HABILITATION THESIS

CORINA MICHAELA RĂDULESCU

RESEARCH ON THE COMPETITIVENESS OF INDUSTRIAL FIRMS FROM ROMANIA IN EUROPEAN CONTEXT

2015

"Rădăcinile adevăratei realizări se află în dorința de a deveni cel mai bun".

"The roots of true achievement lie in the will to become the best that you can become."

Harold Taylor

REZUMAT

RELEVANȚA DOMENIULUI DE CERCETARE

Fenomenul globalizării a atins în ultimele decenii cote ridicate, care lărgesc la scară mondială harta strategică a economiilor sectoarelor şi firmelor şi în acelaşi timp, accentuează importanţa competitivităţii acestora pentru poziţionarea lor favorabilă. În consecinţă, concentrarea atenţiei asupra factorilor determinanţi de menţinere, creştere sau valorificare a efectelor competitivităţii devine o cerinţă obligatorie de fixare a strategiei economice şi sociale a oricărei ţări sau regiuni.

Firmele în general şi cele din sectorul industrial din România au parcurs drumuri sinuoase, caracterizate printr-o vulnerabilitate ridicată datorită turbulenţei accentuate ale mediului.

Mediul extern în care funcţionează firmele, aparţine unei economii globale aflate într-o continuă modificare rapidă, caracterizată printr-o largă varietate de produse, pieţe, concurenţi, clienţi care măresc gradul de atomicitate al industriei sau sectoarelor de activitate.

Intensitatea concurenţială este susţinută în permanenţă de revoluţia majoră a tehnologiei, tehnicii a noilor schimbări economice, sociale este capabilă să genereze valoare, competitivitate în condiţiile limitării resurselor disponibile şi a asigurării dezvoltării sustenabile.

În contextul actual, barierele de timp şi spaţiu între agenţii principali ai globalizării reprezentaţi prin industrii, bănci, noi tehnologii, instituţii puternice, etc.,se atenuează din ce în ce mai mult.

În noile condiţii generate de fenomenul globalizării, vechile modele de dezvoltare industrială bazate pe creşterea capacităţilor de producţie sunt înlocuite cu modelele de dezvoltare a ***capabilităţilor***, respectiv a acelor factori care sunt capabili de a determina creşterea competitivităţii: inovarea, specializarea, dezvoltarea durabilă şi incluziunea socială.

Modificarea structurală şi sistemică a acestor paradigme au ca efect dezvoltarea unor noi structuri organizaţionale de concepţie, producţie, cercetare, dezvoltare, inovare, precum şi a unor noi tipuri de firme bazate pe alianţe strategice, poli de competitivitate, rețele de firme, clustere.

Această nouă economie ce se conturează conduce la necesitatea restructurării strategice a întregii activităţi economice constând în adâncirea specializării , externalizarea unor procese, relocalizarea activităţilor,etc.

Din această perspectivă, competitivitatea privită ca un răspuns proactiv la valorificarea avantajelor conferite de noile modele de integrare a factorilor determinanţi.

Indiferent care sunt elementele care o compun competitivitatea trebuie privită ca un proces continuu, dinamic, chiar exploziv, ce generează provocări constatnte şi continue, ale celor care sunt preocupăţi de valenţele pe care competitivitatea o induce în fiecare ţară, abilitatea de a produce şi dezvolta noi produse şi a inova, capacitatea de a crea bunăstare, adaptabilitatea la schimbările rapide ale mediului.

Aceste considerente reprezintă succint în ce constă relevanţă abordării tematicii competitivităţii ca subiect al cercetărilor pe care le-am întreprins de mai bine de 15 ani încoace.

MOTIVAȚIA ȘI DIRECȚIILE DE CERCETARE

Preocupările cercetărilor mele anterioare, concretizate prin teza de doctorat susținută în cadrul Universității Tehnice din Cluj Napoca ,cu titlul „***Studiul zonelor defavorizate și al dezvoltării regionale ca premise ale creșterii competitivității IMM-urilor***”,sub îndumarea d-lui Prof.univ.dr.ing Dan Cândea

Cercetările doctorale şi post doctorale au vizat, într-o fază de pionerat în România, soluţii clare, concrete pentru creşterea competitivităţii firmelor româneşti.

Am prefigurat în urmă cu 14-15 ani ca posibilă viitoare strategie pentru creşterea competitivităţii economice din România, ***clusterele, ca premisă a dezvoltării regionale***.

De atunci încoace, întreaga mea activitate de cercetare s-a axat pe studierea fenomenului complex al competitivităţii economice care prezintă nenumărate faţete, moduri de abordare, interpretare sau aplicare.

Intensificarea cercetărilor mele din ultimul deceniu în domeniul competitivității s-au finalizat prin realizarea,susținerea și publicarea unui număr considerabil de articole și studii apărute în divesrse publicaţii, cum ar fi reviste şi proceedings ISI, BDI, B+, buletine ştiinţifice (96), cărţi în edituri recunoscute CNCSIS (11), rapoarte de cercetare (18), etc

Preocupările din activitatea de cercetare le-am extins și către latura educațională ,unde am dezvoltat în cadrul unor noi programe de studii masterale,discipline care sunt direct legate și/sau complementare cu problematica competitivității-*Managementul afacerilor,Management Urban,Implementarea și monitorizarea proiectelor europene* .

De asemenea,prin activitatea de tutoriat,am condus peste 250 lucrări de licență și disertație,în care ,marea majoritate au abordat teme legate de competitivitate.

Legat de activitatea Departamentului de Științe economice și Fizică din cadrul CUNBM –UT Cluj ,pe care îl conduc,doresc să subliniez că am reușit să direcționez activitatea de cercetare a departamentului către formarea unor colective inter-disciplinare ,ale căror linii directoare principale sunt problemele legate de competitivitate.Astfel,in anul 2013 am înființat Centrul pentru Inovare ,Competitivitate și Dezvoltare economică,am organizat conferințe naționale și internaționale pe tematică si tematici complementare.(2006,2008,2009,2012).Legat de prestigiul și vizibilitatea preocupărilor de cercetare, am fost aleasă în Consiliul Director al Asociației Române de Științe Regionale in anul 2009, iar in anul 2014 am fost admisă ca membră în ERSA(European Regional Sciences Association),AMA (American Management Association) ,AEA (American Economists Association.

Din analiza rezultatelor obținute,în concordanță cu cele prezentate,direcțiile de cercetare spre care mi-am îndreptat activitatea științifică sunt:

Competitivitatea macroeonomică și Competitivitatea microeconomică

TEZA DE ABILITARE

Toate considerentele prezentate anterior, mi-au dat un imbold pentru valorificarea superioară a cercetării prin elaborarea Tezei de abilitare intitulată:***’’Cercetări privind competitivitatea firmelor industriale din Romania în context european.’’***

Obiectivul general al tezei de abilitare este de a prezenta în mod logic, argumentat şi documentat principalele realizări ştiinţifice după susţinerea tezei de doctorat din anul 2003.

Teza de abilitare a fost concepută cu scopul de a delimita clar direcţiile majore de cercetare parcurgând traseul dual firesc: prezent-viitor, realizat-previzionat.

Lucrarea este realizată în aşa fel încât, gruparea şi succesiunea produselor ştiinţifice să poată fi inclusă în mod organizat, comprehensiv şi logic în cadrul celor trei capitole.

Direcţiile de cercetare surprind în demersurile lor, atât cercetarea teoretică cât şi cea practică. Am urmărit constant ca rezultatele muncii mele să poată aibă aplicabilitate şi utilitate.

În acest scop, obiectivele principale ale cercetării competitivităţii firmelor industriale din România au fost:

- ***Identificarea unor modele optime de competitivitate bazate pe specializare şi localizare a industriilor atât pentru regiunea de NV a României cât şi, în particular în zonele fost industrilaizate,precum cele din industria minieră şi prelucrătoare cu particularizări în judeţul Maramureş.***
- ***Strategii și soluții privind creșterea competitivității economice și sociale în sectorul industrial, din nou cu particularizări pe regiunea de dezvoltare NV.***

Aspectele complexe ale problemelor studiate, au impus varietatea şi volumul ***metodelor de cercetare***, precum: **ipoteza, benchmarking-ul, analiza, sinteza, metoda econometrică.**

Primul capitol tratează aspecte conceptuale ale competitivităţii, ale stadiilor şi nivelurilor de competitivitate, modele ale competitivităţii precum şi funcţiile competitivităţii pe plan naţional şi internaţional. Am grupat în această secţiune cele mai recente articole publicate, care prezintă situaţia critică a competitivităţii regiunii de NV a României, precum analiza competitivităţii prin intermediul modelelor de concentrare şi specializare.

Datele statistice, analizele sectoriale şi spaţiale au permis ***evaluarea şi delimitarea principalelor industrii ale regiunii NV care pot determina dezvoltarea economică în context european.***

O problematică specială care a fost tratată în acest capitol, o reprezintă zonele fost industrializate ca barieră în competitivitatea urbană locală/regională. Cercetările din acest palier au fost asupra posibilităţilor de regenerare ale acestor zone (brownfields), prin oferirea unor scenarii posibile de reabilitare .

Studiile de caz s-au referit la zona industrială Baia Mare a fostei platforme gigant de prelucrare a minereului de aur şi cupru **Phoenix** .

Desigur, informaţia devine în acest caz resursă strategică iar informaţia teritorială pentru noi strategii este un factor-cheie de succes. De aceea, am considerat că business-inteligence este o redutabilă forţă motrice a cercetărilor din domeniu, conferind astfel un spaţiu special lucrărilor de cercetare elaborate. Noile tehnologii informaţionale spaţiale (Geographic Information System- GIS) în congruenţă cu analizele strategice economice crează o nouă perspectivă de dezvoltare a metodelor de management strategic al competitivităţii bazate pe cunoaştere.

Vehicularea rapidă a informaţiilor , gestionarea corectă a acestora, crearea unor predicţii corecte ,conferă utilizatorilor avantaje competitive eficiente şi sigure.

Capitolul al doilea are cea mai mare consistenţă şi întindere, fiind decicat strategiilor privind creşterea competitivităţii economice.

În acest capitol am reunit rezultatele majorităţii lucrărilor ştiinţifice.

Complexitatea, varietatea şi numărul mare al temelor abordate a impus gruparea secţiunilor acestui capitol pe studierea creşterii competitivităţii IMM-urilor prin ***formularea unor strategii privind evaluarea resurselor umane şi a performanţelor manageriale ale firmelor***. În cadrul modelelor matematice elaborate au fost luate în considerare criterii calitative şi cantitative ale performanţelor manageriale. Studiile de caz elaborate în marea lor majoritate în cadrul întreprinderilor forestiere ale judeţului Maramureş, au relevat în cvasitotalitatea lor faptul că performanţele resurselor umane, stilurile de conducere şi perfecţionarea managementului au un rol hotărâtor asupra performanţei colective a întregului grup, a organizaţiei. Cultura managerială va reprezenta de asemenea, un factor cheie de succes în asigurarea competitivităţii firmei.

Tot în aceeaşi direcţie, cercetarea competitivităţii la nivel de firmă a continuat printr-o serie de lucrări care evaluează ***comportamentul proactiv al firmelor în funcţie de performanţele manageriale şi riscul afacerilor***.

Metodele de cercetare s-au bazat pe crearea unor modele matematice care vizează evaluarea performanţelor antreprenoriale, atăt pe plan naţional cât şi local. Scopul cercetării a fost de a facilita activitatea factorilor decizionali în procesul îmbunătăţirii procesului antreprenorial şi al promovării antreprenoriatului din Romania.

Cele trei ipoteze ale cercetării au presupus legăturile existente dintre parametrii modelului rezultând proactivitate – performanţă managerială – risc.

Modelul a fost realizat pe baza datelor provenite din elaborarea şi implementarea a peste 1000 de chestionare aplicate, a realizării unui număr de 10 anchete şi a interpretării a peste 200 de rezultate validate. intervalul de cercetare a fost 2008-2013 cu ocazia realizăţii Diagnozei Judeţului Maramureş, cu focusare pe situaţia dezvoltării IMM-urilor din acest judeţ:

- Cercetări privind studierea identificării oportunităţilor de afaceri din zonele defavorizate şi a consecinţei aplicării Legii Zonelor defavorizate.
- Analiza principalelor obstacole întâmpinate de IMM-urile din Judeţul Maramureş în intervalul 2011-2012.
- Studiul privind extinderea ofertei educaţiei antreprenoriale în sectorul terţiar între 2010-2012.
- Căi privind asocierea în clustere a firmelor din industria mobilierului Judeţului Maramureş între 2012-2013.
- Strategia de dezvoltare sustenabilă a Judeţului Maramureş.

Rezultatele modelului elaborat au o aplicabilitate practică, concretă, fiind un model flexibil, uşor adaptabil schimbărilor de parametrii.

Modelul asigură determinarea gradului de proactivitate antreprenorială(care presupune că firma are o reacţie rapidă, imediată şi pozitivă la factorii externi ai mediului său) în funcţie de riscul afacerii(diferit în funcţie de domeniul de activitate) şi performanţele managerilor mai cu seamă cele legate de capacitatea acestora de a se adapta rapid la schimbările mediului concurenţial.

Capitolul al doilea continuă cu studiile legate de ***clusterele de firmă*** care reprezintă, la nivelul unei concentrări geografice, forme organizate de firme, instituţii, asociaţii, organisme, care cooperează pentru ţeluri comune prin realizarea de conexiuni şi alianţe cu scopul propus de îmbunătăţire a competitivităţii.

Modelul clasic al diamantului lui Porter, privind competitivitatea este abordat într-o nouă manieră, cea care include şi clusterele.

Pentru a înţelege noua economie geografică şi/sau competitivitatea teritorială în modelul clasic, clusterul este introdus ca o consecinţă a integrării industriilor pe orizontală şi verticală în cadrul lanţului valoric al acestora.

Modelele de operare ale clusterelor sunt diferite, însă modul lor de formare şi dezvoltare depind într-o mare măsură atât de concentrarea dar mai ales de specializarea industriei dintr-o anumită arie geografică.

Cunoaşterea, rafinarea, analiza şi regruparea elementelor care constituie succesul iniţierii şi dezvoltării unui cluster a fost obiectul unor ample cercetări întreprinse în intervalul 2013-2015. Cercetarea a vizat Clusterul de Mobilier Transilvan, bazându-se pe analizarea corelaţiei care există între factorii soft şi hard ai celor care asigură,de regulă,succesul unui cluster. Studiile indică faptul că performanţă maximă funcţionării şi dezvoltării clusterului se atinge atunci când, există un echilibru între factorii hard şi soft.

Din categoria factorilor hard fac parte: Cunoştiinţele (Know-how), Suportul instituţional, Managementul, iar factorii soft consideraţi sunt: Educaţia, Networkingul instituţional, Comportamentul antreprenorial.

Un ajutor considerabil în procesul de consolidare şi dezvoltare al clusterului, îl constituie ***ghidul elaborat de autoare*** pentru identificarea relaţiilor sistemice între membrii clusterului.

Ghidul cuprinde indicatorii de performanţă a factorilor care contribuie la crearea şi apoi dezvoltarea unor legături solide între membri clusterului.

Prin evaluarea sistemului de indicatori se poate determina gradul de intensitate al relaţiilor dintre membrii clusterului şi se pot identifica cu uşurinţă ''neconformităţile'' sau ''defectele'' sistemului relaţional, în paralel cu identificarea soluţiilor de îmbunătăţire.

Deoarece „sănătatea" relaţiilor sistemice ale clusterului reprezintă un factor de succes al clusterului, am analizat şi cercetat ***reţelele sociale care compun clusterele***.

