

Prioritization of Manufacturing Entrepreneurial Cooperatives by Principle Component Analysis and Numerical Taxonomy Approach, (The Case of a Province in Iran)

Dr. Younos Vakil Alroaia

Assistant Professor, Department of Management, Semnan Branch, Islamic Azad University, Semnan, Iran,
P.O.Box: 35145-175, Mobile: +989122316247, E-mail; younos.vakil@gmail.com

Seyed Razi Nabavi

Lecturer, Department of Management, Semnan Branch, Islamic Azad University, Semnan, Iran,
srazi.nabavi@yahoo.com

Abraham Ghane

Ghane30@yahoo.com

Department of Industrial Management, Semnan Branch, Islamic Azad University, Semnan, Iran

Abstract:

Expansion of co-operation and improvement of social welfare can be counted as two important factors of economical development of every country. The futuristic and effective strategies in dedication of facilities and equipment's can be measured for bringing fundamental changes and remarkable improvement in co-operatives' performances. The efficient budget allocation, non-refundable assists, determined subsidies and donation of financial and non-financial facilities are the influential ways on co-operatives' performance. It should not be unsaid that the decision-makers of this field always encounter with limitations for dedication of resources to co-operatives. Thus, they should allocate the mentioned resources to those co-operatives of which performance, problems and capabilities are known to them or they have the highest priority than other co-operatives. Therefore, in this research we study 14 types of co-operatives in Semnan Province based on the basic criteria such as background of establishment, average number of members, number of initial members, years of activity, years of efficiency, the first capital for establishment...etc. With using principle component analysis, we determine some important and specific factors and consequently we grade the co-operatives by Numerical Taxonomic System. The conclusion of this research indicates the policy makers of co-operation in Semnan Province would better allocate the resources to co-operatives settlement, service, credit, mining, producers' requirement providing co-operatives, consumers' requirement providing co-operatives and subsequently the other co-operatives.

Keyword: Co-operation, Entrepreneurial Co-operatives, Entrepreneurship, Taxonomy and Principle Component Analysis.

1- Introduction:

In management point of view, the economists define the term 'production' as the activities which are performed to make benefit and will cause the creation of a new physical object or providing a service of which the process can be resulted in survival of a firm or even a society based on productivity. Therefore the productive co-operatives working in agriculture, husbandry, fishing, mining, urban and rural construction etc cannot be excepted from the mentioned theory (1). With daily increasing complexity in economic issues and importance of exploiting the resources, the expansion of co-operatives' activities can be observed within entrepreneurial productive co-operatives. Thus, these co-operatives should be required to be given the facilities and other requisites in order to grow properly and achieve the considered goals. In this way, observing their general operation can be a reasonable motive to look for the most ideal co-operative. In studying these co-operatives, it is mentionable that for a sound resource-allocation we should consider the existence of numerous different elements influencing on their performance. Majority of theorists believe this difference originates from the identity and method of performance in co-operatives (2). Most contrasts among co-operative section and others (public and private sections) can identically be related to the environment. In addition the supposition of constant changing can be counted as a continuous and obvious issue for them (3). With its potential co-operative manufacturing capability, Semnan province is considered as one of the pioneers in the field of industry in Iran. Thus, the said capability can be the basic, positive and reliable ground for the co-operatives in production section. In other hand, supporting financial resources along with supplying required facilities for entrepreneurs can cause increasing the demands, plurality and expansion of productive co-operatives(4). It is clear that this matter can remarkably help in economic growth and development of Semnan province with its bordering cities and totally our beloved Iran. The economic dynamism and enhancement of public welfare as the most important aims of every country require adopting some special measures. Therefore, we can perceive that development of entrepreneurship is one of the most efficient ways to change the management style (method) so as you can achieve to the

culture and management of entrepreneurship with it (5). The interaction among numberless economic management elements will stimulate all elements to grow in a socio-economic system. For instance, we can point out to the role of entrepreneurship and supplying the small and medium enterprises or improvement of enterprising process within economic growth and development (6). Parson and Asmlsr recognize entrepreneurship as one of the essentialities of the development. The economic growth and advance within futuristic strategies can change the bureaucratic and official stages to a developing and useful process of entrepreneurialism. Meanwhile, entrepreneurship and providing small and medium enterprises are capable of employment-creation which will cause the economic development. Entrepreneurship has emerged as a profession so it should be developed as other professions (7). The performed regional researches denote that the successful entrepreneurial co-operatives can have a prominent role in reduction of unemployment, entrepreneurship, the fair distribution of wealth in a society, the sound exploitation from facilities, accessible resources, increasing the national zeal and social affiliation, approach to national exploitation and improvement of the society. For instance, we demonstrate the researches which are as follow:

