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EFFICIENCY OF SMES IN ROMANIA POST CRISIS. A CLUSTERING ANALYSIS

Empirical studies

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O12

Abstract

Smallandmedium-sizedenterprises (SMEs) havehad, even in the economic crisis, a major contributiontotheachievement of gross domestic product, to create jobs, toincrease economic efficiencybystimulatingcompetitionthroughspeed of adaptationtoconditionsandtheadoption of newstrategies, theabilitytoadaptto market requirements. Although, at thebeginning of the economic crisis in Romania havebeensuspended or canceledseveralhundredthousandcompanies, starting in 2012 it isobserved a revival of SMEs. Wecouldsaythat post crisis period, thankstomeasures in support of SMEs, isthebeginning of an economic boost of SMEs in Romania.

Cluster analysis a multivariateanalysistechnique, whichincludes a number of algorithms for classifyingobjectsintohomogeneousgroups.

Analysis of effectiveness of SMEsfrom Romania using cluster analysisis a newmethod of economic analysiswhichenables an analysis, mathematicalmethods, regional development of SMEsandincreasingtheircompetitiveness.

1. Introduction.

The small and medium enterprises in Romania (SMEs) have been hard hit by the economic crisis of 2008-2009. After nearly four years, this important economic sector of the Romanian economy is showing signs of recovery, trying to return to pre-crisis levels, both in terms of number of employees and the share of gross domestic product.

The SME sector in Romania is dominated by very small-sized enterprises (up to 9 employees) and small, so the micro-firms. The number of micro-firms is in 2013, 82.08% of all SMEs in Romania, 14.37% small and medium enterprises 3.55% (Source: NIS Romania,www.insse.ro).Limited liability companies (LLC) represent the wide spread part of SMEs in Romania , that is over 90% [INS, 2013].

Among the SMEs in 2013, trade and services represent over 64% , and in industry and construction, over 28%. [Foundation Post privatization, SME-2013 Report, p. 15-25]. The number of young people under 35 years, entrepreneurs from SMEs in the period 2011-2013, represents approximately 25%, and the number of those under 25 years being between 3.13% 3.73%. (Own calculations on NIS data). A favourable premise is the share of entrepreneurs with higher education (College, graduate, masters, PhD), which has grown each yearly, reaching the highest representative level and that can lead to important performance of SMEs in Romania by moving more quickly to the knowledge-based economy.

The main problemsfacedby SMEs inthe postcrisiswere:

-The sharp declinein domestic demand;

-Difficult accessto creditdue totheirhigh cost;

-Excessive taxation.

Thus,because of theseproblems, andotherswithsmaller weight, the evolution of Romanian SMEsactivitycontinued withfluctuatingdynamics. Percentage ofSMEs thathave reducedactivityduring2008-2011 wason averageabout 45%, the proportion of SMEswho worked onthe same parametersofeconomic efficiencyaveraged37.5% and SMEshare offirmsthat hasboostedactivity inthis periodwas 17.5% (Source: Own calculations based on dataNIS)

2. The evolution ofeconomic and financial efficiencyofSMEs inRomaniain 2010-2013

Romania's economic recovery in the post crisis 2011-2013 is obvious positive GDP growth in 2011, 2012 and 2013, the growth of imports and exports of goods at levels higher than in 2008 and modest growth consumption unequivocally demonstrating this fact. The number of employees increased in 2012 (4430 thousand) and, in 2013, the unemployment rate dropping to 5.2% in 2011 and 2012 and 2013 (NIS and own studies) (the post-privatization fondation, 2012, 2013).

Studying theoverall performanceof SMEsin 2010, compared to 2009,it appears thatapproximately 50% ofSMEshadthe same orbetterresultsin 2010than in 2009and only20% had significantly lowerresults (NIS, insse.ro, 2013)These resultswere obtainedsignificantly lowerin micro. Offieldsmuch weakerresultsin 2010 compared to2009,highlightsthe construction andtrade,am id fallingpurchasing powerof household consumptionand investmentindurable goods.

The analysis of statistical data and surveys conducted in SMEs, shows that, in 2011 approximately 70% of SMEs had identical results, better or much better compared to 2010, which shows a positive economic efficiency financial and SMEs

during this period. And in this case, of all SMEs, micro-enterprises have the lowest development. Also, it is noted that the results have started to improve both commercially and in the construction.