Importanţă analizei reţelelor sociale rezultă datorită posibilităţilor sporite de a oferi modele competitive în ceea ce priveşte ***inteligenţa de business, difuzia de cunoştiinţe, designul de produs şi de procese inovative-creative.***

Spre exemplu, ampla cercetare care am efectuat-o în cadrul Clusterului de Mobilier Transilvan a pus în evidenţă faptul că, prin analiza reţelelor sociale se pot crea modele eficiente privind difuzarea rapidă a ideilor creative, a soluţiilor tehnice, a inovării .

În general scurtarea considerabilă a drumului de la procesul de design – prototip – testare – lansare pe piaţă – validarea noului produs trebuie să fie o preocupare permanentă a managerilor în asigurarea competitivităţii.

Noile modele de ***"lume mică"*** îşi demonstrează eficienţa şi în cadrul Clusterului de Mobilier Transilvan, iar prin extrapolare şi în alte clustere care au la bază industriile creative.

Capitolul al treilea constituie cel care relevă activitatea şi traseul profesional al autoarei continuând cu perspectivele dezvoltării carierei.

Pentru a putea sintetiza aspectele relevante ale carierei, prezint acest capitol sub forma unor ***etape care sunt caracteristice managementului de proiect***, parcurgând formatul de bază al unui proiect:

a) Contextul general de dezvoltare al carierei, începuturile plasându-se în anii ´90, când formarea deprinderilor laturii didactice şi munca cu studenţii au reprezentat fundamentarea carierei academice, urmând firesc anii doctorali cu mari satisfacţii datorită cercetărilor de pionerat întreprinse asupra dezvoltării regionale a zonelor defavorizate din România şi a propunerilor de creştere a competitivităţii IMM-urilor prin asocierea lor în clustere.

b) Relevanţa şi justificarea domeniului de cercetare al competitivităţii arătând aici faptul că în perioada următoare, în contextul strategiilor integratoare ale UE , este mare nevoie de **introducerea unor teme de top în cercetare şi educaţie** în acest domeniu.

Nu pot desprinde sau separa cariera mea profesională de mediul academic în care îmi desfăşor activitatea. De aceea, în proiectul de carieră am abordat ***analiza problemelor, obiectivelor şi strategiilor în domeniul competitivităţii*** la nivelul instituţional în care activez, urmând ca, în final, propunerile de acţiuni pentru atingerea rezultatelor aşteptate să se raporteze la nivel de colectiv restrâns sau individual.

Analiza problemelor identificate prin intermediul relaţiei cauză – efect în direcţia competitivităţii sunt: ***Insuficienţa specialiştilor şi a organizaţiilor specializate în domeniul competitivităţii economice*** rezultând ca obiectiv principal propus în viitorul apropiat crearea unui ***Centru Academic de Competitivitate în cadrul Universităţii Tehnice din Cluj Napoca.***

Strategia propusă pentru atingerea obiectivului meu principal se bazează pe atât pe plan intern prin ***îmbunătăţirea eficacităţii şi calităţii dezvoltării carierei academice în domeniul competitivităţii, creşterea calitativă şi cantitativă a producţiei ştiinţifice,contribuţii privind înfiinţarea unei infrastucturi de cercetare doctorală şi post-doctorală***, iar pe plan extern ***crearea şi dezvoltarea unor relaţii bazate pe parteneriate solide în domeniul competitivităţii economice***.

Desigur, mijloacele de realizare a acestor strategii presupun fixarea unor acţiuni de implementare atât pe termen scurt cât şi pe termen mediu sau lung.

Sintetizarea acestor propuneri s-a realizat prin simbolizarea fiecărei acţiuni propuse în cadrul obiectivelor propuse, concomitent cu indicarea out- put-ului pentru fiecare rezultat.

Dintre aceste acţiuni ca perspective ale potenţialului carierei în cadrul Universităţii Tehnice din Cluj Napoca amintesc:

- Implementarea unor strategii educaţionale bazate pe dezvoltarea abilităţilor tehnice, cognitive, profesionale oferite de programul educaţional doctoral şi postdoctoral.
- Realizarea, aplicarea şi implementarea proiectelor, granturilor de cercetare bazate pe teme de importanţă majoră concomitent cu intensificarea legăturilor dintre cercetători şi specialiştii din domeniu în vedera accesării comune a programelor de tip HORIZON 2020.
- Dezvoltarea parteneriatelor pe plan naţional, transfrontalier, european şi internaţional cu scopul creşterii vizibilităţii şi impactului activităţii de cercetare din domeniul competitivităţii.

TABLE OF CONTENTS

CHAPTER I CONCEPTUAL ASPECTS OF COMPETITIVENESS. MODELS OF COMPETITIVENESS IN N-W REGION OF ROMANIA 9
I.1. Conceptual approaches on competitiveness 9
I.2. Models of competitiveness 16
I.3. Trends in addressing competitiveness 20
I.4. Critical analysis of competitiveness in Romania 22
I.5. The problem of competitiveness in former industrialized areas 33
I.6. Business Inteligence and G.I.S 47
CHAPTER II STRATEGIES AS BASIS OF ENHANCING ECONOMIC AND SOCIAL COMPETITIVNESS OF INDUSTRIAL SECTOR 53
II.1. Competitivness and promotion of entrepreunership 53
II.2. Business strategies regarding the evaluation of human resources 57
II.3. Entrepreneurial risk and its perception 63
II.4. Territorial approach to competitiveness 69
II.5. Clusters 70
II.6. The clustering process.Main factors 73
II.7. Social network analysis. 87
CHAPTER III CAREER DEVELOPMENT PLAN 109
III.1. The relevance and justification of research in the field of competitiveness in the context of career development 109
III.2. Impact and expected results 114
REFERENCES 116

CHAPTER I

CONCEPTUAL ASPECTS OF COMPETITIVNESS.MODELS OF COMPETITIVNESS IN N-W REGION OF ROMANIA

I.1. Conceptual approaches on competitiveness

Competitiveness is a complex economic phenomenon, with different definitions and interpretations and quantification methods using single indexes, composite indicators and indices on which economists do not entirely agree. Competitiveness is often interrelated / or in a complementarity relationship with other economic terms and concepts, which can create confusion that leads to misunderstandings about the phenomena and a tendency to include very many elements, more or less relevant, in this concept. The current status of research in the field leaves space for conceptual disputes about competitiveness.

I.1.1.Competitiveness - definitions

There are different definitions in the literature of **Competitiveness**
In a free market a nation can produce goods and services that can stand the test of international competition and at the same time can maintain and increase real domestic income passing the test of international markets, and at the same time maintain high and sustainable levels of income, or, more generally,'' *the ability of regions, when exposed to external competition, to generate relatively high levels of income and employment*.'
(OECD:1992,p.237).Competitiveness is a measure of a country's advantage or disadvantage in selling its products in international markets.

The Global Competitiveness Report of the World Economic Forum defines competitiveness as "*the set of institutions, policies, and factors that determine the level of productivity of a country*". (World Economic Forum, The Global Competitiveness Report 2009–2010, p. 3)
According to the World Bank, competitiveness accumulates elements that confer a superior position to an economic entity compared to its competitors According to OCDE, Competitiveness is the ability of businesses, industries, regions, nations or supranational organisms to ensure a profit and a relatively high level of use, on a sustainable basis, to the factors of production, provided that they are exposed to free competition
This definition clearly outlines the decisive impact that the competitiveness of a nation has on income levels and thus on the standard of living in the country concerned. Therefore, the focus is on the social purpose of improving competitiveness.
However, emphasizing the role that the differentiation of products has in the competitive strategy of companies, industrial economy has limited this approach, considering that it does not constitute an adequate basis for a comprehensive assessment of competitiveness.(Rusu ,2008)
This definition mainly underlines the widening spectrum of variables that must be considered in the analysis of competitiveness (productivity, technological innovation, investments in physical and human resources, structural policies). To summarize: Competitiveness is that mix of institutions, policies and factors that determines the level of productivity of a country.

Defining the concept of competitiveness remains, therefore, still a controversial issue, justified by the considerable diversity of definitions and approach angles circulated in the literature, from which some common elements can be drawn:

- The ability to produce and develop new products, to innovate;
- The ability to create wealth;
- State support through a system of incentives;
- Its complexity, as evidenced by the many definitions that seek to capture its essence;
- The difficulty in measuring it, as evidenced by the large number of indicators used for this purpose;
- Adaptability to rapid changes in the environment;

I.1.2.Pillars of competitivness

The pillars of competitiveness, in a more extensive WEF (World Economic Forum,2014) evaluation, are based on 12 pillars of competitiveness:

***Institutions*.** Institutional environment is determined by the legal and administrative framework in which individuals, companies and governments interact in order to generate revenue or added value.

***Infrastructure*.** It seems favored by the current crisis if we observe that, in general, economic stimulus packages promoted by governments are largely aimed at this sector.

***Macroeconomic stability*.** Although this factor does not contribute directly to productivity growth, it is evident that the lack of this stability affects both businesses (lack of predictability translates into increased costs for companies) and governments, for which access to deficit financing becomes much more expensive.

***Health and primary education*.** A healthy workforce is vital to a high level of productivity. A low level of medical services is reflected in increased labor costs. Basic education is also critical. This allows an easy adaptation of the workforce to technological changes and processes.

***Higher education and continuous training*.** It allows economies to address the evolution of complex systems with higher added value.

***Efficiency of the asset market*.** It includes the openness of the market, customer preferences and the degree of demand sophistication.

***Labor market efficiency*.** The flexibility of low-cost transition from one activity to another, providing a correlation between remuneration and effort, efficient use of talent.

***The degree of "sophistication" of financial markets*.** Ensuring a high level of liquidity, access to financing for companies.

***The absorption capacity of new technologies*.** The agility with which new technologies are applied allows obtaining a competitive advantage.

***Market size*.** A big market allows obtaining scale economies.

***The level of business sophistication*.**

***Innovation*.** Probably the most important pillar of competitiveness. Long term, only innovation can ensure improved well-being.

Figure 1.1:The GCI Framework: The 12 Pillars of Competitiveness
Source:Adapted by author:WEF- 2014

I.1.1.3.Stages of competitiveness

The competitive advantages of a country or region are the performances of a multitude of activities of private and state enterprises, in a country or region, which tend to the top level of international performance. The CA concept reveals both the microeconomic aspects of CA, businesses, and the macroeconomic ones, starting with the assumption that most of the competition takes place between companies, not between countries, and that, however, there are certain features, functions and characteristics of the countries that affect the likelihood of success of a company.

The following stages of competitive development are established in the specialized literature, according to CA sources:

A. Economy based on factors
B. Economy based on efficiency
C. Economy based on innovation

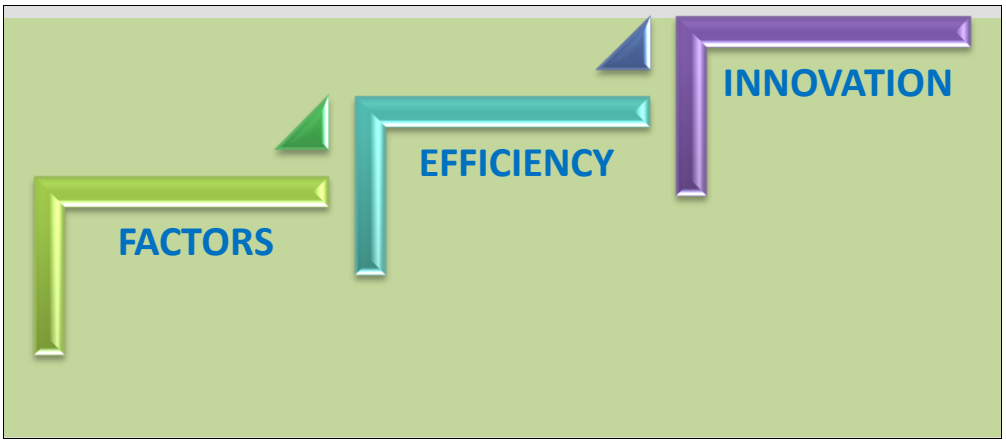


Figure 1.2 Stages of competitivness
Source:The author

1.The stage dominated by the impact of production factors, is a basic stage (including labor) which is the main source of advantages; at this stage of the substitution policy of imports is not a way to sustain development, as a higher quality of production factors cannot be achieved by protecting them from external competition; competitiveness due to factors of production - factor-driven (unskilled or poorly qualified labor, natural resources). The economy is competitive mainly due to lower prices (comparative advantage), and the products are less complex, with low added value and labor intensive. Technology is assimilated in particular through imports and foreign direct investment. However, certain essential prerequisites (institutions, infrastructure, macro-economy, health and primary education) are assumed to exist. In this first stage, competitiveness means identifying those factors that would ensure regulatory and quantitative efficiency, giving it a basis for further development. The economy based on factors is that in which competitiveness elements are found mainly between the **pillars 1-4**. Here we find countries where companies are competitive by having low prices, selling raw materials and "commodities", that use unskilled labor, and products have a low added value.

2.The stage dominated by the impact of investment, Stage II: Competitiveness determined by efficiency factors based on the investment - efficiency-driven (more efficient production, higher quality products). Competitive conditions are related to higher education and continuous training and the ability to obtain benefits from existing technologies and access to new technologies (through licensing, business partnerships and foreign direct investment).
The more advanced production factors are joined by basic ones, meanwhile developing internal competition and starting an internal market. There is a growth in demand, especially for certain segments with low added value from different sectors and industries. At this stage, "the scale effect" is important.
Here we find economies that are mainly between **pillars 5-10**. In these countries, companies have higher margins.

3.The stage of economy based on innovation
Competitiveness based on innovation- innovation-driven (new products derived from innovation, complex production processes).This competitiveness is achieved through the development and sale of innovative products and new technologies. To move to this stage one should identify those factors that contribute to the improvement of existing technologies and the uptake of new technologies and knowledge from outside the country, and improve interaction between different institutions of the national economy (higher education institutions, research and development

institutes and government policies, private sector, NGOs). Providing such premises should generate innovation and creative processes that can be transferred into the production process for new products and technologies that enhance the competitive advantage of domestic companies.

Here we find the largest corporate margins mainly due to the novelty and / or uniqueness of products/services performed, that integrate the influence of the other pillars of competitiveness. Here we find a significant share of the pillars 11 and 12 (business complexity and innovation).
Delimitation of stages is not a rigid process, as there are countries "in transition" between stages, during which time the action of new factors starts based on the support of the contribution of the essential ones for the stage of which they are just about to come out, and on increasing the contribution of the essential ones for the next stage.