Ustadi and Alizade, a study on policies of governmental supports for creation and expansion of co-operatives through donation of bank facilities, subjective study on Kohgiloie va Boier Ahmed Province (8) considering the ways of government assistance in creation and development of co-operatives through the banking funds and a research on the criteria for allocation of credit facilities to co-operatives of kohgiloie va Boier Ahmed, comparative studies on grading industries in development-concerning co-operative section affecting on their efficiency in economy of the country (9), Researches of Soori and Keihani Hekmat, assessment and determining the investment priorities, the subjective study on Hamedan Province co-operatives with the purposes of finding the capable industries and the capacity of industrial investments in order to lead the co-operatives to those industries (10), and finally researches of Jahan shahloo and Saeed Mehabadi, testing the efficiency and grading all branches of Samen-al-Aema co-

operative by using the Data Envelop Analysis (DEA) (11). This research has been provided to study the situation of entrepreneurial co-operatives so as to identify the most ideal industry and consequently to recognize the priorities for providing resources and facilities based on meritocracy which includes Principle Component Analysis for determining the coefficient of importance in studied elements and Numerical Taxonomic Decision-making Technique to grade the productive co-operatives. This research has been performed based on indigenous cultural samples of Semnan Province to find the ideal units so that the process of resources and facilities allocation, financial support, donating the credits or the general policy of the province would be performed based on priorities and the real necessities of Semnan.

2- Literature review

2-1 Co-operation and Co-operative

Usage of the terms ‘co-operation and contribution’ returns to the very beginning of mankind history. In the course of history, some groups of people have always followed their common aims through the interactive co-operation throughout the world. We can find some co-operations or group activities in our ancestors’ lives who had realized the advantages of group hunting, harvesting and a social life in comparison with individual efforts (12). These kinds of co-operations had been in use among different societies’ inhabitants with diverse economic qualifications or it had been the basis of most actions. Existence of traditional co-operatives and self-assisting and co-assisting groups, particularly in rural settings of different countries indicate that the survival and improvement of the societies are based on diverse types of co-operations and participation. The common sense of the term ‘co-operation’ includes assistance, observation of public interest, contribution to others etc. In one point of view, all social behaviors based on interactivity with others can be called co-operation. It means performance of those actions which require two or more than two people’s assistance. Whether it would be a group game, playing music, working in a group, participation in a dialogue or having a social relationship. In all the mentioned instances there is a social system in which the members’ activities will be coordinated to achieve the final goal (13). Emory believes the co-operation is the way of life and the philosophy of survival which is the set of

behavioral methods and principles to guide humankind in his or her personal and social lives. Co-operation is the composition of self-assistance and inter-assistance which leads to institutionalization of global values. Therefore co-operation is one of the important dimensions of social life which has been used since the first era of man's life. But the formal term of 'co-operation' denotes a proper interactive work which makes it possible to achieve the common goals within a formal organization by using the specific administrative measures. The co-operative firms and unions have expanded by this way throughout the world. Inauguration of new-born co-operatives requires legalization and formalization which would have been done by the ministry of co-operation. It should not be unsaid that the mentioned steps would be done by officers of the said organization.