Interestingly, in 2010and 2011entrepreneursopiniononthe future stateof the business environmentremaNIS about 80% "embarrassing business development" (White Paper of SMEs,2010, 2011).

Indicators, such as average number of employees in SMEs and the number of economically active enterprises have grown further in 2010 and 2011. The number of economically active companies was about 437 000, and the number of employees stood at approximately 2.5 million (NIS and own studies). These increases did not lead to recovery of losses compared to 2008, the percentage remaining approx. 14% less, so the number of employees and the number of active firms.

Statistical datafrom the Trade Registryshows anegative growthSMEcompaniesregistrationsin 2012compared to2011byapproximately5%.Also, the number of suspensionactivity increasedfrom about21,000to about24,000, and the numberincreasedbydissolvingin 2011to approximately12000to22000in 2012. Number ofcanceledSMEsstoodbothin 2011and in2012 atthe level ofapprox. 72000, the difference between the two yearswas2%. In 2013, the number ofactive SMEsreachedapprox.717000(NIS andown studies).

Causes suspensions, removals, or the level of registrations of new SMEs were the economic and financial crisis, but heavily and GEO. 34/2009 on the introduction of mandatory minimum tax and other fiscal measures burdensome. The reduction of budget revenues and pensioners were factors likely to reduce household consumption drastically and create skepticism among entrepreneurs.

The contribution ofSMEs tothe totalturnoverof the economyisabout 60% in 2011, and the distributionof turnoverby class ofSMEs(micro, small, medium) isabout the same, 33%, witha small gap(about2%) in favor of small and mediumSMEs(NISstatisticsandownprocessing).

Structureturnover ofSMEsshows thatthe largest shareof turnoveris given bywholesale and retailtradeand repair, leading to the conclusionpoor performanceof SMEsin the industrial sector (A. Stancu, 2011).

The evolution ofnet profitshows agreater increase innet profitto micro. This is due totheir abilityto adapt quicklyto market requirements,obtain ahigher speedof rotation ofcapital, reduced costs due tothe reduced number ofemployees.

Italso notesthatapproximately55% of all active SMEshaveprofitin 2011 andits turnoverin 2011compared with 2010approx.8%, the share issmall, the expensemicro-firms whoseturnoverhas decreased (ownprocessing).

Asistheaverage number of employeesinSME andthe averagelabor productivity,it is determined thatanaverage ofapprox. 6 employees(comparedto the European average, 4.3) average labor productivity, calculated bythe average turnoverper employeeisapprox.240,000 RONin 2011, muchlower thanlarge enterprises.This showsthe low levelof technologyandcapitalization.

SMEprofitability, measured as the ratio betweenthe profitandthe average number ofemployeesin 2011wasapproximately12,000RON/personon average.The highestprofitabilitywas achievedin micro.

In 2012, about 75% of SMEsreportedperformanceas goodorbetter

than in2011, the percentageof SMEswith better performanceand very good, being approx.25%. Average labor productivityand profitabilityhavehad an upward trendin 2012 (ownprocessing).

Analysis ofefficiency indicatorsproveseconomic and financialefficiencyandreducedcompetitivenessof SMEsin Romania, indicating that SMEsin agricultureand food industryachievedprofitabilityalmost doublethe average.

One of the factorsindicating thepotentialuse ofcompany'srapid growthandabilityis thecoverage ofproduction capacitybyorders (Wang Yue-hua, 2009).In2013, over41% ofSMEshada coveragebyordersbelow 50% (ownprocessing)

The statistical datashows that, in 2012-2013, the sales volume, the volume of orders, exports, employment, economic efficiencyindicatorsof SMEs, such as size of the profit, increased from 15% -24%.

We conclude that, in 2010-2013, the SME sector has beenseverely affected bythe economic crisisofrecent years. At theend of 2011,statisticsshowed arebound ineconomic indicatorsinpositive territory, which indicatessigns of stabilityandeconomic recovery. In 2012and 2013, trends inrecoveryefficiencySMEswenton the sameupwardtrend.

Thismeansthattheefficiency-enhancingmeasures, economic-financialandpositiverestructuringtakenbyentrepreneurswerecorrect, counteractingtheeffects of economic crisisleadingto economic recovery of companies (A. Puiu et. al, 2001).