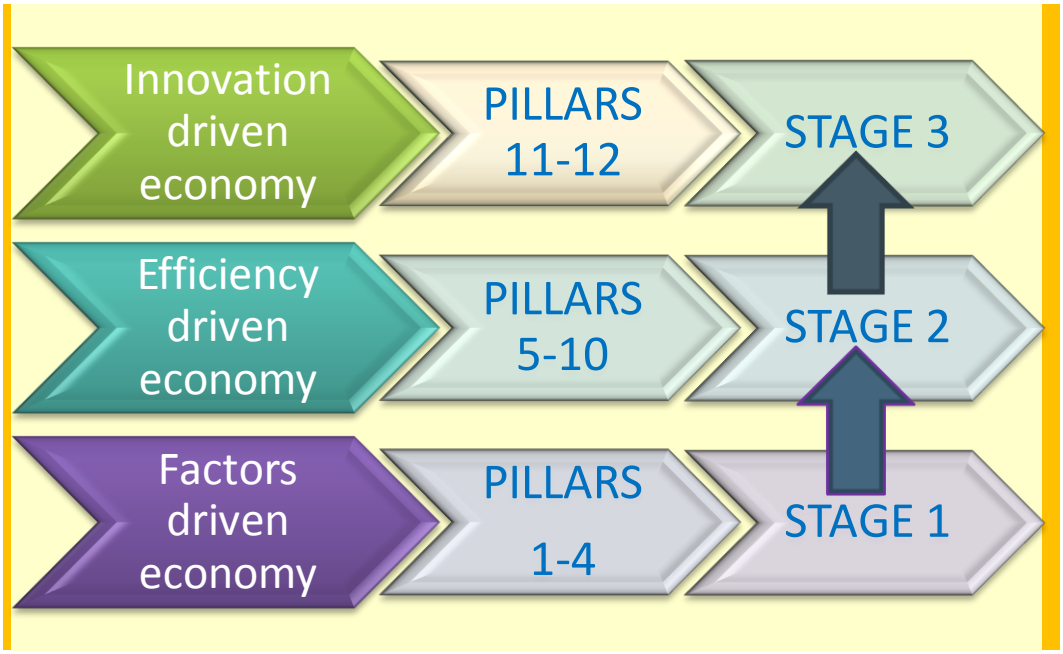


Figure 1.3 Stages of competitiveness
Source: Adapted by author: WEF

In another approach, based on the WEF 2014 competitiveness report, Romania is placed in a phase of transition between stages B and C (transition from an economy based on efficiency to one based on innovation). According to economic theory, in the first stage of economic development, the economy is mainly dependent on inputs such as labor (mainly low-skilled) and natural resources. Competition is based on prices, and low productivity is reflected in low wages. In this stage, competitiveness depends mainly on four pillars: the proper functioning of public and private institutions, the development of infrastructure, the economic environment and the health of the workforce that received at least a basic education.
The second stage of development shifts the focus on efficiency of production processes. The increase in wages without the possibility of unjustified price increases implies a higher quality products. Competitiveness is determined by six other pillars: high education and
training, efficient markets for products, the proper functioning of the labor market, the sophistication of financial markets, the ability to implement existing technologies and access to a

large domestic or foreign market. In the third stage of development, the high level of income can be sustainable
only if profitable businesses with new and unique nature can be developed. What counts are high-tech manufacturing processes and the continuous development of new products and improved production techniques. The classification of national economies is done on five development stages, corresponding to the three stages mentioned and the intermediate positions between them. The classification criteria used are GDP per capita and the weights that resources, efficiency and innovation have within the economic results. We can see that in the first part of the process of economic growth efficiency gradually takes over the role of resources and innovation remains marginal. From a certain point onwards, efficiency can only determine half of economic development and the one taking over more and more of the share of primary resources is innovation, which should become more important than it. Romania is in the second stage of development, not so much for reasons of efficiency but for failing to move the focus from resources toward innovation. In other words, all the pillars matter, but their relative importance depends (in Romania as in any other country) on the stage we are in.

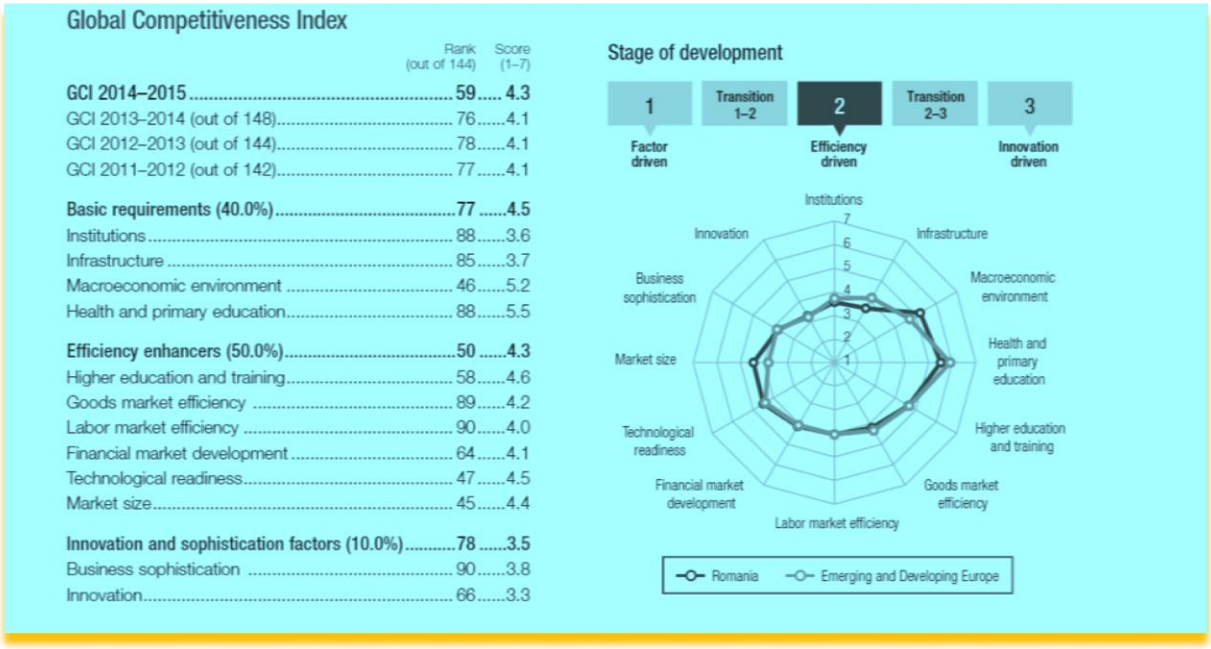


Figure 1.4 Romania's Stage of develpment
Source: World Economic Forum –The Global Competitiveness Report 2014-2015

Table 1.1 Indicators of Competitivness Stages and path limits
Source: WEF

Indicators	Stage C	Path S1-S2	Stage B	Path S1-S2	Stage A
GDP/INHAB. (USD)	bl 2.000	2.000-2.999	3.000-8.999	9.000-17.000	>17.000
Factors (%)	60	40-60	40	20-40	20
Efficiency(%)	35	35-50	50	50	50
Inovation(%)	5	5-10	10	10-30	30

I.1.1.4. Levels of competitiveness

Prospects for handling competitiveness, in terms of multiple reference levels – focus on company, industry, industry as a whole, regionally, nationally, internationally (economic blocks), globally:

- at **company** level the problem seems apparently simple in light of the idea that firms that survive are competitive and those that step out of the market are not;
- in the case of **sectors,** the vision regarding competitiveness was strongly influenced by the work of this author, that includes, in addition to firm-level determinants, factors specific to the mezoeconomic plan - the dynamics of the sector (its growth rate), specific market size, the strategic groups in the sector etc.
- nationally, the issue of competitiveness is based largely on Porter's model, which has many interpretative meanings and defines four determinants of a country's competitive advantages: resources; business environment; related and supporting industries; demand for goods and services in the internal market. The novelty and force of the model lies in the concurrent inclusion of company, industry and country specific factors;
- globally - "Global Competitiveness", competitiveness is a concept that cannot be compared with another entity in the known universe, but could instead be measured by comparing the past with the present and the future of possible actions in this global market.
-

Figure 1.5: Levels of competitiveness
Source :The author

Thus it is important to understand the complex nature of competitiveness and the links between each of these levels. However, regardless of the level, distinct measuring indicators will be used and different mechanisms for management of competitiveness (Nicolescu et al.2007).
Each of these levels are interrelated and influence each other. The competitiveness of a nation depends on competitive sectors, and these in turn depend on the activity of companies. Currently there are studies whose object makes comparing the performance of the business environment in different countries and national competitiveness, analyzed based on a multitude of factors. National competitiveness is directly determined by the domestic economic environment. Therefore, a first exercise in determining the level of national competitiveness lies on the analysis of the quality of the domestic economic environment (Șule, et al ,2008).

I.2. Models of competitiveness

Regarding the theories and models on competitiveness the principal groups consist of ***comparative advantage models and location advantage models***

The first group includes absolute ***comparative advantage theory of Smith ,and the Ricardian model of comparative advantage developed previously by*** *.Heckscher-Ohlin-Samuelson (HOS)*
Based on the concepts of competitiveness and ***comparative advantage*** (*given by the endowment with material factors*) the concept of ***competitive advantage*** was developed by M.Porter 1990 (granted, in addition to material factors, with the possession and adequate capitalization of intangible factors, primarily research & development and marketing skills), which was determined, in his view, by: conditions of supply and demand of factors; the existence of support industries; company strategies; market structures.
At a microeconomic level, *competitive advantages* mean a superior profitability of a company compared to the other.
According to Porter's conception,(1990,1998) sustainable competitive advantage are achieved by a firm when it is creating the same profit with lower cost than its competitors (*cost advantage*) or obtains higher profits compared to its competitors, for competitive products (*differentiation advantage*). The competitive advantage allows the company to offer greater value to the consumer and also to achieve higher profits for itself.
Based on the two types of advantages (cost and differentiation), the company takes a leading position, whose main feature is the creation of a superior value through the use of *own resources* (patents, trademarks, brands, reputation, etc.) and efficient use thereof, within a system of *value chains* positioned horizontally and vertically.
The theory of competitive advantages, in a more comprehensive and dynamic approach, is nothing but the theory of comparative advantages (costs), studied in their evolution over time. For this reason, one of the major problems of competitive advantages is their *sustainability* (durability) over different periods of time, given that it is difficult to maintain top performances, especially long-term. Competitive advantages require *special schemes* of *strategic management* that take into account maintaining a unique competitive position, compromising and selecting competitors, coherence, synergy and efficiency of operations. Comparative advantages, in a strategic sense, are based on an effort to imprint the continuous nature of the *innovation process* which must be stimulated, maintained and developed through various strategies of the innovation system of entrepreneurial creativity.
Moving from a microeconomic approach of competitive advantages to the macroeconomic one was a natural process as *the basic set of competitiveness principles* remain virtually unchanged. What changes is the *metric of competitive advantages* (the system of indicators and sub-indicators), as well as the policies, instruments and mechanisms used for stimulating them. At micro and macro level, a *particular system of indicators of competitiveness* was created, with

different levels of cohesion, according to the goals and field of research and the information available(Durand et.al.1992).
The model often referred to when analyzing differences in competitiveness between nations is "Porter's Diamond", which highlights the importance of four essential factors:

- ✓ production factors,
- ✓ strategy,
- ✓ structure and management of the company and the level of competition,
- ✓ domestic demand and
- ✓ related industry

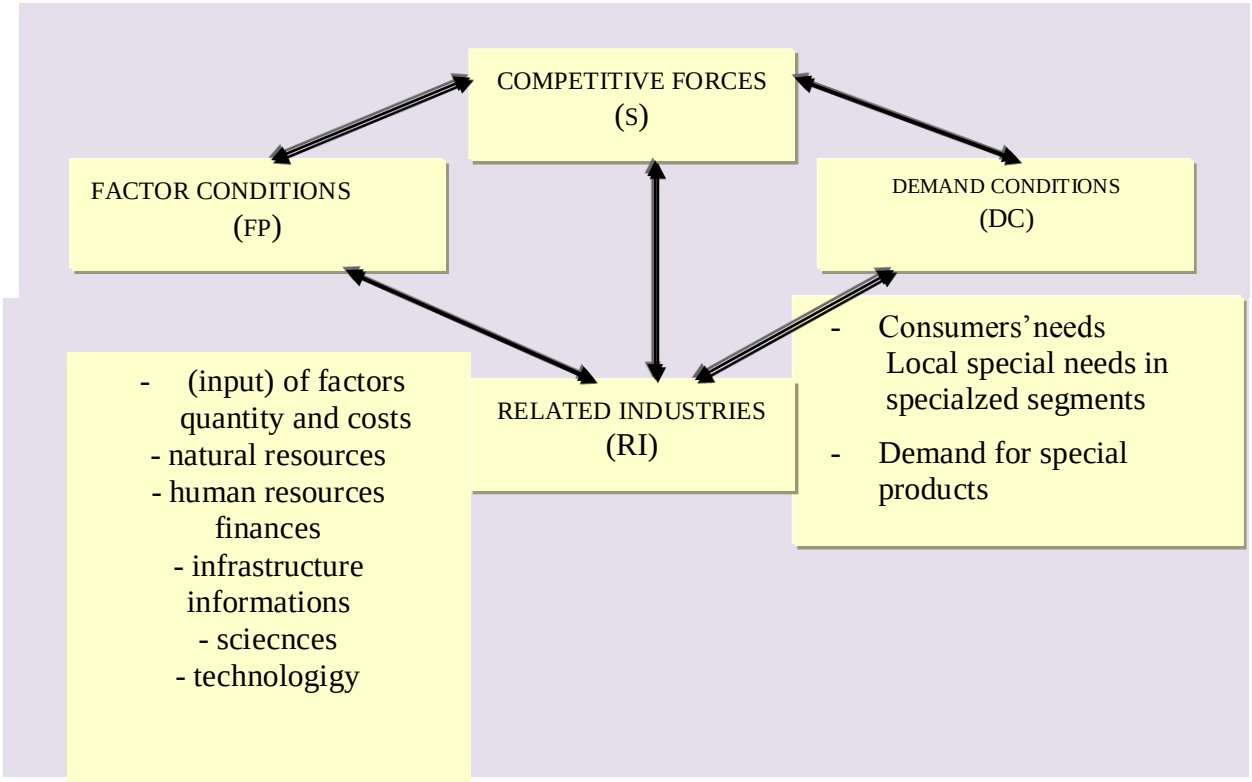


Figure 1.6 New Porter's Diamond Model
Source:Adapted by author from M.Porter (1998)

The determinant elements of national competitive advantage
The determinant elements of national competitive advantage lie in a relationship of interdependence, creating an interactive and dynamic system.
The factors of production (FP) should be seen both as primary sources of competitive advantage, as well as defining elements of the business environment: they are both effect and cause of the quality of the business environment. This requires a comprehensive view of the factors of production. The volume, structure and quality of the production factors represent determinants in the formation of competitive advantages. Moreover, the relative comparative advantage theory and the theory of introducing production factors in countries represented the main theories for setting the grounds for the specialization of countries and economic reason of international exchanges. In terms of contribution of production factors to the formation and continuation of the competitive advantage, the structural components of production factors show different roles and significance.

Performance and competitive environment in related and support industries, upstream and downstream

The **related industries** (RI) are those appearing in the line of value creation in a sector and whose contribution can be singled out: make complementary products available; participate in achieving competitive advantage in any stage of the value chain by improving manufacturing technology, marketing, after-sales services among which information providers stand out, managament methods, manpower and equipment, which are a prerequisite of labor productivity and capital.(OECD,2012)

The best performance is obtained when clusters are created which include representative companies carrygin out activities, functions and subfunctions of the value system. Concentrated in the same area, they benefit from utilities and common public goods at lower costs compared to when they are separate. A cluster allows more efficient joint training and research programs and the results in economic practice are multifaceted. Upstream and downstream industries are required at two contradictory processes: inertia and innovation.

The demand (DC) has one of the strongest influences in the development and maintenance of competitive advantage. Demand is the first criterion considered in the allocation of resources and starting a business. In dealing with domestic demand, the quality of goods is crucial, and forms of competitive advantage are forged. Firms and industries in a country that declares its competitive advantage on the relevant market prove they understand, interpret and satisfy demand on segments of customers better than their competitors.

Strategies, structure and competition of firms in each industry (S). In assessing this factor we take into account the overall context in which companies are created, organized and managed, the number and balance of power between them, competition and cooperation, w hich condition the competitive advantage and success internationally. The study mde by M. Porter is not relevant, globally, there are no cases in which a firm has monopoly nationally and has a competitive advantage in the international market. A contributing factor for obtaining competitive advantage is the reduction and elimination of artificial barriers in the way of new domestic and foreign competitors entering the industry.