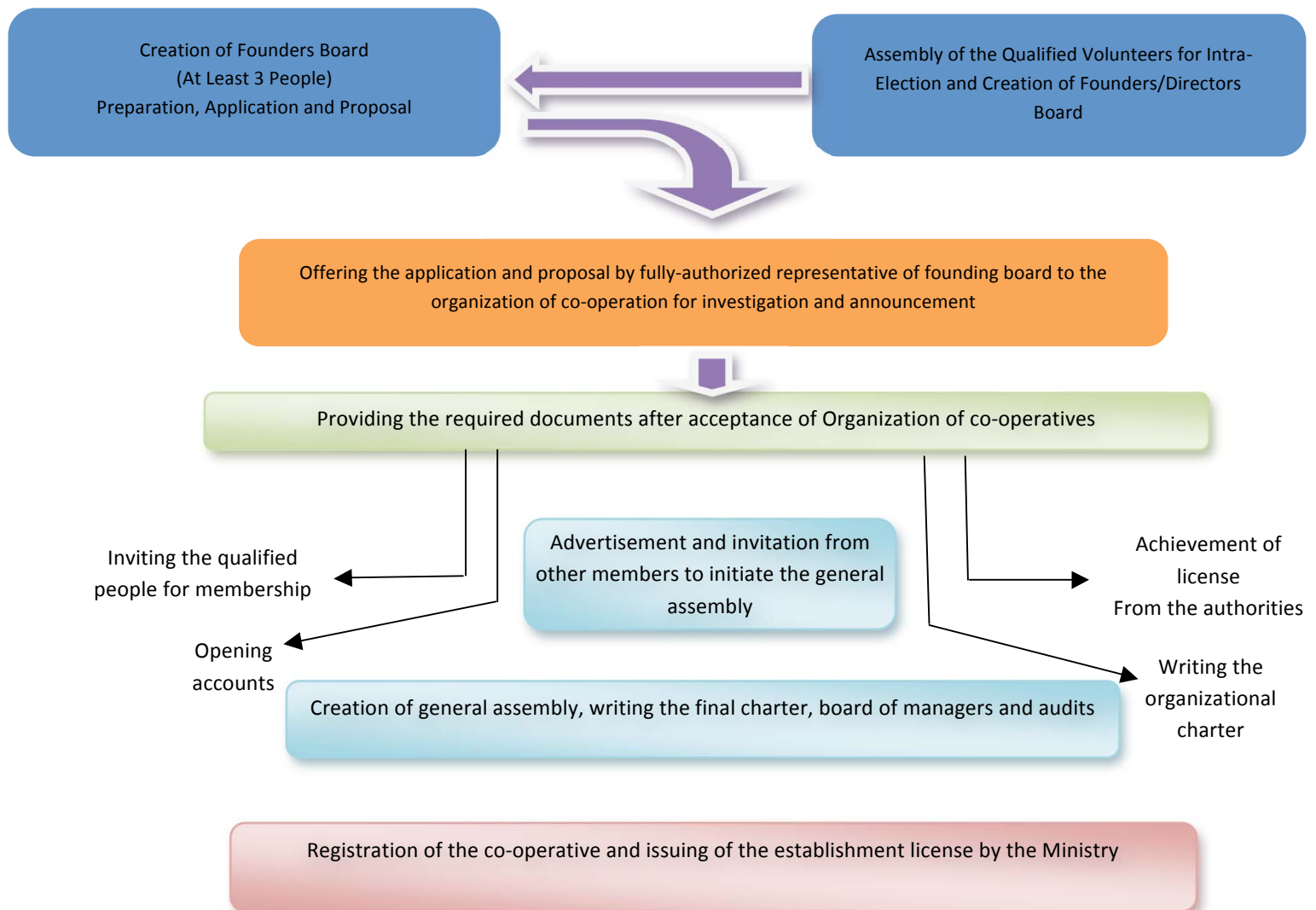


Figure 1, the stages of the registration in Ministry

‘Co-operation’ in its common meaning has had a long history in Iran like other parts of the world. In ancient Iran, in spite of some philanthropists who had embarked on some constructions such as roads, bridges, caravanserais, Masjids, underground water cisterns and other building and structures like them, the ordinary people co-operated with each other and in the case of economic shortage, they used their physical potentials. We can find the best type of co-operation in the rural communities in which it has been used among farmers as an accepted tradition since the ancient period so far (14). Like other rural people on the earth, the farmers used to do their cultivation, weeding, irrigation and harvesting together. This kind of co-operation can be called the mass agriculture with saving the qualifications of private possession and profit which is also being used among villagers now. Until Shahrivar, 1941, there was not any actions based on international standards and norms of co-operatives in Iran. After that the expenses of life started increasing, and extortionately expensive supplies made people encounter with a financial crisis even though they had the stable governmental income. In this epoch, the educated young generation of the country got familiar with the contemplation of co-operatives’ movement in the world and its consequences on urban and village residents and they came up with co-operatives as the best way to root out the high prices in the time of war and campaign against hoarders. Semnan Province has numerous co-operatives of which the performance fields can be observed in the figure.2.