Thestrongrevivaloccurredin 2012and 2013, in micro andsmall businesses, mainly due to rapidadaptabilityandlowcosts.

3. Research on economic efficiencygrowthprospects of SMEs in 2014, a cluster analysis.

Cluster analysisis a newmethod of analysis of the economic phenomenon. Objective of the analysisis to increaseeconomic efficiencyby strengtheningthe competitivenessof SMEsandlocal andregionalbusiness links (A.G. Babucea, 2003).

We started with themanagement objectivesofSMEperspectiveiethefrequency of operationsbydeveloping regionsarelocalizedSMEs. SME White Paper2013, usingdata organizationin the following table1.

To achievecluster analysis, we determined correlations betweendifferent approachesusing**Euclidean distance**, **Minkowskidistance**and **Cityblock distance (Manhattan distance)**.

Euclidean distanceis thesquare rootofthe sum of squareddifferencesbetween eachvariableof the same type,

$$D(i,j)=\sqrt{\sum_{f=1}^{p}\left(x_{if}-x_{jf}\right)^2}$$

To removethe effect ofthe way in whichmeasuredvariables, some researchersusethe datastandardization ofthe formula:

$$z_{if}=\left(x_{if}-m_f\right)/s_f,$$

When m_f and s_f are averageand standard deviation for thevariable f matrixentries.Euclideandistancetransformed

$$D(i,j)=\sqrt{\sum_{f=1}^{p}\left(z_{if}-z_{jf}\right)^2}$$

becomes a measure of thedifferences. Thistransformationhastheeffect of makingthe data for use, for allvariables standard deviationwillbe 1.

CityblockdistanceorManhattandistancebetween twoobjectsis the summoduledifferences betweenvariablesof the same typedistance

$$(x,y) = \Sigma_i |x_i - y_i|$$

Minkowskidistanceisdefinedbythere lation:

$$D(i, j) = \sqrt[q]{\sum_{f=1}^{p} \left| x_{if} - x_{jf} \right|^q}$$

Whereq is an integergreater than orequal to 1. It is notedthat asthe Euclidean distance, cityblockandareembodiments ofthis distance(q = 1 for City Block, and q = 2 for the Euclidian distance).

Data processing anddeterminationof the correlationswas performedusingIBMsoftware applicationSPPSStatistics. After processing thedatain the table,the following resultswere obtained1. SquaredEuclideanDistance. Based onthe calculation ofEuclideandistance, complete proximitymatrix(Proximity Matrix) for all pairs ofcases.

Processingwas performed usingSPPSStatisticsApplicationIBMcomput er. Afterwork-upgave the followingresults:

From Table2, Agglomeration Schedule can see how they grouped the cases in each group phase. In the second column, Combined Cluster are presented grouped cases. In the third column, Coefficients are coefficients distances between the elements grouped. In the fourth column, Stage Cluster First Appears, phase number shown us that have appeared each of the two elements. The last column, Next Stage, tells us how the item will probably appear in the first group and which phase will change him.

Table3,ClusterMembership, depending on the number of groupsformed, displayingcasesthat goes intothem.

From theobservedclusteringdendogram (Figure 1)managerialcharacteristicsof importance, regardless ofregiondevelopmentof SMEsconcerned.

The6,7,8,10,11,12featureshavethe same importance, equal to 1. The characteristic9, 10, 2are importantinterms ofeconomicefficiencyperspectives, characteristics ofimportancebetween9, 10and 11, 2 and 13 andform aclusterandfeatures3with2,4,5imported11. Features3, 2,5,4and1,9,10weretogetherthe greatest importanceinthe developmentoffutureeconomicefficiencyfirm , about 24.

Ifweusedthe**CityBlocksdistance**proc essing, dendogramobtainedis (Figure2)and theresultsare almost identical tothose ofthe Euclidean distance. Differ onlylead tosomeof the groups ofclusters,which showsthat, dependingon the calculation methodandtheclusteringobtained, some features changethe significance.