State, economic policies and legal regulations. Many authors consider the state as the fifth determinant of competitive advantage in international competition because: the state influences the formation and use of factors of production through fiscal, budgetary, environmental, monetary, education and scientific research policies; it influences the dynamics and structure of demand, both in fiscal and budgetary policy, but also by state orders, commercial policies and social protection, idenpedent of the dominant ideology, and has a fundamental objective: to provide a framework for economic growth that brings wealth. Only this legitimizes it as a general manager of interests and particular conditions, autonomous and often divergent. Any of the components that form the business and competitive environment is influenced, to a lesser or greater extent, on the quality of the policies, regulations and actions of state authorities.

Risk, chance and various random factors are present in each of the elements above, and in developing relationships of interdependence. History demonstrates the role that risk and chance had in the existence of companies and decisions of managers that were the basis of some fulminating developments of national and international companies.

In conclusion, due to the interdependence of the components " porterian romb" it is difficult to separate cause from effect in the creation and evolution of competitive advantages. The starting point is the state of the production factors and taking into account the influence that other components can have on them. The productivity of factors of production is ultimately the cause and expression of competitiveness and competitive advantage. However, the nature and quality of production factors depend on the performance of the structures involved in the formation of specialized and complex production factors, the extent and quality and rivalry between firms in each industry, the nature of the relationships that they engage with upstream and downstream

industries and the state, how the structure and intensity of domestic and external demand are involved in decisions regarding investments for the creation and modernization of production factors.

Table 1.2 Main features of New Diamond's Model
Source: The Author

Production factors	**Domestic demand**	**Related industries**	**Company strategy**
• Employment, specialized skills, technology, financing, etc. • Competitive advantage is not built on inherited factors but on those created by: - substantial investments, - specialization • The investment and specialization requirements ensure a high barrier that protect competitive advantage • Free movement of factors of production paradoxically increases limitations (emigration has increased costs with employees and has reduced productivity)	• Characteristics of domestic demand have a very significant effect on the strategy of national companies by: - preferences, - sophistication, - size, - consequently, through pressure on costs, on innovation and quality - intra-EU and global trade liberalization reduces the importance of local demand	• The existence of competitive related industries, internationally, is a condition for success in a field • A sector or a company cannot excel in isolation from the rest of the economic network that it supports • It is a constraint which is geographically localized, and therefore it requires, as preconditions, a good quality of the other elements of the competitive diamond.	• Different methods of management, investment performance horizon, size of firms, type of market positioning • Type of scale economies that the sector enables and / or the company exploits: - domestic economies: the unit cost depends on the size of the company and not necessarily on the size of the industry - external economies: the unit cost depends on the size of the industry and not necessarily on the size of the company
Horizontal impacting factors			
• **Government policies: investment in infrastructure, education, research and development; sectoral and regional policies; macroeconomic stability** • **Clusters: the existence of a competitive "diamond", as a whole, generates an international competitive cluster, rather than an isolated success.** • **Chance**			

In terms of competitive factors of Romania, if we use porter's model, they are:
company strategy ,demand condition,srelated industries, production factors condition
The influence of various factors in this area can be highlighted as follows in table bellow

Table 1.3 S.W.Analyses for New Diamond's Model
Source: The Author

	Strenghts	**Weaknesses**
Strategy	Trade liberalization due to the EU accession process	Local competition, still weak, in many sectors / segments (institutional, structural reasons, etc.) Important bureaucratic barriers persist Competition is concentrated in low value-added activities The lack of sophistication of economic agents (business strategy - what - and business model - how)

Demand conditions	Increasing the proportion of production exported (connection to external sophisticated demand in the EU)	Relatively small size of solvent domestic demand Distribution and marketing activities largely controlled by foreign companies, blocking contact with the end consumer
Supporting and related industry	The existence of a relatively large industrial base	Low quality of locally produced inputs Reduced synergies between economic sectors Low level of collaboration between institutions of education / research and businesses Lack of trust and cooperation between companies / entrepreneurs / investors Low impact and presence of institutions for market collaboration
Factor conditions	Skilled labor (intermediate level) Positive trends in refurbishment Rapid development of the private banking sector	Few highly qualified human resources in management, marketing and finance Still low productivity of workforce Financial resources are still inaccessible to many businesses / sectors

In conclusion, the most important elements that prevent or slow down the transition to an economy based on investments are included in the company's strategy and related industry.
Thus, in terms of business strategy, we notice little added value of exported products. Also, the structure of investment financing in technology reflects a preponderance of borrowed sources and less own resources.
Regarding the related industry, there is an obvious lack of coherent and inter-relation clusters. Many inter-sectoral linking elements between clusters have disappeared, and so the current structure is incomplete due to the insufficient funds in R&D.

Another **model on competitiveness** developed by P. Krugman(1994), states that countries should not be seen as competitors in international markets, but only the firms which are competing with products / services; instead countries can compete in attracting international mobility factors - capital and skilled labor - using its ***location advantages,*** which consist in a low level of corporate taxation, public infrastructure efficiency, proper regulations and a relatively cheap workforce.

I.3.Trends in addressing competitiveness

A trend that manifests itself vigorously in the efforts of countries and companies to increase competitiveness is one of the **superior exploitaition of location advantages (**Qin and Jiang ,2007**)**, a form of advantage that joins competitive ones. The main vector of the globalization process, mentioned above, are multinational companies (trans-national TNC), which contributed to the globalization of industries (automotive, pharmaceutical, electronics, petroleum and petrochemical processing, telecommunications equipment), to create a new configuration of the international division of labor by decomposing production chains and marketing activities and processes that may be geographically dispersed according to considerations of efficiency. The location of productive activities is designed according to global strategies depending on the results of the comparative analysis for local location, where local factors - adequate infrastructure, cheap and skilled labor, innovative capacity, know-how, technology etc. - are crucial.

Another trend to increase the competitiveness of national industries is tracking the increasing development of the industry on a sustainable basis, which requires measures to ensure mainly upper competitiveness of products / services in international markets and protecting the environment, being the result of the action of a large number of economic, social and political factors interacting with one another. Determinants of sustainable development of the industry tend to grow and strengthen with increasing levels of socio-economic development of each country. They can be combined in different ways depending on the size of the markets, geographical location of productive units and their markets, natural resources available, external pressures, economic policies, initial base of skills and abilities.
Another trend for increasing competitiveness of national industries is the focus on R&D and investment (Zaman, 2012). The main industrialized countries make great efforts in R&D and are, at the same time, major beneficiaries of FDI. In most of these countries, FDI inflows have a double benefit: attracting new technologies and supporting transnational companies to benefit from the results of local research & development (Radulescu,2011). Among these countries, which increasingly specialize in innovation, technology flows are intense in both directions. It should be emphasized that both the strategy based on **national research & development** and the one oriented toward **foreign direct investment** allow acquiring foreign technology, but differently. The first strategy is autonomous and requires more significant investments in upgrading skills. For countries that have started industrialization at a later time, this strategy is riskier because it generally involves the use of proactive industrial policies. The strategy focused on foreign direct investment can allow countries to progress without having to invest in national R&D. However, over time, these countries increase their investment efforts in these activities, especially when transnational corporations implant innovative activities in their territory. Only a few countries have managed to combine heavy dependence on foreign direct investment with a strong increase in national R&D capabilities, and those who managed this largely relied on industrial interventionist policies.
A final worldwide trend is the one manifested in the national formulation and implementation of industrial policy in the context of globalization.

I.3.1.Competitiveness in globalization

In the current global economy, for Romania, as for other Eastern European countries, the issue of international specialization on the basis of competitive advantage is vital, determined not only by economic considerations (ability to reduce existing disparities regarding unfavorable development levels compared to advanced countries), but also those concerning the structural connection with the industrialized world and the gradual accession to the standards of productivity and hence its specific level of prosperity.
The issue of competitiveness of the levels mentioned above is strongly marked by the **contemporary phenomenon of globalization**, which consists of an increasingly stronger connection of national markets, in creating global allocation mechanisms (institutions, policies regulations, agreements) acting on the markets of factors, goods and services, for a continental and global expansion of production, research & development and marketing of products and services. Under the new conditions created by globalization, radical changes occur in the patterns of industrial development from **increasing productive capacity** to the **development of "capabilities"**, i.e. adding factors able to create and strengthen sustainable competitive advantages. The effect of these factors for increasing competitiveness was stimulated by profound changes in production activities such as: the emergence of production structures, R&D and innovation and strategic alliances between companies, industrial clusters (clusters of firms with efficient under-providers), local area networks, long-term contractual ties with suppliers and

customers, etc.; strategic restructuring (long-term) of production processes, consisting of better specialization, outsourcing related activities, relocation of processes and activities in order to achieve higher efficiency of activities, inclusion into innovative manufacturing(Abrudan,2011) and marketing networks etc.; gradual transition in industrial development from exploiting comparative advantages based on traditional factors, to the one in which neo-factors - innovation, management, organization, organizational culture , marketing, partnerships and strategic alliances, company reputation, brand image – play a crucial role in increasing competitiveness.
Globalisation removes traditional protectionist barriers that turn from geographical or informational barriers into technological barriers. All the objectives of any organization can be grouped into two categories: higher revenue and lower costs. Limitations are given by market constraints, such as availability and price of human, material, energy, financial, technological resources, sales, the structure of production capacity and the cost and structure of public services.
Globalization involves integration in international supply chains, from raw materials to finished products, and from services infrastructure to public utilities. From this perspective, competitiveness is a constant struggle for survival through adaptation and performance. The sources of competitive advantage are, in the logical order and generally speaking, the product, economic superiority, market presence and relationship superiority. In order to tap this advantage all these components are required in an optimal mix. Governments establish industrial policy, summarizing national experience in development and exploiting the experience of other countries, specify general guidelines, priorities, ways of action and tools to modernize industry and increase competitiveness. Depending on the characteristics of each national economy - factors, socio-economic development, innovation potential, specific socio-cultural model, degree of integration in international trade and financial flows etc. - there are, naturally, a multitude of patterns of industrial development adopted by different countries.

I.4. Critical analysis of competitiveness in Romania
(Informations provided by NW Regional Development Agency)

Although it had a substantial progress in recent years, Romania has serious gaps in terms of competitiveness with the states of Western and Central Europe. The reasons for this are found in all the determinants of competitive ability. They all translate, ultimately, into low productivity, which defines the competitiveness issue in Romania. GDP in PPC101 is only 50% of the average of the new EU Member States. After analyzing the current situation, there is a disadvantage to many factors influencing competitiveness. The use of energy-intensive technologies and equipment with expired life-span drastically reduces productivity in most industries.

The SME sector is probably the most affected, with a structure that shows a relatively low orientation towards productive activities, as can be seen from the analysis of the current situation. Despite a positive trend, SME share in GDP is still insufficient, requiring both a quantitative and qualitative growth of the SME sector. The access of SME to capital, technology and infrastructure is low, well below the level that would allow the exercise of the vital role of SMEs in strengthening economic competitiveness, by introducing innovative processes and showing adaptability to market requirements. Scientific research suffers because of a declining level of investment in the field from the public and private sector, a reduced number of highly qualified specialists and an extremely low number of centers of excellence. Regarding aspects of corporate strategy, low skills in management are a disadvantage that manifests itself in all levels. Most local companies still base their competitive strategies on low cost and not on improving productivity.
Innovative companies are three to four times lower as a percentage of the total firms, compared to the European Union. Intellectual property protection has progressed at regulatory level, but

less at implementation level. The infrastructure to support innovative start-ups is only in its early stages.
Regarding related industries and support services, the Romanian economy are seriously deficiencies. Many economic sectors have developed either due to the natural advantage (wood processing, construction materials, tourism) or as a result of massive state intervention toward forced industrialization (machinery, metallurgy, chemistry and petro-chemistry). Both judgments have determined a low degree of aggregation and cooperation within the same sectors, with serious gaps in ensuring an adequate production chain, able to create added value.

Business infrastructure is very and support services are still at an early stage of development. The SME sector, which employs almost half of the employed population, has limited access to specialized consultancy services. In the OECD countries it was found that information and communication technology contributes significantly to economic growth, both through the related industry and by using information technology industries. Although in recent years Romania has decreased the gap on the implementation of the information society by developing the ICT industry, infrastructure (hardware, software, communication means) and specific applications and services, information and communication technology penetration is quite low, both because of a deficient request, partly due to a low purchasing power of the population, poor ICT education and the limited availability of infrastructure in terms of access and cost of use. Increasing economic competitiveness depends on economic activities and their location in terms of territory, the distribution and spatial relations in which they stand when it comes to resources, workforce, facilities and relevant services and markets.

In **spatial** context, economic competitiveness is determined by: involvement of urban centers in harnessing the creative and innovative national potential - developing an integrated system for accessibility to national potential and establishing interconnections between elements of the polycentric system; use of the research and innovation potential, especially university centers, which are thus promoting innovative activity and provide multiple opportunities for professional development that stabilize the local workforce and attract highly skilled labor; development and promotion of tourism by exploiting the natural and cultural heritage and the perspective focused on natural and cultural landscape. Moreover, tourism development will follow the national spatial plan (tourism), targeting the creative management of natural landscapes and cultural heritage areas; making superior scale connections at the local level by stimulating the emergence and consolidation of economic clusters. Territorial cohesion, long-term, determines a balanced economic development and a rise in living standards. Medium-term, a policy solely aimed at spatial balancing would lead to weakening the strong areas and therefore it requires evaluation, selection and prioritization of investment options given the optimal mix / combination of competitive activities, the existence of facilities and services necessary for the operation of development poles, checking accessibility, existing facilities for training human resources, offers regarding space / land required and functional compatibility thereof.(Popa,et al.,2009)

I.4.1.The relevance of the industrial sector for growth and development

The industrial revolution led to a sharp increase in the use of knowledge in practical work, laying the foundation for structural and qualitative changes in world economies and boosting competition between countries and changing competitive advantages. Globalization and implementation of the knowledge society led to increasing the role of human capital in economic development of countries and regions, the growth of export and competitiveness. Competitiveness is determined by a country's ability to add value to products, services and processes in the global economy at a low cost; (Constantin,2004). The key factors of

competitiveness in a globalized and interdependent economy become the knowledge and qualifications of the workforce .(Constantin,2004). Human capital makes the difference between businesses.