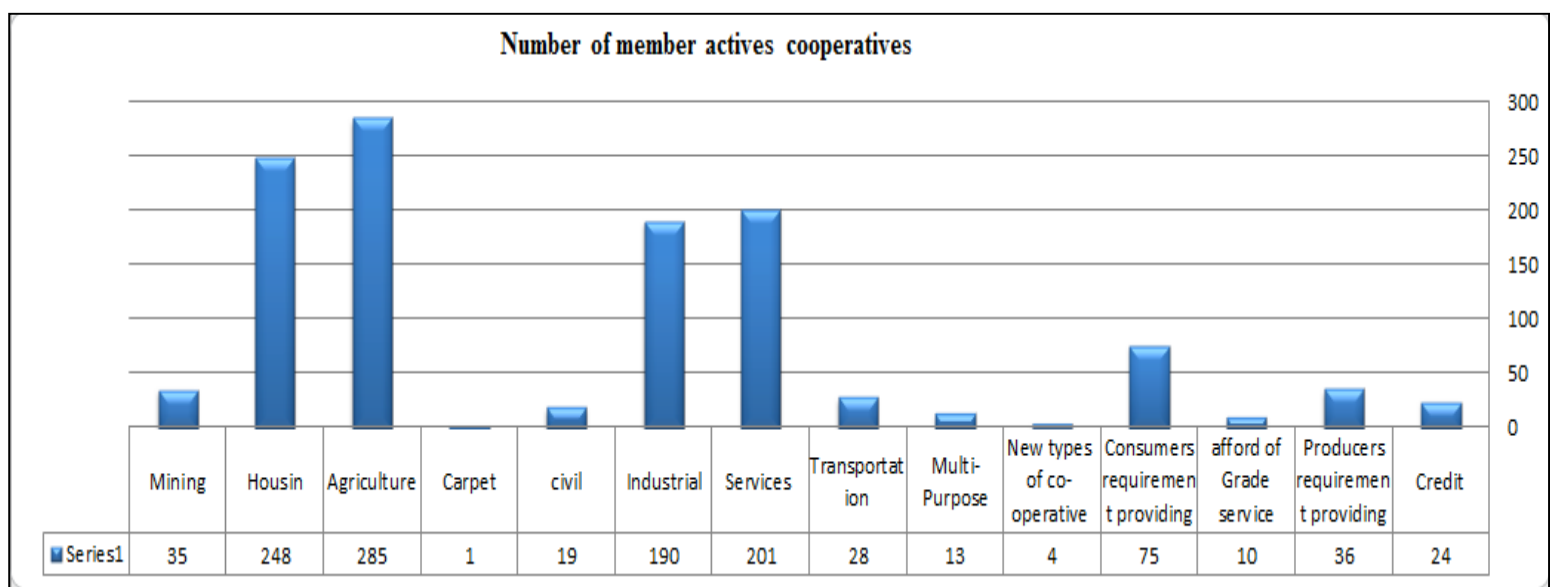


Figure.2; Number of active co-operatives in Semnan Province 2011 ref: Semnan Directorate of co-operative

Semnan province has 14 co-operatives as shown in figure.2. In the following table there are definitions of some co-operatives.

Table.1; Terminology of Some Active Co-operations in Semnan Province

Definition	Co-operative
This co-operative works alongside farmers, gardeners, husbandpersons, animal husbandpersons, silk worm, honeybee and fish farmers, workers in local industries of village and agrarians for: Acceptance of their deposit and current accounts by the branches of Agricultural Co-operative Bank of Iran (Taavone Keshavarzi Bank of Iran), purchase, providing the personal, family and occupational necessities and supplies, accumulation, storage, converting, changing, categorization, packing, transportation and member's productions sales	Agricultural Co-operative
This co-operative provides various services such as: Supply and sale of productions, supplying the producers and consumers requirements in the framework of public interests and decreasing the costs and expenditures.	ServicesCo-operatives
This co-operative has been established to support the occupational necessities of members in the framework of public interests and decreasing the costs and expenditures. The activities of this firm encompasses: Providing raw materials, goods, services, tools and other requirements, providing facilities for packing, standardization, branding members' productions, creation of store in operation site, holding some fairs, inauguration of branches inside and out of the country.	Producers Requirements Providing Co-operative
This co-operative provides the whole or a part of the following services: Providing land and construction, residential houses and flats and giving them by cash or several installments to the members, purchase of residential units and selling them to the members by cash or several installments, providing services in the fields of drawing, engineering and architecture for members.	Settlement(Housing) Co-operative