IntheMinkowskidistancecalculationm ethod, dendogramobtained is (Figure 3)

4. Conclusionsandfutureresearch

The primordial importanceof SMEsin the postcrisisresulting from:

- The ability to rapidly adapt to market requirements;
- The possibility of creating new local jobs;
- Capacity for innovation;
- Ability to cooperate with all types of businesses, both horizontally and vertically;

Fromthe cluster analysisperformeddeductingthe importanceof specificmanagement approachin relation toothers inincreasingeconomic and financial efficiencyof the company

Thus, it isfoundthat, in 2014, for entrepreneurs of SMEs, of great importance (withscore over 15) for enhancingtheeffectiveness of economic andfinancial are: cost reduction, distributionandrelationshipswithcustomers, theproduction of newproducts, development of effective economic strategies.

The researchshouldbeextendedby a cluster analysisto determine thedistributionbygroupingthemosteffective management approaches. Thiswayyoucanmake an analysis of forecastingthefuturedevelopment of SMEsbygroups of countiesandregions.

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Appendices

Table 1.Addressingfuturemanagementstrategiesof SMEsby region

managerial approach	NE	SE	S	SV	W	NW	C	B-I
strategy development	0,7950	0,1026	0,0391	0,0738	0,1140	0,1042	0,0817	0,0998
relationshipswith suppliers	0,5430	0,4103	0,3398	0,4016	0,4649	0,3472	0,5131	0,3659
relationshipswith suppliersand customers	0,6225	0,6496	0,6289	0,5738	0,4298	0,6042	0,6961	0,5696
development ofnew products	0,3510	0,2735	0,3594	0,2541	0,1404	0,5069	0,3268	0,3451
reduce costs	0,3974	0,3162	0,4023	0,2705	0,3509	0,2500	0,2680	0,3971
new processes	0,0265	0,0598	0,0586	0,1230	0,0351	0,0417	0,0621	0,0748
information	0,0199	0,0684	0,0586	0,0738	0,0263	0,0486	0,0490	0,0936
reorganization	0,0066	0,0256	0,0039	0,0246	0,0088	0,0347	0,0065	0,0125
delivery	0,0132	0,0513	0,0234	0,0533	0,2982	0,0694	0,0098	0,0146
capitalization	0,0132	0,0085	0,0078	0,0123	0,0789	0,0000	0,0196	0,0146
training	0,0331	0,0171	0,0195	0,0123	0,0263	0,0556	0,0196	0,0229
decrease the number ofemployees	0,0000	0,0000	0,0156	0,0000	0,0088	0,0000	0,0065	0,0146
employeesperforming	0,0027	0,0598	0,0469	0,1270	0,0175	0,0,625	0,0752	0,0395

Source:White Paper onSMEsin 2013

Table 2. Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster FirstAppears		NextStage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	8	11	,002	0	0	3
2	6	7	,003	0	0	5
3	8	12	,004	1	0	4
4	8	10	,006	3	0	5
5	6	8	,022	2	4	6
6	6	9	,080	5	0	10
7	4	5	,123	0	0	8
8	2	4	,189	0	7	9
9	2	3	,546	8	0	11
10	1	6	,641	0	6	11
11	1	2	1,294	10	9	0

Table 3. Cluster Membership

Case	4 Clusters	3 Clusters	2 Clusters
1:strategydevelopment	1	1	1
2:relationshipswithsuppliers	2	2	2
3:relationshipswithsuppliersandcustomers	3	2	2
4:development of newproducts	2	2	2
5:reduce costs	2	2	2
6:newprocesses	4	3	1
7:information	4	3	1
8:reorganization	4	3	1
9:delivery	4	3	1
10:capitalization	4	3	1
11:training	4	3	1
12:decreasethenumber of employees	4	3	1