I.4.1.1 Industrial competitiveness

The industrial competitivness contains two main influence factors - ***government and market-related.***It is expressed by offer characteristics, grouped into two categories:
cost, determined, in turn, by:
• productivity;
• factor prices;
• other variables of the offer (investment, organization, management);
quality (given by the level of profit for the same costs) having its three dimensions:
• innovative (capacity of products/services to incorporate new technical and technological elements);
• technical (feature of products/services to be consistent with technological documentation and reliable);
• marketing (advertising, ability to adapt quickly to changes in demand, trademark)

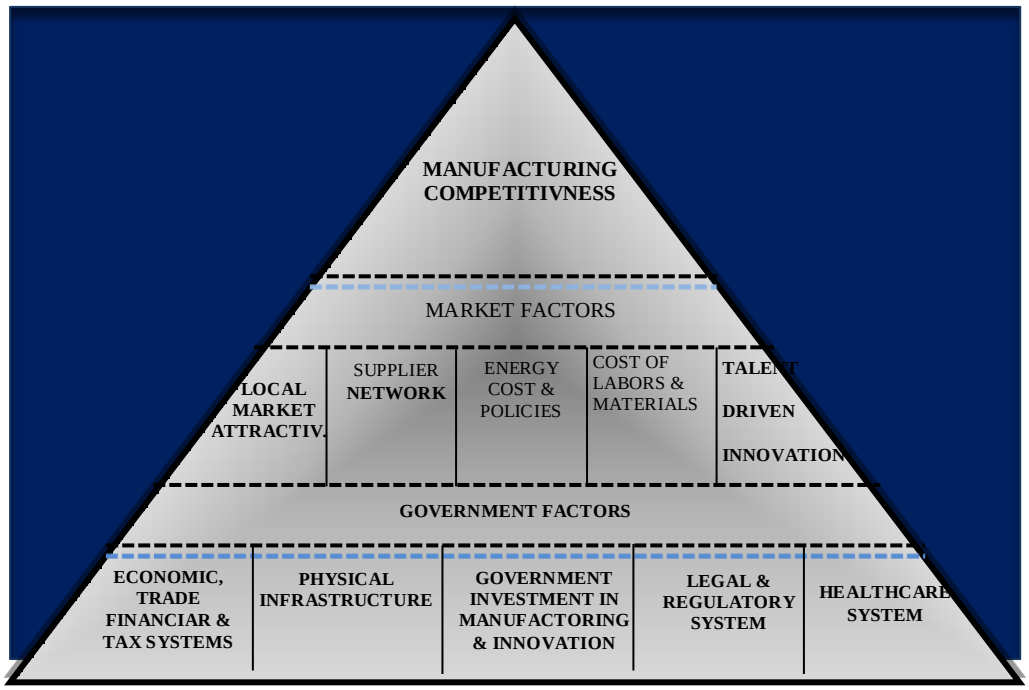


Figure 1.7 Components of industrial competitivness
Source:The author

I.4.2.1.Critical analysis of the current state of development in the region NV

The key factor in determining economic growth, for the entry in a market full of strong competitive forces, is economic competitiveness. In addition, the development of competitive economic advantages must be a constant process, which takes into account European trends, and the process of globalization as a whole.The section provides an analysis of competitiveness through concentration and specialization patterns in NW Region of Romania,and by data processing reveals the most important industrial sectors in this region .Conclusions point out that

the increase in competitiveness should not be seen as a process of exploiting short-term advantages but as a process of building an economic structure based on capital investment and research -development-innovation processes. In other words, a medium and long term perspective should consider a knowledge-based development of economy. Sustainable economic growth and improving living standards of the population are determined by the development of economic competitiveness in the context of global challenges(Bacali and Avasilicai,2008) (globalization of the economy, opening of international markets, rapid technological change), challenges that must be turned into opportunities for the Romanian economy

The economic overview of the NW Region of Romania captures the strengths with growth potential, generating added value and need financial support in the future, but also those who show negative trends, by whose support is trying to eliminate disparities and non-balanced development in Northwest region.
The data provided by North West Development Agency (NWRDA) (http://www.nord-vest.ro/planul-de-dezvoltare-regionala-2014-2020--eID1724.html)**,**shows that relevant macroeconomic indicators are places the Northwest region on third place by national ranking, in terms of contribution to GDP and Gross Value Added, but, below the national average values for labor productivity and GDP - per capita community, at large distance compared to the EU average.
According to NWRDA, between 2005-2011, in nominal terms, the GDP in Northwest Region increased by 78%, with an average annual increase of 16.3% by 2008 ,and a slower annually pace since 2009 2.6%, following the general dynamics of national GDP, fluctuations due to economic crisis and growth of the inflation rate. In real terms, between 2005 and 2008, GDP grew in Region NV with annual average of 5.5%, with a peak ecart- 10% in 2007, 2009 was marked by a decrease of about 6%, under the effect of the economic crisis. Representing 14.3% of the country and 12.92% of the total population, Northwestern region contributed 11.32% to the national GDP, occupying the entire period analyzed the 3rd position nationally, with a of 61,060,300,000 lei in 2011, an increase of 3% compared to 2010 (GDP Northwest Region in 2010 was 59,292.5 million, respectively 14.079 million euros).

I.4.2.2. Manufacture performances

There is increase in turnover in manufacturing units in spite of the number of employees which decreased significantly especially since the outbreak of the economic crisis that has left its mark through mass layoffs. Labor productivity grew on its bases. Manufacturing of North West is labor intensive, but considering the indicators evolution (growth of turnover and fewer employees) we conclude that the undertakings in this sector is emphasized the need to increase the degree of automation.

Manufacturing was and is, one of the pillars of regional economic structure, in turn, is composed of traditional sectors, labor intensive and low value added. The following section will be addressed to the manufacturing industries in order to be identified regional specificities.

Table 1.4: Main indicators of NW region: Industrial Sector
Source: NWRDA, 2015, Processed by author

Crt. No.	Industry	No of active local units	No of SME'es	No of employees from SMS-es	Turnover milion lei	Productivity in SME thousands lei/ employee
0	1	2	3	4	5	6
1.	Diary industry	1.184	1.178	16.260	2.333	143,48
2.	Textile industry	943	926	2.720	330	121,77
3.	Footwear and leather industry	402	386	11.286	617	54,66
4.	Wood industry	979	976	7.429	893	120,2
5.	Celulosis and paper industry	120	119	1.819	393	216,05
6.	Furniture industry	700	684	10.082	874	86,68
7.	Poligrafic industry	292	292	2.527	318	125,84
8.	Chemical industry	108	107	986	269	272,81
9.	Pharmacy industry	18	17	454	76	167,4
10.	Rubber and plastics industry	453	449	6.145	1.132	184,2
11.	Mineral product industry unferrous (construction)	500	494	5599	995	177,7
12.	Steel constructions and metal products industry	1.002	1.000	11282	1547	129,14
13.	Electric eqhipment industry	98	91	1737	495	284,9
14.	Means of transportation industry	285	207	3458	505	146,03

I.4.2.3.Analysis of competitiveness through concentration and specialization patterns; Functional regional specialization

Regional specialization on employment is defined as the weight distribution of employment in a particular branch of industry *i* in the employed population in manufacturing in a given region *j* compared to the norm. A region *j* is specialized in a particular branch of industry *i* if this branch has a large share in total employment in manufacturing in region *j*. Manufacturing of a region *j* is "highly specialized" if a small number of industries have a large share in total manufacturing.
Geographical concentration is defined as the share of different regions (counties) within a particular sector of economic activity (industry) *i*. A particular branch of industry *i* is "concentrated" if a large part of production is made by a small number of regions (counties) (Aiginger K., 2004). Regional specialization and geographic concentration of industry can be characterized by absolute and relative indicators. (Constantin, D. 2004), (Capello, R. 2006).In the literature there are several indicators, each with advantages and disadvantages. As an absolute measure of regional specialization and geographical concentration of the industry we use the Herfindahl index, and as a relative measure the dissimilarity index proposed by Krugman and the Gini index transformed.
In order to use these indices presented in econometric models to be presented below, they were calculated as (Aiginger, K., et al., 1999):

Note with:

- $E-$ employment;
- $s-$ share;
- $i-$ industry (sector,branch); $i=1,\ldots,n$;
- $j-$ region; $j=1,\ldots,m$;
- $s_{ij}^{s}-$ share of employment in industry i in region j in total employment/ in manufacturing in the region j;
- $s_{ij}^{C}-$ Share of employment in industry i in region j in total employment in the industry i; s_i- - The share of total population employed in the industry i in total employment in manufacturing ;
- s_j- The share of total population employed in industry j in toatal employment in manufacturing
$s_{ij}^{s}=\frac{E_{ij}}{E_j}=\frac{E_{ij}}{\sum_i E_{ij}}$, $s_{ij}^{C}=\frac{E_{ij}}{E_i}=\frac{E_{ij}}{\sum_j E_{ij}}$, $s_i=\frac{E_i}{E}=\frac{\sum_j E_{ij}}{\sum_i\sum_j E_{ij}}$, $s_j=\frac{E_i}{E}=\frac{\sum_i E_{ij}}{\sum_i\sum_j E_{ij}}$
Gini Index correspondent to regional specialization has been calculated based on the following următoarelor formulas:
$\text{GINI}_J^s=\frac{2}{n^2\bar{R}}\left[\sum_{i=1}^{n}\lambda_i(R_i-\bar{R})\right],\%$, Where: $n-$ number of industries; $R_i=\frac{s_{ij}^s}{s_i}$ - (For each industry j in region); $\bar{R}-$ Average of R in industry λ_i- Pozition of industry i in yhe hierarhy of R_i.
Gini Index correspondent to geographical concentration has been calculated based on the following formulas: $\text{GINI}_i^C=\frac{2}{m^2\bar{C}}\left[\sum_{j=1}^{m}\lambda_i(C_j-\bar{C}\right]$, Where: number of regions; average of on regions; pozition of region j in hierarhy of ;

The Herfindahl index (also known as Herfindahl–Hirschman Index, or HHI) is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them (Acar, W., and Sankaran, K. 1999)

- An H below 0.01 (or 100) indicates a highly competitive index
- An H below 0.15 (or 1,500) indicates an unconcentrated index
- An H between 0.15 to 0.25 (or 1,500 to 2,500) indicates moderate concentration
- An H above 0.25 (above 2,500) indicates high concentration.

A small index indicates a competitive industry with no dominant players. If all firms have an equal share the reciprocal of the index shows the number of firms in the industryThere is also a

normalised Herfindahl index. Whereas the Herfindahl index ranges from 1/*p* to one, the normalized Herfindahl index ranges from 0 to 1. It is computed as: using the normed Herfindahl index, information about the total number of players (*p*) is lost.

Herfindahl Index correspondent to regional specialization
$H_j^s = \sum_i (s_{ij}^s)^2$.
Herfindahl Index correspondent to geographical concentration
$H_i^C = \sum_j (s_{ij}^C)^2$.

I.4.3. Appraisal of the concentration of industrial sector of NW region of Romania based on spatial concentration

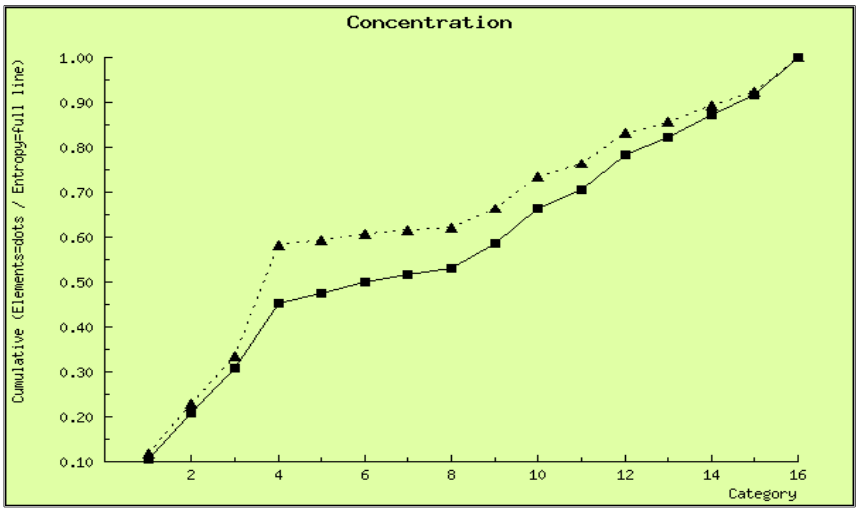
There are several statistical methods (Săvoiu, Crăciuneanu and Ţaicu, 2010) used to identify inequalities and concentrations in spatial distribution of a phenomenon that has been applied to a number of economic problems. Some examples used in this regard are: coefficient of location, Herfindahl index used to measure industrial concentration, Gini coefficient which describes the spatial concentration, the index for measuring the degree of agglomeration. The most used instrument is the coefficient of location (it has been defined by / shows the degree of specialization of a region in a particular industry

In this paper we use the Gini index for determining the total space concentration of industries and the coefficient of location to measure the level of concentration within the region (county). By application of the formulas described above one can determine the cumulative percentage of employees in the industry I and the cumulative percentage of employees in the total industry. Cumulative weights can be represented by the so-called Lorenz curve. Gini's coefficient value locality is the surface coefficient of the straight line and the Lorenz curve 45 ungular degree .The Gini coefficient was used to measure the concentration of economic activity. It compares the Lorenz curve / element to see if it has the same contribution to the total sum of values of a variable. The Gini coefficient ranges from 0 where there is a concentration (perfect equality), to 1, where there is a total concentration (perfect inequality). Program wessa was used for processing data. (Wessa, P. 2015)

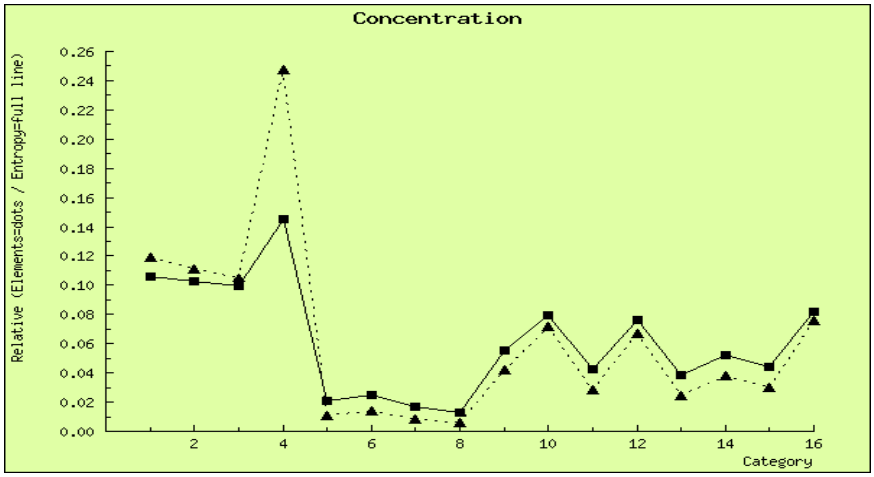
Concentration - Ungrouped Data				
Entropy			2.381737	
Maximum Entropy			2.772589	
Normalized Entropy			0.859030	
Exponential Index			0.092390	
Herfindahl			0.120110	
Normalized Herfindahl			0.061450	
Gini Coefficient			0.479214	
Concentration Coefficient			0.511161	
Categories			16	
Concentration 2 - Ungrouped Data				
Category	Elements (Absolute)	Elements (Relative)	Entropy (Absolute)	Entropy (Relative)
1	12.650000	0.118846	0.253134	0.106281
2	11.850000	0.111330	0.244398	0.102613
3	11.190000	0.105130	0.236811	0.099428
4	26.330000	0.247369	0.345544	0.145080
5	1.190000	0.011180	0.050239	0.021093
6	1.470000	0.013811	0.059141	0.024831
7	0.900000	0.008455	0.040357	0.016945
8	0.640000	0.006013	0.030749	0.012910
9	4.450000	0.041808	0.132726	0.055726
10	7.630000	0.071684	0.188922	0.079321
11	3.010000	0.028279	0.100832	0.042336
12	7.150000	0.067174	0.181401	0.076163
13	2.640000	0.024803	0.091691	0.038497
14	4.040000	0.037956	0.124166	0.052132
15	3.230000	0.030346	0.106061	0.044531
16	8.070000	0.075817	0.195565	0.082110

Concentration 3 - Ungrouped Data				
Category	**Elements (Absolute Cumulated)**	**Elements (Relative Cumulated)**	**Entropy (Absolute Cumulated)**	**Entropy (Relative Cumulated)**
1	12.650000	0.118846	0.253134	0.106281
2	24.500000	0.230177	0.497532	0.208895
3	35.690000	0.335306	0.734343	0.308322
4	62.020000	0.582676	1.079886	0.453403
5	63.210000	0.593856	1.130125	0.474496
6	64.680000	0.607666	1.189267	0.499328
7	65.580000	0.616122	1.229624	0.516272
8	66.220000	0.622135	1.260373	0.529182
9	70.670000	0.663942	1.393098	0.584909
10	78.300000	0.735626	1.582020	0.664230
11	81.310000	0.763905	1.682852	0.706565
12	88.460000	0.831079	1.864253	0.782729
13	91.100000	0.855881	1.955944	0.821226
14	95.140000	0.893837	2.080110	0.873358
15	98.370000	0.924183	2.186171	0.917890
16	106.440000	1.000000	2.381737	1.000000

