1,a_2, a_3	a_2	a_1,a_2, a_3	a_1,a_2	a_1,a_2, a_3	a_1,a_2, a_3	a_2,a_3	a_2	a_1,a_2, a_3	ʎ

Dependency of Attributes

In studying data, it is important to find the relationship between all conditional attributes and decision attribute. By using this dependency among attributes, we can eliminate those which are not important. If Td be decision attributes and Tc be a set of conditional attributes, their dependency is expressed as Tc=Td which means that all decision values come from conditional values. Of course, there is partial dependency condition. Formal definition of this condition is:

If C and D be subsets of A such that the subscription of C and D be empty and their unity be A, we say that D is dependent upon C with k (0<k<1) degree, (with symbolic form $C \Rightarrow_k D$) if

$$K = \gamma(C,D) = \sum \frac{|\underline{C}X|}{|U|} = \frac{1}{|U|}\sum_{X \epsilon U/D}|\underline{C}X|$$

k = { {1,2,3,4,5,8,11,12,14} / {1,2,…,15} } + {{6,7,10,13}/ {1,2,…,15}} + {{9,15}/ {1,2,…,15}}=(9/15) + (4/15) +(2/15)= 1

if k equals with 1, D is completely dependent on C.

Using Ros2 software, we obtain Reducts and infer decision rules but instead of this method which is long and time-consuming, we can use second method in calculating Descernability matrix and Boolean algebra and set indiscernible matrix and Reducts as below.

Central core obtains by subscription of all augments as below:

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$(a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \vee (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2\vee a_3)$

Core ∩ Reducts = 0.733

Conclusion

Regarding following table and first column in table 5, below decision rule will be obtained: X_2, X1 ,X_0 conceptual sets B={a_1,a_2,a_3 } using

	Different Decision
X_0	X1,X2,X3,X4,X5,X8,X11,X12,X14

$(a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2)) \wedge (a_1\vee a_2)) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3)= a_2 \wedge a_3$

Therefore, they are called definite rules. $\underline{B}X$ for each conceptual set inferred rules of lower approximation can be extracted for example rule 1 from objects {1,2,3,4,5,8,11,12,14} and rule 2 from objects {6,7,10,13} and rule 3 from objects{15,9}. Regarding below table and second column of table 5, we will obtain following general rule:

	Different Decision
X1	X6,X7,X10,X13

$(a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_2\vee a_3) = a_2 \wedge (a_1\vee a_3)$

Considering following table and second column of table 5, we reach to the general rule:

	Different Decision
X2	X9,X15

$(a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_3) \wedge (a_1\vee a_3) \wedge (a_1\vee a_2) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2) \wedge (a_2\vee a_1) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_1\vee a_2\vee a_3) \wedge (a_2)= a_2$

And such it is claimed that identification is deeply dependent on ability in classification. By studying and classifying information system $\overline{B}X_1$ and $\overline{B}X_0$ and some decision making rules of $\underline{B}X_1$ and $\underline{B}X_0$, we can

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obtain definite rules for decision-making. ROS_2 with following description and using rough logic and software is called contingent concepts (feasible or probable). Rules extracted from above approximation

Rule 1: (a1 = 0.01) => (D = 0-0.33); [1, 1, 50.00%, 100.00%] [1, 0, 0]
[{9}, {}, {}]
Rule 2: (a2 = 0.15) => (D = 0-0.33); [1, 1, 50.00%, 100.00%] [1, 0, 0]
[{15}, {}, {}]
Rule 3: (N = 6) => (D = 0-0.33); [1, 1, 50.00%, 100.00%] [1, 0, 0]
[{9}, {}, {}]
Rule 4: (a2 = 0.5) & (a3 = 0.12) => (D = 0-0.33); [1, 1, 50.00%, 100.00%] [1, 0, 0]
[{9}, {}, {}]
Rule 5: (a3 = 0.12) & (N = 11) => (D = 0-0.33); [1, 1, 50.00%, 100.00%] [1, 0, 0]
[{15}, {}, {}]
Rule 6: (a1 = 1) & (a2 = 0.5) => (D = 0.33-0.67); [2, 2, 50.00%, 100.00%] [0, 2, 0]
[{}, {6, 10}, {}]
Rule 7: (a1 = 0.9) & (a2 = 0.8) => (D = 0.33-0.67); [2, 2, 50.00%, 100.00%] [0, 2, 0]
[{}, {7, 13}, {}]
Rule 8: (a2 = 0.5) & (a3 = 0.32) => (D = 0.33-0.67); [2, 2, 50.00%, 100.00%] [0, 2, 0]
[{}, {6, 10}, {}]
Rule 9: (a2 = 0.8) & (a3 = 0.12) => (D = 0.33-0.67); [2, 2, 50.00%, 100.00%] [0, 2, 0]
[{}, {7, 13}, {}]
Rule 10: (a2 = 0.94) => (D = 0.67-1); [3, 3, 37.50%, 100.00%] [0, 0, 3]
[{}, {}, {1, 4, 8}]
Rule 11: (a2 = 1) => (D = 0.67-1); [3, 3, 37.50%, 100.00%] [0, 0, 3]
[{}, {}, {2, 5, 12}]
Rule 12: (a3 = 0.14) => (D = 0.67-1); [6, 6, 75.00%, 100.00%] [0, 0, 6]
[{}, {}, {1, 2, 4, 5, 8, 12}]

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