*Figure no.1.***Dendogram using Euclidian distance**

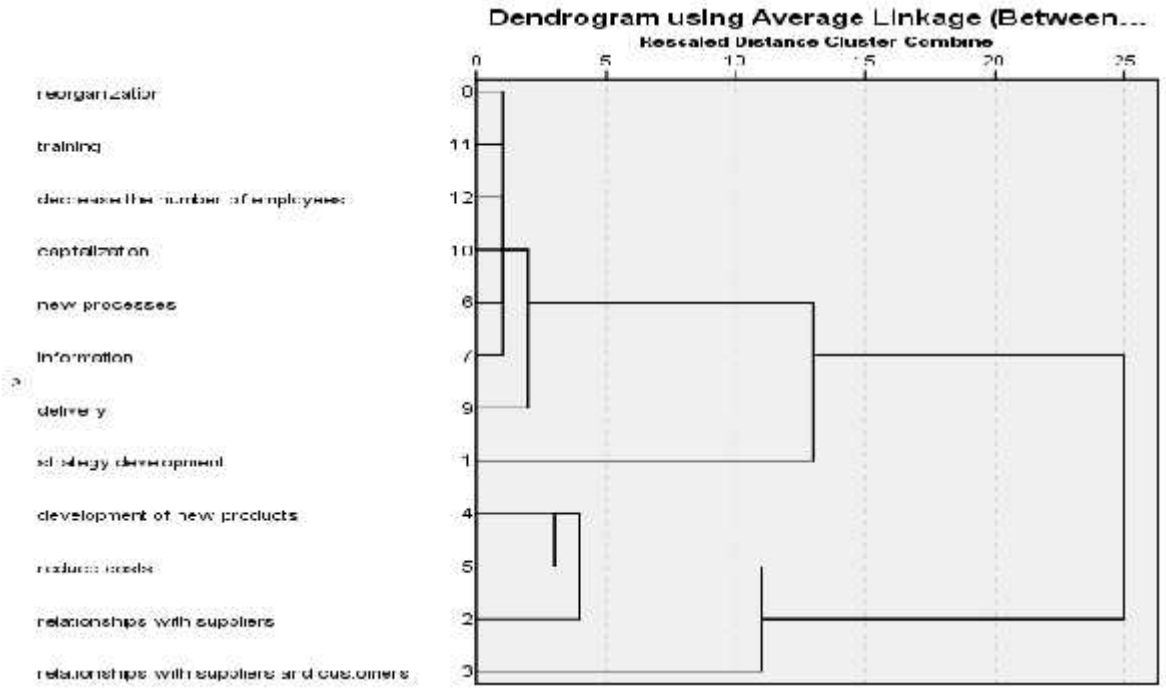


Figure no.1. **Dendogram using City block distance**

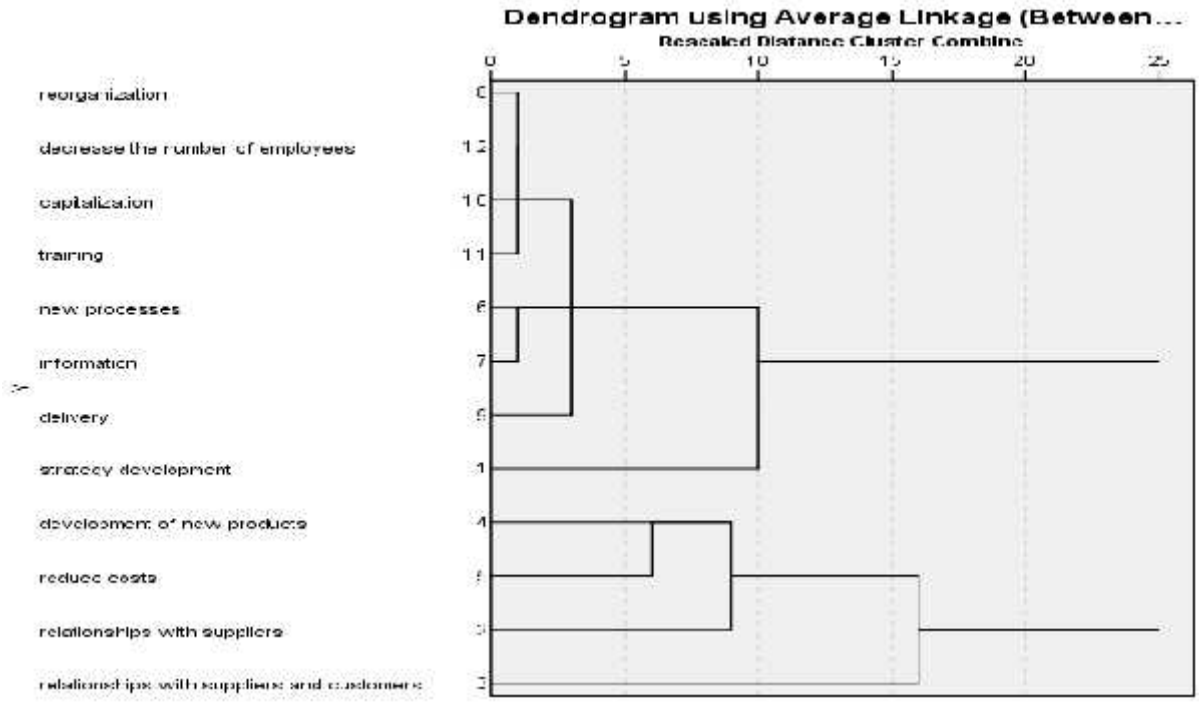
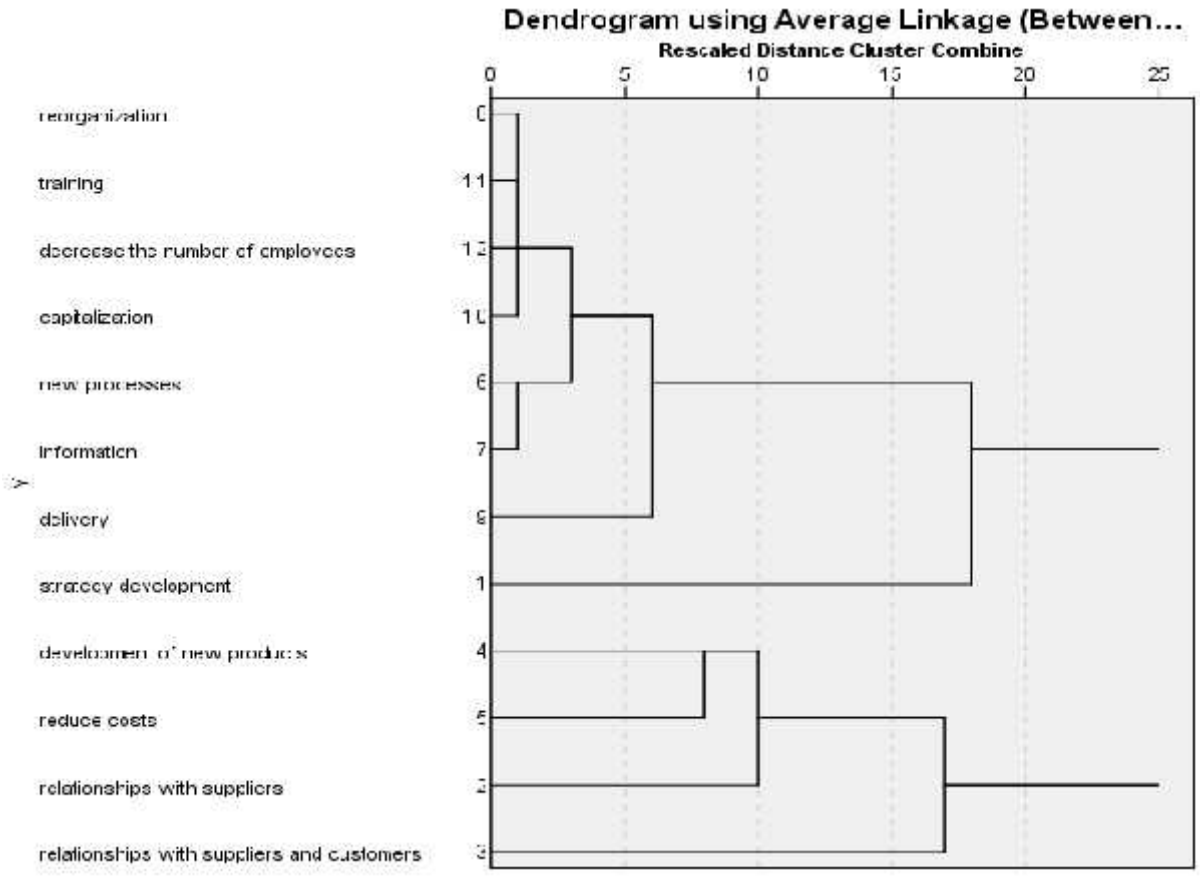


Figure no.3. **Dendogram using Minkowski distance**


Dendrogram using Average Linkage (Between...
Rescaled Distance Cluster Combine
0
5
10
15
20
25
reorganization
training
decrease the number of employees
capitalization
new processes
information
delivery
strategy development
development of new products
reduce costs
relationships with suppliers
relationships with suppliers and customers