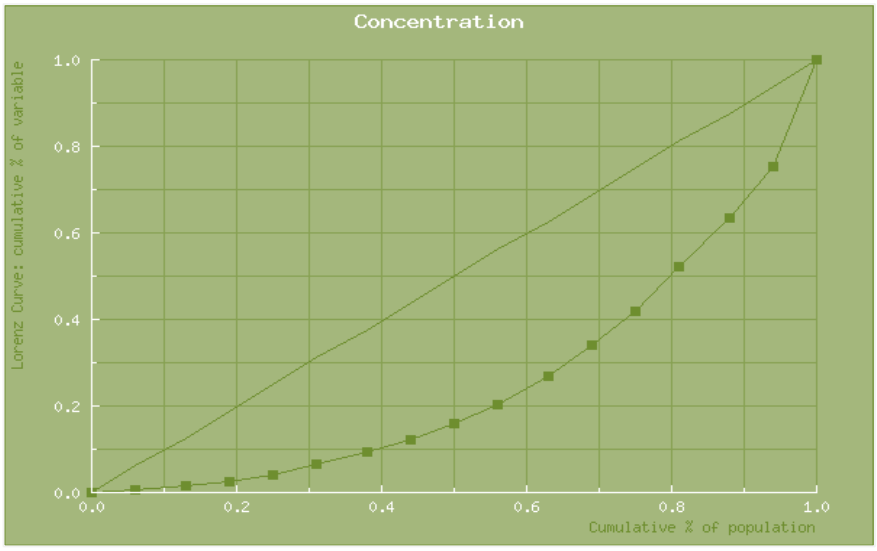
Concentration 4 - Lorenz Curve - Ungrouped Data		
Cumulative % of population	**Cumulative % of variable**	
	Expected	Observed
0%	0.000000	0.000010
6%	0.062500	0.006013
13%	0.125000	0.014468
19%	0.187500	0.025648
25%	0.250000	0.039459
31%	0.312500	0.064262
38%	0.375000	0.092540
44%	0.437500	0.122886
50%	0.500000	0.160842
56%	0.562500	0.202649
63%	0.625000	0.269823
69%	0.687500	0.341507
75%	0.750000	0.417324
81%	0.812500	0.522454
88%	0.875000	0.633784
94%	0.937500	0.752631
100%	1.000000	1.000000



Plot 1.1: Cumulated entropy



Plot 1.2: Relative Entropy



Plot 1.3:Lorentz Curve

The indicators of economic concentrations, like the Gini index and the coefficient of location, are designed to provide information about the degree to which each industry in a country, in our case Romania, is concentrated in a number of areas, regardless of whether or not those areas are neighbors.
These indicators measure the variability in the distribution of employment in all observations of a certain region of the entire space, i.e. the concentration of economic activity (Arbia, 2001).
Thus, for the Northwestern Region, the synthesis of analyses performed in order to identify the regional specialization (industrial) sectors and areas of excellence is shown schematically in the tabel below:

Table 1. 5: The most important industrial sectors fron NW Region of Romania
Source : Processed based on data
provided by INS Tempo Online,2014

Crt no	**Industrial sector**	**% from Active units***	**% from turnover***	**% from employees***
1.	Diary industry	15,66	17,02	12,65
2.	Textile industry	12,20	4,46	11,85
3.	Footwear and leather industry	5,25	3,93	11,19
4.	Wood industry Furniture industry	22,47	19,02	26,33
5.	Celulosis and paper industry	1,45	1,60	1,19
6.	poligrafic industry	3,59	1,17	1,47
7.	Chemical industry	1,40	1,28	0,90
8.	Pharmacy industry	0,21	1,32	0,64
9.	Rubber and plastics industry	5,61	5,74	4,45
10.	Mineral product industry unferrous(construction material)	6,55	4,99	7,63
11.	Metalurgic Industry	0,85	5,80	3,01
12.	Steel constructions and metal products industry	12,56	6,24	7,15
13.	Manufacture of computers ,electronic and optical products	1,70	17,61	2,64
14.	Electric eqhipment industry	1,27	6,98	4,04
15.	Machinery and equipment industry	2,47	2,66	3,23
16.	Means of transportation industry	0,88	4,85	8,07

Remarks:

In terms of concentration of economic activity in the region in sectors, the analysis of the main economic indicators related to manufacturing sectors in the region may led to the identification of industrial clusters focusing significant financial and human resources. There is a series of labor-intensive sectors in which most enterprises in the region operate; these sectors of regional significance need to be supported mainly due to the social risk they pose: **food industry, textile and clothing industry, leather and footwear industry, wood processing and furniture industry** and, on a smaller scale, the manufacture of metal and metal products and non-metallic mineral products industry (construction materials). On the other hand, the following sectors produce high added value, with the potential to generate future smart specialization (http://s3platform.jrc.ec.europa.eu/home)(http://www.minind.ro/PROPUNERI_LEGISLATIVE/2014/SNC_2014_2020.pdf) through sustained investment policies: manufacture of computers, electronics and optical products, manufacture of electrical equipment, manufacture of motor vehicles, metallurgical industry and, to a lesser extent, the pharmaceutical industry, rubber and paper
An important problem concerning the identification of economic and regional clusters is that there is no "baseline" for interpreting results. The Gini index only shows the extent to which an industry deviates from a situation in which employment is distributed across regions in exactly the same way as the entire population.Although the analyse of concentration shows a week proportion of intelligent specialized industries eg 8,13,14 the combination of R&D with economy can identify two domains with development potential, anchored on the one hand in the industrial economic reality of the region and on the other on development based on new technologies and further research in the field. Sustainable economic growth and improving living standards of the population are determined by the development of economic competitiveness in the context of global challenges (globalization of the economy, opening of international markets, rapid technological change), challenges that must be turned into opportunities for the Romanian economy
In our opinion an intelligent approach to functional specialization involves focusing on public intervention (which will be multiplied by private investment) in these areas of specialization, according to the principle "limited resources directed to limited areas".

I.5.The problem of competitiveness in former industrialized areas

I.5.1.Introduction and background

Due to the decline of many traditional industries such as coal, steel, textiles or mechanics, which contributed to the prosperity of many regions over several decades, certain regions of the European Union are currently facing similar problems. Thus, many depend on European funding as a form of aid for conversion and restructuring of old industrial areas. In this context it becomes evident that due to the financial and economic crisis, the ambitions of EU's industrial policy and the EU 2020 Strategy cannot be carried out only by sectoral policies - support from cohesion policy measures becomes very important. Funding under EU cohesion policy intervenes where private investors do not and seeks to influence industrial policy and economic, social and territorial development, particularly by improving the determinants of location and investment. It also supports the upgrading of industrial structures through the transfer of technologies and the development of new industriesfor the future. The main challenges presented by structural change processes in old industrial regions in the European Union and the role that EU cohesion policy can play in this context. In this sense we can identify three main objectives:

- where is the most desperate need of funding in old industrial regions;
- what are the successful regional strategies that would contribute to structural changes;
- how the cohesion policy funds can still be used to support industrial regeneration.

In order to shape a coherent strategy for increasing the competitiveness of former industrialized regions the following should be stressed:
Industrial policy tends to focus on industry-specific everyday problems and its powerful impact on the regions is often overlooked;
Research shows (Foray and Goenaga, 2013). that the restructuring of old industrial regions requires a more extensive and administrative obstacles can prevent the achievement of this objective;Member States, regions and cities of the EU are facing financial difficulties; whereas, in particular regions of the old industrial base are often not in a position to be able to attract the necessary funds for retraining; whereas EU funding, intended to support conversion and restructuring efforts, is essential to support regional and cross-border policy approaches;
cities are engines of innovation and sustainable growth and have the important task to solve the challenges of old industrial areas; new and innovative integrated approaches are needed aided by appropriate legislative and policy frameworks for smart specialization strategies in order to help regions and cities to capitalize on their innovation potential and to refocus their industrial assets to emerging industries and services and global markets; the potential of cultural and creative industries is not sufficiently taken into account in the various policies of re-industrialization, while they show great potential for growth , innovation and employment and labor and are a factor of social cohesion and an effective means of combating the current recession.

I.5.2.Former industrial sites

The various tools offered by cohesion policy to meet the challenges facing the old industrial areas can be used in the case of our country. They can become examples of good practice for the development of strategies in some cities with old industrial heritage like Manchester and Bilbao. Drawing attention to the problems facing the old industrial areas, on the one hand, and highlighting examples of successful conversion strategies, on the other hand, namely to contribute to the process of configuring viable strategies, of future territorial investments. The study undertaken in the old industrial areas in the NW Region, namely Maramures, reveals the need for an integrated approach of three perspectives: Competitiveness-Sustainability-Inclusion.

I.5.3.The need,importance and role of urban regeneration

The disappearance of part of the industrial sites in the European cities allowed, in recent years, the expansion and planning of new public and / or semi-public spaces, and opened new perspectives developing cities. Rehabilitation of old industrial sites for an environmental approach is the main concern in many European cities. (Vaccarino and Johnson, 1997;Marot, 2003)
New urban management is concerned with achieving sustainable development through which to ensure the physical structures and the appropriate framework for the current needs and trends created by economic growth, technological development and social needs (Rogerson,1999).
Numerous papers (Roberts and Sykes,2000;Marot,2003;Hall,1995) in the current urban practice and literature discuss urban regeneration, which is seen as an action that leads to solving urban problems and finding long-term improvements for economic, physical, social and environmental objectives in an area that needs to be changed(Vaccarino et al,1997).
Some authors (Schädler et al,2011) note that there is currently a progressive reorientation of the construction sector from making new buildings to reusing existing buildings - many of them

abandoned and in an advanced state of degradation. This phenomenon (Marot, 2001;Perrault,2001) is due to complex social, economic, psychological, aesthetic reasons, of which the most important are:

1) the need to stop the development of cities by expanding urban limits (Nuissl andSchlaack,2009).The development of towns caused a large increase in the price of land, especially in central areas occupied by old constructions. Therefore, the need for efficient use of existing old buildings was real.

2) acute dissatisfaction of the population with monotone,(Perrault,2001) depersonalized assemblies, newly built urban spaces in which they can conduct a normal, balanced life, based both on respect for the privacy of individuals and the importance of social relationships in the community.

4) reconsideration of the role of traditions, the value of old urban tissue and traditional urban spaces (streets, squares, pedestrian alleys), decorations.

In this respect, studies have been conducted on the influence of the living environment on the human psyche and behavior. It was thus found that disorder creates anxiety and monotony creates apathy, neglect, categorically confirming the positive effect that spaces which are varied, scaled, adaptive and marked by the familiar continuity of history have on individuals.

5) expanding the boundaries of protected heritage to old buildings, modest in terms of architectural value, but which constitute cohesive historical ensembles, fronts of architectural monuments, traditional urban typologies or parts of neighborhoods.

6) the need to stop certain negative social phenomena, such as: social migration, due to people leaving old dwellings considered inappropriate, and the exodus to the suburbs; de-inhabiting of old city centers (related to the same phenomenon stated before) by turning them almost exclusively in commercial and administrative areas; social mutations - due to the phenomenon of impoverishment encountered in old unattended neighborhoods (progressive abandonment by original inhabitants following the degradation of buildings and ambient conditions), replacing them with tenants belonging to the poorer layers of the population; increased delinquency, establishing a direct relationship between the level of social delinquency and the quality of the living environment; creating a sense of alienation of the urban population - solving previous problems by demolishing the old assemblies and replacing them with new constructions. This creates new urban areas where old landmarks are no longer present, the old urban typology is lost, and the feeling of belonging to the environment, the feeling of familiarity and integration of the population disappears.

7) economic considerations - the calculations made, both general and broken, reveal that in the current technical conditions, achieving new constructions is almost twice as expensive as the rehabilitation works.

8) changes in the level of comfort - that have evolved in line with the rise in living standards and the reduction of housing deficit.

9) environmental issues - which require reducing harmful emissions and energy consumption; the management of urban development and the challenges regarding brownfield conversion - as general policies of the EU.

The management of urban sprawl and the reuse of brownfields has emerged as a separate EU policy since 1991 and was treated in the "Green paper on urban environment". EU Communications, namely "Sustainable Urban Development in the European Union: A framework for action" (1998) and "European space development perspective" (Territorial Development Committee, (1999) have introduced aspects on this type of public policy. The Lisbon Strategy (2000) on sustainable development and economic, social and environmental renewal drew attention to the need to reduce the consumption of land and generate sustainable urban development (European Commission).

In 2001, the "Expert group on urban environment" published the document entitled "In the interest of good urban land use: recommendations of the European Commission for policies and activities" which included several recommendations for the 6th Environment Action Programme (2002-2012), a program under development at the time.
Fourteen years after the date of publication and viewed in conjunction with the findings of environmental action program, the document remains a point of reference in identifying the relevant public policy objectives regarding urban expansion in Europe and also the correlation defines land use policies with the regeneration of damaged sites (brownfields).

I.5.4.From brownfields to integrated interventions for the reuse of urban environment

The notion of reuse of areas inside the city has evolved over time: in the first phase, interventions within cities were aimed at protecting the environment. European projects that have approached the reuse of brownfields were oriented towards the recovery of soil quality and pollutant removal in order to preserve environmental resources and limit long-term impact of industrial heritage (Alker et al, 2000).
Rehabilitation operations, which originally referred only to the repair and renovation of the buildings in question in order to conform to current standards of comfort (space, hygiene, isolation) and stability, gradually expanded their scope from remodeling interior spaces to expansion works and even transformation/conversion (for disused buildings the original function is replaced by a new function, whose choice is determined by various considerations). (Ferrara, 2008).
Currently, the perspective has changed, and the reuse covers a whole range of target areas, in which environmental goals represent only one aspect of the intervention. Meanwhile, rethinking old functions in order to produce an urban change, with effects on economic, social and physical components, involves a re-prioritization of urban interventions, in order to limit the consumption of land (Nuissl and Schlaack, 2009).
Due to changes in technology and the spread of high-tech techniques as well as the transfer from manufacturing to services, the economic profile of European countries appears radically altered. Conservation and conversion of historical particularities as social, economic, cultural assets is part of the new trend of urban regeneration and is also a strategy meant to attract capital.

I.5.6.Regeneration of degraded industrial areas as a contribution to sustainable development

The reuse of brownfields contributes greatly to sustainable development as it relates to the three objectives: improving the economy, improving social cohesion and the environment. Brownfield regeneration helps recycle underutilized urban land and restore beneficial use. The reuse of an urbanized land helps improve the urban economy of land use (Nuissl and Schlaack,2009).

- **Brownfield threats**

Brownfields are not just a problem for their owners. They can easily become a problem for the entire community. Locally, brownfields have the following effects:
• reduce the value of the property;
• discourage investors and investment interest;
• further encourage decay;
• reduce employment and increases unemployment;
• reduce the quality of local community services;
• reduce the quality of community life;
• push those who can find jobs outside the community;

• high costs of local externalities (local services are under-utilized, but operating and maintenance costs must be paid by the rest of the community);
• decrease of local competitiveness;
• presenting a negative image of the local community.
When the volume of brownfields increases in some communities, the community begins to be affected and must respond by providing appropriate policies and strong leadership and vision, showing how improvements can be made. However, sometimes the threats of brownfields are so great that interventions should be considered through national or regional programs.

I.5.7.The management of urban development using integrated interventions - quality issues

Local initiatives for the conversion of buildings and brownfield sites are becoming more numerous. Their consistency with a medium-term territorial diagnosis, larger and better, is a necessity. This goal requires factors involved to perform a phase of analysis and confrontation of their aspirations and values, to share objectives and guidelines in order to draft an integrated rehabilitation project.
Among the generally accepted principles of urban regeneration there are:

- Regeneration is based on adequate analysis of local conditions.
- Regeneration should aim to simultaneously change the physical condition of buildings, social structure, economic base and environmental conditions.
- Regeneration is consistent with sustainable development objectives.
- Regeneration must set clear and measurable goals.
- Regeneration must make effective use of natural, economic and human resources.
- Regeneration is based on participation and consensus among stakeholders, working as
- partners. (OECD, 2000).