2-2- Entrepreneurship

Nowadays, organizations and their relevant systems adapt themselves with big changes, beside their survival; they try to convert the problems to the opportunities by reasonable solutions. It requires innovation, making processes and the new methods (15). Therefore, we can call entrepreneurship, one of the most effective ways in changing management method that can lead to entrepreneurial management, culture and outlook (16). The interaction among numberless economic management elements will cause all elements to grow in a socio-economic system. For instance, we can point out to the role of entrepreneurship and supplying the small and medium enterprises or improvement of enterprising process within economic growth and development (17). The economic growth and advance within privatization can change the bureaucratic and official stages

to a developing and useful process of entrepreneurship. Meanwhile, entrepreneurship and providing small and medium enterprises are capable of employment-creation which will cause the economic development. Before explaining the main concepts of entrepreneurship such as structural factors, behavioral factors and context factors in small and medium enterprises, it is better to talk over the concept of entrepreneurship itself. Theorists and management, either has a particular view to define the concept of entrepreneurship but the common issue in all the definitions can be found at the core of entrepreneurship which are environmental analysis, exploiting the resources, creation enterprises commercial transactions and earning reward (18).

Table.2- Definitions of entrepreneur from theorists point of view

Definition	Theorist
Entrepreneur has new ideas and thoughts, a person who offers his production or service through making an enterprise along with struggling financial and social resources (17)	Ahmed Pour Dariani
An entrepreneur is the one who feels responsible for events and suggests new solutions. He handles all struggles in the work stages (19).	David Johnson
Entrepreneurs are the people or groups who either work independently or in associated manner. They establish new organizations or rehabilitate the previous organizations(20)	Chrisman and his colleagues
Entrepreneur is a person who starts the small and new financial activities by his own capital. Entrepreneur changes the values and their identity (21).	Peter Draker
Entrepreneurship encompasses acceptance of struggle, following the opportunity, meeting needs and demands by innovation and establishment of an enterprise (22).	Rabbets
Entrepreneurship is the process in which the opportunities are followed by people for themselves or the organizations they are working at without consideration of the accessible resources (23).	Stevenson and his co-workers
Entrepreneurship is a process which cause to satisfaction or a new demand. It is the process of making values through forming a distinctive group of resources in order to exploit the opportunities (24).	Ahmed Pour Dariani

The enterprises with less than 9 members can be counted as small enterprises. The terms ‘small enterprise’ and ‘entrepreneurship’ can be interchangeably used because of their virtually close meanings. So, we can call the owner of a small enterprise, the entrepreneur (25). The small and independent enterprises can be considered as one of the most important kinds of entrepreneurships. Its characteristics are simplicity of performances,

less amount of work, novice enterprise, and personal strategies in doing works to achieve the appropriate cost. In this condition, entrepreneurship means creation of a visible enterprise of which the owners use to achieve additional value through composition of productive factors. Designing the productions and services, identification of market capability, budget support and expansion of infrastructure are the important points of these enterprises, Koobisk and Ebister (1983). Miler believes that the Shortage of cash back up, competition with bigger and stronger rivals, shortage in capital, personal performing disabilities, inadequate aptitudes and the weak control are the most considerable challenges for the small enterprises (26). Skillfulness, the proper knowledge and human resources are constructive parts of small enterprises. Eigon and Waven (1998) have divided the Human Resources into professional HR and entrepreneurial HR. They introduce the professional human resources, modern and educated and the entrepreneurial human resources based on person's entrepreneurial experiences (27).