According to these principles, brownfield reconversion projects aim to:

- organize, develop and protect the natural and built environment;
- improve quality of life through urban and social innovation;
- develop, maintain and create activities and jobs;
- position people as factors of development and construction of urban identity.

The quality of interventions aimed at reusing space within cities is a fundamental aspect to be taken into account. The quality of interventions may depend both on the development and design tools, as well as the managerial approach that local authority can have.
Urban environmental quality has significant effects not only on the quality of life of citizens, but also on the economic opportunities offered to investors and city competitiveness. (Rogerson,1999).
The urban plan and its operations clearly reveal the need for a collective approach. It involves the organization of multiform partnerships, i.e. the adhesion and mobilization of a large number of actors, initiators, supporters and entertainers: local communities, often the state, professional, economic, cultural and social environment. The key terms of the results of implementing these projects are numerous and exciting: sustainable development, social cohesion, pollution, greater coherence and interactions between different areas of the city; dynamic neighborhoods and trade; improving services, protection of natural, cultural and built heritage; diversification of activities; increasing the number of recreation, education and entertainment facilities; increasing the attractiveness of the city, improving the city's image, creating jobs, information and training of citizens; creating and structuring partnerships (Roberts and Sykes,2000).

I.5.8.Technical aspects and stages of regeneration of declining industrial areas

Generally, brownfield reuse is more complex than greenfield development sites. There are many additional factors that require investigation, there is no need for additional consultants and there are many more risks that accompany this development process. In case of substantial demolition and cleaning work, there may be a lag of several years before a viable site is available for redevelopment. Sellers' common practice is to remove structures from the ground, which can often lead to the perception that it will be simple, which is valid until the engineers began investigating the site. (RESCUE, 2005).

a. Site investigation and surveying

The site survey is a complex subject, a team of consultants who cooperate, being led by a development manager. The sites are investigated for many purposes: facilitate acquisition and development, take regulatory actions. The survey of brownfield sites is more complex, as it needs to not only establish existing structures and uses, but focus on past uses and processes of sites. (Bhatta,2010).

a.1. Preliminary site investigation. Check-list.

The objective is to collect a maximum amount of relevant information in a short term. The significant advantage of such a procedure is the particular value of information obtained with minimum investment. The preliminary investigation of the site aims to assess a particular site, and estimate its strengths (commercial, residential, recreational, industrial), threats (known, expected), stakeholders, funding (private, PPP, public) and next steps for redevelopment.

b. Investigating the technical aspects of the structure

Individual buildings and structures vary by location and origin of the brownfield site. In terms of total area and the size of the built area there are brownfields, vast areas that have emerged in place of the old plants. Each item is unique, historically or constructively. Each structure has its specificity, which depends not only on the type of construction, but also its location, the method previously used, its historical or cultural value, and more. All these issues must be considered in the diagnosis of unique structures. Building diagnosis is an independent discipline that cannot be easily described in a few lines, so this section should be regarded only as an introduction to the problem.

c. Transport and communication

The quality of communications infrastructure supports land development opportunities. In the case of brownfields, the existing road network, power system, telecommunication system, water and rail transport system save a good share of the money of potential investors. But the complexity and risks of such an infrastructure, owned or desolated, can remove some of this advantage. If the existing structures on the site can be economically reused, their value to the community and owners grows, and the historical atmosphere can be preserved. If the entire structure cannot be preserved, at least parts of it must be saved in order to preserve the history of the site.

I.5.9. Alternatives regarding the technical solutions of urban regeneration projects

Existing structures - Reuse of structures

There are three suitability categories for structural processing, as follows:

Structure repair and strengthening - changing the function of a building is almost always accompanied by the need for reconstruction thereof. This is usually linked to the change of a superstructure construction task and requires the removal of items. Such an interference in the construction system leads to changes in its internal distribution, which often requires the

consolidation of certain building elements. The need to strengthen and repair can result from long-term use in harsh conditions, causing many mechanical defects arising from limited durability of materials used for construction.

The possibility of transformation of the industrial structure - depending on the type of industry; depending on the type of building; depending on the use of potential.(Ferry and Brandon,1994). The following three categories can be distinguished from the analysis of the opportunity for conversion of this type of building:

• almost impossible to convert: monolithic technological buildings (chimneys, freezers, ovens, containers), buildings used for special technical processes (metal trees and cranes);

• difficult to convert: tall or stretched, multi-story, monolithic buildings;

• easy to convert: institutional buildings, with a single manufacturing floor or office infrastructure.

Demolition - demolition results from partial or total removal of the structure from the surface of the ground, and often from the basement. Demolition and debris removal are often preferred by investors as a quick and easy option and meets some of their objectives:

- eliminates the old stigma of use;
- reduces structural risk;
- reduces the risk of contamination;
- can help accelerate development;
- may prove to be more cost effective (cheaper than rebuilding);
- can produce higher values for site development.

However, demolition may also have negative effects:

- uproots historical links;
- is a costly process, especially if there is a large amount of material to be taken out;
- is a less sustainable option in terms of the use or reuse of material (material is carried to a remote location and new materials have to be brought in);
- is less sustainable in terms of transport;
- there are increased risks of accidents for workers and the public;
- may cause public harm due to dust and the large number of vehicles.

I.5.10. Identifying the main areas covered by urban regeneration in Baia Mare

The strategic lines of Baia Mare City Hall when planning capital investments are fully in accordance with the strategy for sustainable development of the municipality, aiming to meet the needs of the population. Capital investments held by local authorities in Baia Mare mainly targeted the primary needs of the local community, by improving the built environment and by upgrading basic infrastructure. The actions which aim at achieving the strategic objectives are:

- ❖ Creating modern means of communication, improving accessibility, connectivity and traffic;
- ❖ Promoting the city as "development engine", responding to pressure from investors;
- ❖ Promoting the role of dispatcher in tourism, given the area's potential;
- ❖ Protecting cultural and architectural urban values, and revitalizing historical sites;
- ❖ Improving quality of life;
- ❖ Improving the quality of the urban area, infrastructure and public services.

It should be noted that the multi-sectorial integrated projects launched by the City Hall wish to develop the business environment, attract foreign investment, increase GDP, therefore transform the municipality in an urban pole of economic growth, both in the county and in the entire North-West Region. City Hall relies on the urban regeneration strategy and pays special attention to the quality of public space. There are currently five priority areas for urban regeneration:

1. **North Area – ROMPLUMB;**

2. **East Area - Phoenix Baia Sprie (including the CUPROM platform);**
3. **City Center and Rivulus Dominarum;**
4. **South Area - Vasile Alecsandri;**
5. **West Area - Railway Station / Warehouse Area.**

The priority strategic objectives in the areas of intervention in order to achieve urban regeneration are the following:

Objective 1. Promoting the cultural identity and social cohesion of the community by improving public space and creating structures for meeting, dialogue and socializing;

Objective 2. Reducing the risk of ghettoization / isolation of the community by improving accessibility and urban mobility and strengthening the link between neighborhoods and surrounding areas;

Objective 3. Raising the living standards of citizens by improving environmental quality and protecting (sustainable use) natural resources through:

- Cleaning polluted areas (including bodies of water);
- Rehabilitation and / or landscaping of green areas (including intra-residential ones);
- Development of green corridors;
- Rehabilitation and modernization of water-sewage infrastructure.

Objective 4. Creating conditions for social inclusion for all citizens by improving access to basic social services and infrastructure;

Objective 5. Facilitating economic restructuring and strengthening the role of the Old Town and V. Alecsandri neighborhood in municipal economy by developing the business support infrastructure, promoting innovation and sustainable use of resources.

So far, the task of identifying urban regeneration areas encountered difficulties related to the lack of detailed / reliable information and lack of political decisions and methodologies for:

- ✓ The relationship between the level of pollution / contamination of areas in the city and the dangers for the community: the issuance of building permits and PUG zoning for the three areas identified by recent studies as having the highest level of contamination and consequently toxicity, should be related to health screening, and the negative effects on infrastructure and housing due to improperly closed mines.
- ✓ Abandoned or degraded buildings, in every neighborhood.
- ✓ The relationship between the current areas owned by the municipality of Baia Mare and Baia Mare's natural expansion directions.
- ✓ The ratio between public spaces, industrial areas and residential areas.
- ✓ Maintaining the cultural and architectural identity of the city (the historical center)

By updating the GUP it is recommended that a specialized study be made on the toxicological aspects related to residential, industrial and green areas where there are high levels of contamination with heavy metals, especially lead and cadmium.

The new rules of urbanism also administratively "spur" the resolving of situations that endanger public safety and affect the look of the city, while finding ways of transforming those areas that are absolutely necessary for sustainable urban development into public spaces, including spaces that according to the legislation in force should exist on both sides of the river, and the situation of Ferneziu and Firiza neighborhoods, as tourism corridors. The new urban planning regulation defines the directions and functions (industrial, commercial, tourist, residential) of areas of expansion in Baia Mare. Official talks with neighboring towns should be initiated: Baia Sprie, Tautii Magheraus, Grosi and Recea.

The new rules of urbanism emphasize the alleviation of negative effects of mine closures and the construction of a means of transport (train or cable car) which would stop in the interest areas designated above and which would be connected to logistics parks.

I.5.11.Identifying the use of land resulting from demolitions that is subject to urban regeneration in Baia Mare

- ***Clearing land that constituted former industrial sites, the pros and cons of the demolition action***

Romania, and therefore Baia Mare, is not faced with having to demolish damaged homes but closed and abandoned industries. According to several criteria authorities may opt to keep them and convert them into useful spaces, or demolish them. Some buildings are in such bad condition that they require demolition, others could be repaired and may get another destination, but these actions require funds. In the case of Baia Mare, where there was a highly polluting metal manufacturing industry, most spaces that were left behind after the dissolution of the industry must be demolished because they are heavily contaminated; also, the land cleared after demolition will require costly decontamination investments. In this situation, in which some industrial buildings are demolished in whole or in part, but the land is not used, seems explicable; it is actually the cause of failure of many projects in this area. One aspect that should not be overlooked is the low cost, but not low enough as to offset the costs of decontamination, and the negative influence these lands have on neighboring properties whose value has significantly decreased. But the main question remains: once this land will be clean, free from investments, will anyone be interested in investing in the area, in achieving his share of urban regeneration? Currently, there are over 11,000 vacant lots in St. Louis, approximately 40,000 in Philadelphia, and nearly 68,000 vacant lots ("unused") in Detroit. Most are a result of demolition, but nobody buys them in order to invest. We believe that this is a serious warning signal. The global crisis, which began in the U.S., has first of all shown its effects there. Analyzing the challenges caused by the demolition of civil and industrial objectives we can identify the following important topics:

• Stakeholders are primarily the landowners, in very few cases the state, as most of the industrial sites, now abandoned, were privatized; sometimes private investors own this land by purchasing it and in most cases the creditor banks of failing industries. Obviously, in the first three cases there is a chance that they enter into a regeneration process but in the last example, the bank will want to sell the land with the best possible price.

• Failure to demolish the buildings imposes serious social and economic costs. Maintenance costs of abandoned buildings are high. When coupled with the loss of income associated with these properties it can lead to a significant fiscal drain on local government. A comprehensive study conducted by Econsult Corporation concluded that the annual cost to the city of Philadelphia to maintain vacant properties was $ 20 million, while lowering taxes paid by their use amounted to losses of $ 3.6 billion.

• Besides these measurable effects, vacant / abandoned properties can undermine the vitality and quality of life in city neighborhoods, which act as a barrier to their revitalization and as a deterrent to the regeneration of the city as a whole.

• Vacant lands are much easier and less expensive to maintain than abandoned buildings, and present significantly less risk in terms of criminal activity and the risk of fire or accidents. They also are cheap when it comes to reuse, unlike abandoned buildings: they can be sold to homeowners of adjacent homes for secondary lots, for example, or used for community purposes. In most circumstances, a vacant lot has a less negative influence on the environment and the proximity than abandoned building, and, most importantly, can be readily converted into an advantage, or at least a neutral factor for a neighborhood considering that resources and market conditions do not allow its reuse.

• Demolition is an expensive, complicated, complex process involving a variety of steps, activities and regulatory requirements, plus the cost of the final result. Beyond simply tearing down buildings, the process includes choosing the company that will perform the demolition,

obtaining necessary permits, removing the entire structure, foundations, ejecting debris, and freeing the site of any other loads so that it may be prepared for other activities.
• The regulations affecting demolition and its effects (Law211/2011 on waste, National Guide for assessment of risks related to the effects generated by *demolition* using explosives for the neighborhoods, Order no. 860 of 26 September 2002 for the approval of the Procedure for assessing the impact on the environment and issuing an environmental permit, Text updated based on amending normative acts published in the Official Gazette of Romania, Part I, until November 7, 2005) existed at all levels of government. The regulations impose additional costs that may outweigh their benefits.
• Strategic demolition is vital to stabilize and revitalize cities and neighborhoods. Taking into account the critical need for large-scale demolition in many larger communities, the costs associated with it and the limited resources available, policy makers and practitioners must be strategic in their decisions about demolishing buildings, while becoming more creative about finding the resources to do so. Demolition activities, in short, must be part of a wider strategy to stabilize and revitalize neighborhoods and the city as a whole.
Not all empty buildings should be demolished: many can be reused productively, either for the same purpose as before or in new and different ways. At the same time, the demolition of buildings that cannot be reused would not be a high priority, at least in the short term. Demolition, in short, should not be an end in itself, but rather a step in the process of creating healthier and stronger communities. In this respect, in Baia Mare there are industries that still work, surviving heroically: in this case the former industrial enterprise IMMUM Mechanics and Mining Machinery and IMUAS Machine Tools, Accessories and Tools, Baia Mare is the only one that survived. Other several businesses producing mining machinery operated here as well. The buildings that remained after privatization are in a functional state, and partly used for industrial purposes today.
However, sooner or later, they will have the same fate as those now in liquidation, requiring demolition. But these buildings will not require demolition: located within a relatively short distance from the old town center they would be great for different destinations concerning the new urbanism.

- ***Using land for building homes***

If we compare the situation of living spaces in Romania, and also in many European countries, especially former communist states and the United States, for example, we find that from 2000 to 2010 the number of vacant housing units in the United States increased by 4.5 million, representing an increase of 44 percent (Mallach, 2012), while in Romania, where housing construction was slow after 1990 and demand high, the housing fund is still not fully insured today. There are more and more social cases seeking a home from the state, and in this respect the Romanian government, despite huge efforts, is unable to find a solution. The offer for sale (housing) currently exceeds the demand; however, the offer for rent at low prices, with virtually no profit, is practically nonexistent. If the state and the municipalities would invest in this area of housing for rent they would solve a problem of social origin but should invest funds that they currently do not hold, not for this purpose. In this sense, turning to cheap construction, with lightweight solutions (but modern and aesthetic) would represent a solution for using land resulting from demolition, given that the main potential buyers would be young couples enjoying credit stimulated and supported by state and the banks would be their solvent customers.

I.5.12.Urban development strategy of Baia Mare, projects proposed for urban regeneration

Over time, both the municipality and a number of private companies have proposed various solutions for the urban regeneration of the city of Baia Mare. To better understand the reasoning behind these projects we have to specify the context in which these projects emerged, showing Baia Mare municipality's vision to bring the city - by 2020 - to the level of a developed European city (Anghel, 2013).