2-3- Research Methodology

Grading and evaluation of the priorities can be considered as one of the important issues in management and taxonomy. A group of homogenous people, elements, industries, enterprises, policies and strategies of an organization can be categorized in different ways. Each grading can be studied with regard to these three elements: Specifying the criteria and grading points, value of elements or the coefficient of their importance and method of grading (28). In this research we study some factors to calculate the coefficient of importance with observing 9 criteria such as: average number of the members, number of the first members, years of activity, years of efficiency, background of establishment, the first capital for establishment, unfair regional infrastructures, organic factors, internal management and the difficult access to resources and facilities. Then 14 co-operatives of Semnan Province which were mentioned in figure.2 will be analyzed and scrutinized. At first with forming and simplification $n=332$ and calculation of coefficient Alpha (Cronbach) equals to the amount of 0.78 were confirmed by Self-made questionnaire in this stage we have tried to use the theorists' ideas for having a more concise research. With accumulation of the required data, the necessary numerical amounts have been

provided for the principle component analysis. Finally, grading these co-operatives has been taken place based on ideal template with understanding the coefficient of importance from the principle component analysis by using numerical taxonomic technique. The framework and the main process of prioritization of co-operatives in SemnanProvince have been shown in the following diagram, figure.3.

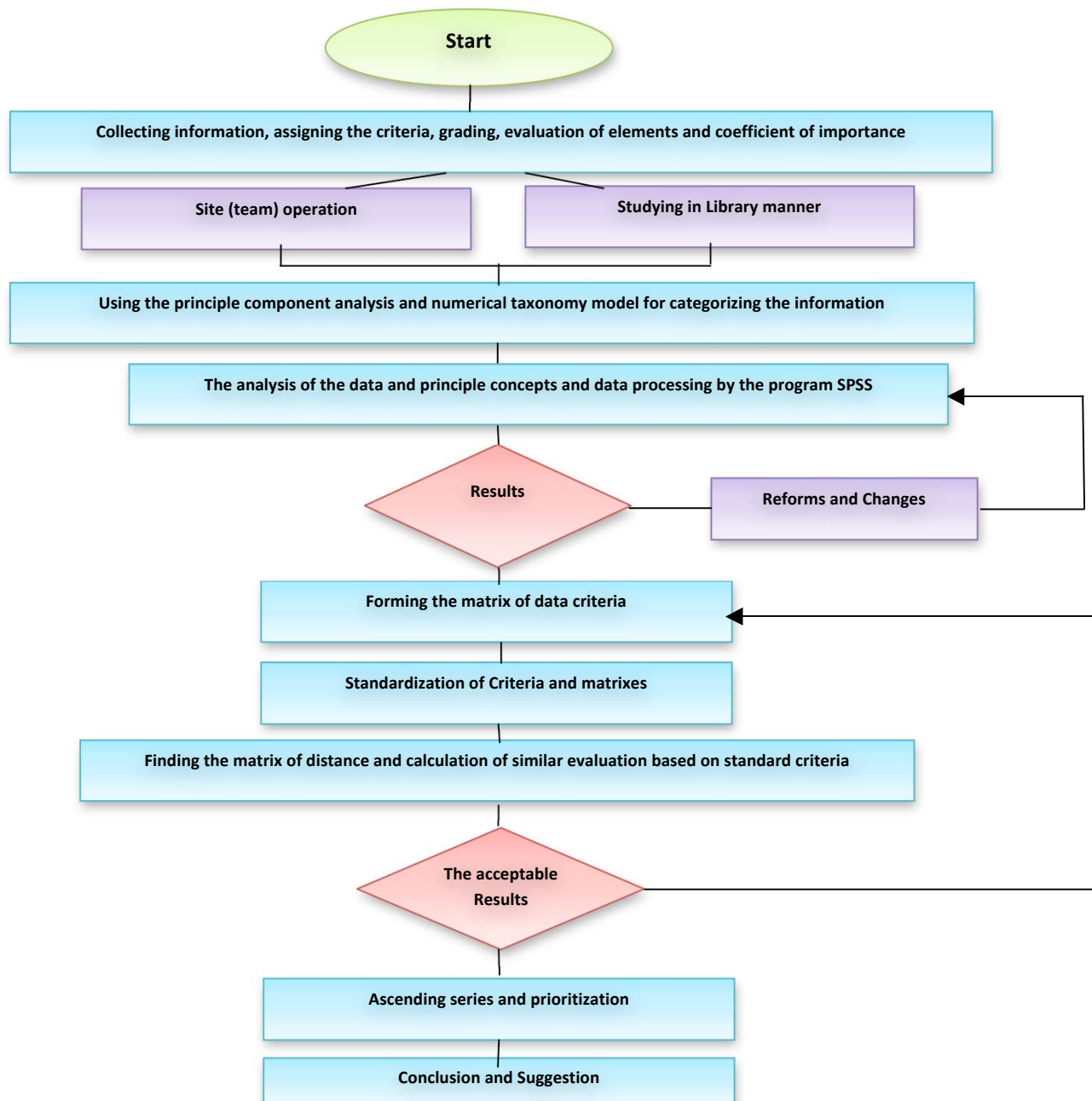


Figure.3: Diagram of process of performing in this research

2-3-1-Numerical Taxonomy:

Numerical taxonomic analysis was suggested by Adanson in 1763 for the first time, but years later at the beginning of 1950s, some Polish mathematicians realized the importance of this method and tried to expand it. Then, this method was introduced for categorization and grading the countries according to development in UNESCO by Prof. Zignant Meloik from WROCLAW high school of economics (1968). This method has been used as the well-known model so far. Recently it has been used in prioritization, grading the other economic activities, industry and agriculture. The mentioned technique has some operational stages. As far as we do not deal with one dimension space in practice, in other words, classification is unlikely performed based on one criteria and a single specification. We want to talk over the poly dimension taxonomic area now. At the beginning of the work we suppose that we would categorize n amount of different activities based on the criteria m .

Table.3: Stages of Taxonomy

Stage1	Selection of the items considering the specific goal and different criteria to choose the items
Stage2	Forming the datum matrix, estimation of average and deviation of criterion
Stage3	Normalization of gained matrix data
Stage4	Calculation of compound distance among items
Stage 5	Choosing the shortest way
Stage6	Restricting the items (resembling the items)
Stage7	Choosing the archetype
Stage 8	Grading the items based on their development

2-3-2-Principle Component Analysis

The criteria related to industries and co-operation has usually had resemblance and interference. Thus, principle component analysis can be a reasonable way to estimate the weight and coefficient of criteria's importance. This technique provides the possibility of identifying the smaller groups of criteria with higher internal solidarity by decreasing the number of affiliated parameters. To extract the mentioned factors, the principle component analysis can be used. In this method we called β as a Column vector whit p Componentso that $\beta'\beta=1$ if Random vector $X'=[x_1 \dots x_p]$ has 0 average and covariance, Variance matrix are Σ . the variance $\beta'x$ of are defined by this way:

$$E(\beta'x)^2 = E(\beta'x)(\beta'x)' = E(\beta'xx'\beta) = \beta' \sum 1 \beta$$

By using Lagrange' method we can achieve the line standardized composition of $\beta'x$. It should be said that the principle component analysis uses SPSS19.

3- Discussion and Analysis

In this part, after specifying the criteria used in prioritization and determining the coefficient of each of these criteria's importance through the principle component analysis and using the numerical taxonomic analysis, we prioritize Semnan Province Co-operatives to approach to a definite archetype toward the sound planning for donation of financial facilities and equipment's. With regard to the importance of this research, we took the following criteria into account: average number of the members, number of the first members, years of activity, years of efficiency, background of establishment, the first capital for establishment, unfair regional infrastructures, organic factors, internal management and the difficult access to resources and facilities. To perform the satisfactory principle component analysis, at first we should study the KMO statistics. Considering the achieved data, the numerical amount of KMO statistics is 0.508 which is 0.5 above its presupposed amount. Therefore we can be pleased with principle component analysis and its performing process. Another test which has been studied for our criteria is Bartlett's test. This test determines if calculated solidarity matrix is single or no? In another word, if the solidarity matrix is a single one, so all the criteria and totally the principle component analysis cannot be counted as a good method and we must use another model for our research. This test can be significant when its probability is less than 0.05.

Table.4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.508
Bartlett's Test of Sphericity	Approx. Square	Chi- 54.979
	df	36
	Sig.	.022

Regarding to the extracted results, it can be claimed that the Kroit's test is verifier the matrix of the solidarity's coefficient among the criteria and factors has been studied by using the varimax method and circulated matrix in SPSS19. The results of using the varimax method has been given within the table.5

Table.5: Correlation coefficient parameters with Factor

4	3	2	1	Criterion
-.024	-.112	-.484	.555	Average number of Members
-.346	.097	.180	.581	Number of first members
.348	-.010	-.044	.623	Years of activity
-.339	-.005	.712	.104	Years of efficiency
.258	.730	-.049	.079	The first capital
.513	-.010	.591	.041	The background of Establishment
.192	.240	.139	.440	The unfair regional infrastructure
.245	-.717	.088	.225	The organic factors and internal management
-.519	.040	.059	.285	Difficulty of accessibility to resources and facilities

The Table.6 indicates matrix of each criterion's weight in each factor as the most weight in a criterion will be considered as the weight of that criterion. In other word, that criterion has more importance in itsfactor. Therefore the weights' of the introduced criteria are: 0.573 0.627 0.705 0.562 0.707 0.691 0.503 0.752 and 0.578.

Table.6: The Matrix of Each Criterion's weight in each factor

4	3	2	1	Criterion
.146	.117	-.573	.439	Average number of Members
-.010	.627	-.034	.323	Number of first members
.101	.006	-.062	.705	Years of activity
.069	.562	.552	-.086	Years of efficiency
-.707	-.132	.056	.296	The first capital
.078	-.195	.691	.303	The background of Establishment
-.160	.122	.116	.503	The unfair regional infrastructure
.752	-.112	.066	.224	The organic factors and internal management
-.010	.578	-.143	-.024	Difficulty of accessibility to resources and facilities

After determining each criterion's weight, the co-operatives of Semnan Province will be graded according to the taxonomic method. The stages of taxonomy have been scrutinized according to the table.3. As well as, for accuracy in grading Semnan Province co-operatives, we have used the computer program named Pars Taxonomy. With regard to the process of Taxonomic decision-making techniques, the first stage of data's matrix was formed. With passing the other stages, the heterogeneous co-operatives were omitted. The executive stages of taxonomy were scrutinized and were restudies. The co-operatives of transportation, new type, multi-purpose, services, industry, construction,

handcraft carpet and agriculture were identified as the heterogeneous co-operatives. The graded results of Semnan Province co-operatives have been provided in table.7 based on distance from the ideal co-operative. It should be mentioned that the less distance to the ideal co-operative reveals the prior co-operative

Table.7: Grading the Co-operatives of Semnan Province

		Average Number of Members	Number the members	of first activity	Years of efficiency	The first Capital	Background of establishment	The unfair regional infrastructure	The organic factors and internal management	Difficulty of accessibility to resources and facilities
1	Settlement (Housing)	18822	80	35	32	35682320	37	4	3	4
	Vision	18822	80	35	32	35682320	37	4	3	4
2	Service providers requirements providing Co- operative	730	56	19	10	563213	23	3	4	5
	Vision	9776	68	27	21	18122766.5	30	3.5	3.5	4.5
3	Credit	4172	64	29	15	3957290	30	4	3	2
	Vision	7908	66.6667	27.6667	19	13400941	30	3.6667	3.3333	3.6667
4	Mining	282	39	25	23	4899730	27	1	3	4
	Vision	6001.5	59.75	27	20	11275638.2	29.25	3	3.25	3.75
5	Consumer Requirement providing Co- operative	19088	49	10	5	15463719	13	2	3	3
	Vision	8618.8	57.6	23.6	17	12113254.4	26	2.8	3.2	3.6
6	Producers Requirement Providing Co- operative	1575	35	12	9	6413893	14	3	3	4
	Vision	1575	35	12	9	6413893	14	3	3	4

Conclusion and Suggestions:

The appropriate decision-making and planning in donation of financial facilities, resources and equipment's to Semnan co-operatives can influence on their growth and consequently further economic development in Semnan Province. Identifying superior cooperatives according to the fundamental criteria and factors involved in a cooperative's approach can provide a suitable circumstance for Semnan Regional Directorate of Co-operative to have efficient interaction with them (the superiors).

Leading human, financial and intellectual resources to these co-operatives as a high priority and subsequently to the others can enhance and expand the developing process of co-operatives' activities. Thus, based on the comprehensiveness of this research, it is better to pay an adequate attention in allocation of financial resources and facilities to co-operatives of settlement, supplying service providers, credit, mining, supplying consumers and producers and consider other co-operatives later than the mentioned ones. It goes without saying that all co-operatives are deserving to be benefited by the encouraging policies of Semnan Regional Directorate of Co-operative but more attention to the leading co-operatives can have the plentiful efficiencies on all the co-operatives' activities. As well as, it is suggested to use the analytical network process (ANP) technique by developing the criteria and creation of causality method among all criteria and it should be analyzed by using non- liner regression .some fickle elements in growth of Semnan Province co-operatives with the applauding policies of Semnan Regional Directorate of Co-operative.

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