The most important urban regeneration project was "SEPA Eco Industrial Park Baia Mare" part of the European Union Cooperation Programme SEPA (Sustainable and Equipped Productive Areas) through which seven areas in Hungary, Romania, Italy (two projects), Greece, Slovenia and Serbia are targeted and co-financed in projects of urban regeneration. Baia Mare is presented as follows in the technical documentation of the EU project:

About the SEPA area of Baia Mare, identified as the former industrial site Phonix (gold and copper production) the following are stated:

Baia Mare is a "leading partner" in the SEPA Project - sustainable and productive areas, Funding program "South-East Europe", Priority Axis 4 "Development of cross-border synergies for sustainable growth areas".

The project aims to promote the concept of sustainable production area defined as a "Community of production and service companies" which, within a functional area and through cooperation, aims to improve the economic and social performance, the acquisition of specific organizational tools, management and infrastructure - the creation of a business support area. The project aims to facilitate the regeneration of a number of production areas in accordance with sustainability criteria, thus increasing the attractiveness of these areas for Romanian and foreign investors. The project is innovative since it focuses on the environmental sustainability of production planning since the design stage of production site organization. This approach can be very beneficial for SMEs, which generally do not have the scale necessary to organize sustainable production sites among themselves in an efficient manner in terms of cost. Based on best practices and experience sharing, the project will test a model of "sustainable production location for SMEs", applicable in any field of production, based on environmental protection and the use of renewable resources and on specific local circumstances. In order to implement the project, Baia Mare has initiated a feasibility study on the topic of approach and application issues regarding the SEPA industrial platform (east of the municipality), i.e. PHOENIX / now CUPROM with a total area of approx. 55 hectares where currently there are numerous buildings and facilities specific for metal extraction from non-ferrous ore, activity suspended in 2009 when CUPROM became insolvent.

Considering that the re-functionalization of the CUPROM platform is intended to constitute a pilot project in the city and the North West region of Romania, it is extremely important to consider the vision contained in the Sustainable Development Strategy of Baia great until 2020. In the PUG, the CUPROM platform is described and included in the chapter Production / Storage Area, Technology Park which occupies an area of 459.81 ha, less than 10 % of the town area. Note that when CUPROM was closed there were approx. 150 buildings on the platform, partially now demolished, for scraps.

In the overall development strategy of the municipality, the re-functionalization of the CUPROM platform falls under Priority Axis 4, with the following characteristics: promoting economic growth and urban expansion with the purpose: strengthening the economic center of Baia Mare in the local context.

For the construction of the eco-industrial park on the CUPROM platform, two technical-economic scenarios have been created, based on the reality that the site holds the structure of the dispersion chimney with a record height of 351.5 m. The differences between the two scenarios lie in building the platform in two versions:

- Technical- Economic Scenario Option 1 - the dispersion chimney is removed by demolition;

- Technical- Economic Scenario Option 2 - the dispersion chimney is preserved and integrated into the future architecture of the area. (Fig.1.8.a,1.8..b)

Given that from the financial analysis the two versions have significantly similar results, we believe that the economic analysis prevails when choosing a scenario. Through it the advantages and disadvantages of the two options can be highlighted, taking into account the effects on the socio-economic, cultural and tourism "brand" development of Baia Mare, in the near future or long term.

Although we believe that the selection of the optimal scenario is required to be made following public debates, with the participation of all socio-professional categories concerned, the choice of the creator of this feasibility study is moving towards Technical- Economic Scenarios:

Option 1. In this variant, the construction of the eco-industrial park can be completed in less time with a more efficient employment of space available, without the constraints imposed by continuous monitoring and maintenance of the chimney.

Option 2 - keeping the dispersion chimney - although more difficult to achieve in time, would provide a platform arrangement so that the park resulted would ensure openness and interest from a wider range of integrated activities.

Figure 1. 8.a Eco Industrial Park-SEPA Project Proposal 1
Source:www.sepaproject.eu

Figure 1.8.b Eco Industrial Park-SEPA Project Proposal 2
Source:www.sepaproject.eu

I.5.13.Alternative, Phoenix Quarter in Baia Mare

If we talk about urban regeneration in Baia Mare we necessarily have to address the concept of new urbanism, because it would best meet the current needs of city residents. Analyzing what would be a neighborhood emerging from these modest steps we have to look closely at those ten main aspects that define the concept, relative to the needs of the community in Baia Mare:

- The neighborhood (quarter) is a perceptible and recognized center;
- The neighborhood will be connected to the rest of the city by a transit station;
- Most houses are within walking distance from the center of the city, about 5 minutes;
- There are a variety of inexpensive and expensive homes for young, old, rich and poor;
- In the neighborhood there are sufficiently varied shops and service offices;
- Kindergarten and elementary school are close to the houses in the neighborhood;
- Playgrounds for children are provided close to every home;
- The streets in the neighborhood form a connected network, which disperses traffic;
- The streets are relatively narrow, creating an environment suitable for pedestrians and bicycles;
- The neighborhood is organized in a form of self-government.

The area concerned is that which contains the two platforms, Phoenix / CUPROM and IMMUM and IMUAS, the first in the current view of full demolition and decontamination and the second remodeled according to the principles and practices of new urbanism. The result would be an autonomous district, close to the old town (300 m), 400 m from the central market, so that would fit the theme of the concept of new urbanism both internally as well as fitting into the community. The chimney will be preserved as a symbol not only of the Phoenix Quarter but of the city. Its structure is strong enough to allow layering upper floors including restaurants or view rooms of the surroundings, access lift, etc.

The central idea of the project is to build housing and the necessary facilities according to the distances mentioned in the previous list, on the land resulting from the demolition of the CUPROM platform and the remodeling of the former industrial buildings IMMUM and IMUAS. In other facilities that do not require a certain maximum distance, urban planning can be expanded to general urban regeneration, so these new features can satisfy both urban ideas.

Remarks:

After the collapse of socialism in Eastern Europe, the socialist concepts of growth and development have been replaced with capitalist concepts of growth and development. Logic would say that these former communist countries should grow faster to catch up with the developed capitalist countries. Integrated sustainable development of cities in former communist countries is one of the basic components being urban regeneration.

Cities grow slowly in spatial dimensions, but can grow rapidly by reusing spaces and buildings left behind after the collapse of large communist industries. Despite repeated privatizations, exchanges of owners, most went into bankruptcy and liquidation.

This is the prerogative and the role of urban regeneration, and new urbanism: can be a partial solution of fastening grows of cities. Strategic planning of sustainable urban development has become one of the constant concerns of urban policies in recent decades, both in the U.S. and in the European Union. Thus, one of the axes of action of the sectorial program Regional Development implemented under the structural adjustment program agreed between Romania and the EU was to support the development and implementation of development plans for the cities in our country.

The new activities that occur on regenerated sites then produce other public benefits, employment and local revenues increases. Regeneration of brownfields may also improve social cohesion, reduce environmental risks, help protect historical values and improve quality of life, not just on the site itself, but also its surroundings. Developing brownfields strongly influences the surrounding areas and usually increases the real estate value. Other advantages can arise from reusing site resources and infrastructure capacities (buildings, energy and sewers etc., or its transport facilities).

Relevant planning proposals, taking into account the wider social needs, can get maximum benefit from the reuse of brownfields, not just for the general public but also for developers and owners. All this contributes not only to increasing the sustainability of a specially redeveloped industrial area, but also contributes to a greater local sustainability. Rehabilitation proposals must be made on the basis of observing the continuity of the urban tissue of particular areas in question, and the socio-economic function previously performed.

Choosing the new functions for rehabilitation should be designed to ensure an economic recovery of the area (trade, handicrafts, and services), a prerequisite for an effective revitalization and implicitly conservation. The functions chosen for rehabilitation must meet the social, cultural and economic needs of the population and also must not contravene the specific nature of the assembly in question. In the transition from the industrial to the information society (from industrial activities to service activities) it is stringent that urban rehabilitation becomes a core issue of the construction industry, so as to allow cities to adapt to the structural changes required by the new type of activity. The rehabilitation of existing buildings requires reconsideration of the architectural heritage and the expansion of the concept "protected historical-architectural monument(site)" for large urban areas - sometimes even whole cities - historic industrial complexes (disused), rural assemblies (progressive awareness to the historic quality of buildings, assemblies and towns, leading to the reevaluation of a "place", that ultimately affects the quality of life. It is necessary to adopt immediate measures to protect and exploit the existing patrimony.

The built environment is seen as an object of heritage through a new branch of restoration - urban restoration. By functional and aesthetic re-conversion, it re-introduces important buildings and

entire sites into the economic circuit and the public, buildings which can then shape the image and activity of a city.

I.6.Business Inteligence and G.I.S

I.6.1. G.I.S.components

The Geographic Information System (GIS) appeared recently in the history of information technology, has grown extremely rapidly and has now become the best known and used computer information system. "A GIS is an information tool for mapping and analyzing objects that exist and events that are occurring on Earth. GIS technology integrates common operations with databases such as query and statistical analysis, with the benefits of unique views and analyses provided by geographical maps."
"A GIS is a set of tools for gathering, storing, processing and visualizing spatial data of the real world."
"A GIS is a system for capturing, storing, checking, integrating, manipulating, analyzing and displaying spatial reference data on the surface of the Earth." The development of GIS is connected in parallel to the evolution of several other spatial data processing subjects, such as cartography, computer-aided design, remote sensing, topography and photogrammetry. Today, GIS is considered an important tool in planning and decision making.
The complexity of the real world is so great that GIS applications require intricate models. The quality and power of a GIS lies in reporting all layers to a base map (using established standards), an aspect highlighted in redefining the concept MGIS. Layers contain information on each of the entities used in the model, specifying the (geographical) position, spatial relations, attributes and possibly time information.

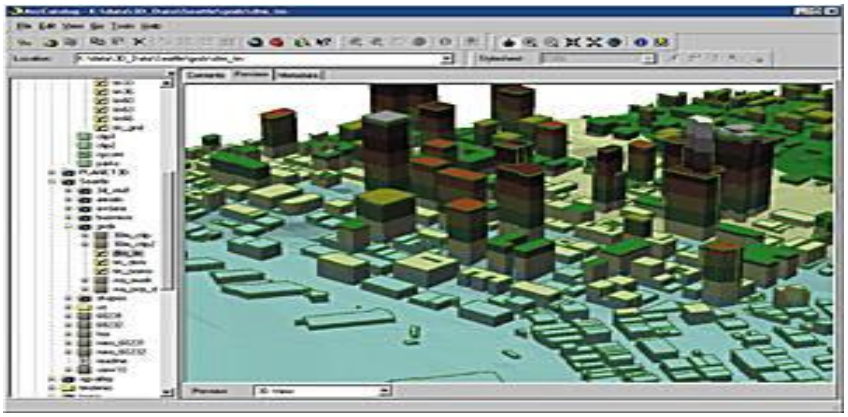


Fig.1.9 The complexity of the real world
Source: Daniel and Goodchild, 2011

For years GIS was a tool only for technically qualified users. GIS software was incredibly helpful for a select number of people - but nevertheless, GIS was not much more than a complicated map with a computer display. The "boom" of GIS technology, its most spectacular development, i.e. the transition from a technology of the "select few" to a technology of all manifested most strongly in the period 2000-2009. The last decade of the last century brought spectacular changes, new software, new companies in the field and more importantly public and private institutions understood the importance of this field. The GIS revolution of the last three decades has fundamentally changed geography both as a scientific field and the trades with spatial implications. The development potential of GIS is very high. An estimated 85% of all

existing data volume has a space component, which means it can be represented using GIS. GIS has proven to be a flexible, adaptable technology, with an evolution adapted to changes in the ecosystem. At every step in this development, GIS not only adapted to these changes, but it has embraced them, becoming stronger and more valuable. Recent technological advances help us review what GIS is in a new context. As a hosted or cloud-based Web system with maps and applications ready for use, GIS is moving toward the moment when it will be used anywhere, anytime, by anyone. The way we use GIS, the way we interact with it, and the way it interacts with the world are changing. While some of these changes have been and will be driven by new tools and technologies from ESRI and other renowned developers of software applications in the field, the biggest factor changing GIS is the public, made up of professional users and their exploitation needs. (Daniel and Goodchild, 2011). GIS maps have evolved over the last two years from intelligent maps (offering analysis, query and management opportunities) to the so-called "multimedia maps" which, in addition to the attributes of previous maps, can also combine and incorporate multimedia, real-time and web applications.

I.6.2.Aspects of GIS development during the economic crisis

If we look at the statistical analyzes of the percentage of GIS implementation, we see that despite the shortage of liquidity of the world economies (it is known that GIS is expensive, and requires major investments), GIS is one of the few areas that have continued to expand. Policy makers in countries affected by the crisis understand that it is an instrument which, by streamlining business processes and management in the economy, leads to personal savings, investments or eliminates wrong decisions and ultimately contributes to a more efficient economy, gradually reducing and eliminating the crisis. This economic efficiency and profitability saved GIS technologies from a slowing down, or even a stopping of its evolution, recent years bringing a higher level of GIS implementation worldwide. Until it is able to help diminish or even stop the global crisis, GIS was used as a cold, "cynical", but accurate instrument, that could count the losses of the world economy in real-time and could show the effects of the financial crisis in all areas. Currently, companies that provide industrial products must cope with rapid developments taking place both in the technical and the economic and commercial fields. In essence, these developments are:

- Globalization of the economy resulting in stronger competition;
- Individualization of needs, which determines customization of products;
- Boosting capital, leading to increased demands on investments efficiency;
- Discrediting industrial and commercial structures, big business being replaced by independent groups of SMEs.

This development requires a new balance between economy, technology and society. Major changes which occurred in the market determined significant conceptual changes regarding the processing of materials, data, knowledge and orders. To go through the economic cycle, after which the company can make a profit, it is important to go through a stream of data that starts with the preparation of price quotations and tenders in order to participate in auctions, continuing with product design, manufacturing and marketing in order to recover the investment made in that business. During this flow, the data is processed using the CAD/CAM/CAB software products. The last challenge in terms of data processing is complete integration of the flow using CIB (Computer Integrated Business) information products (Cioca et al.2007).

Compared to the previous analysis of data banks we can say that GIS is the most modern territorial data bank representing the current managerial concept in the leadership of any organization.

The USA remains the world leader in the field in terms of diversify of applications and companies working with system management and specialized software production, with almost

monthly update. GIS operates in 2D, 3D or 4D systems, adapting to requirements to submit data in plan and space, chronologically, up to presenting data in real time. In an organization, data can be stored in a centralized location or fragmented and can be spread across multiple locations, making GIS the most effective management tool of any existing organization worldwide.

I.6.3.GIS impact on society, power of GIS, GIS in the everyday life people

Geographic Information Systems are considered by many as particular cases of computer systems. In a broad sense, GIS is a set of manual or automated procedures used in storing and handling geographically referenced data. A GIS is both a database system of specific possibilities for spatial geo-referenced data and a set of operations for working with data.
The terms "spatial" and "geographical" are often used interchangeably. Strictly speaking, the term "spatial" refers to any type of information about location and may include terrestrial measurements, remote sensing and mapping. On the other hand, the term "geographical" refers only to the location information on the surface of the earth, in real scale.
The main advantage of computerization of geographic information is a rapid integration of numerous data sets from various sources and of different types in a single system, using their common characteristic: geographical location. In fact, the objective of geographic information systems is precisely that of ensuring an organized structure for managing complex and diverse collections of geographic information, as well as tools and functions for display, query, processing and simulation. Spatial analysis goes beyond simple playback, allowing us to explore spatial relationships and processes.
The need for information on the changes that occur yearly, monthly, weekly, daily and even within hours of the surface of the Earth, for the decision-making process to be current and informed, makes creating a classic map inappropriate or even impossible. Research on the interrelationship between geographic information systems and society addresses two major questions: how the spread of this technology affects the political, economic, legal and institutional aspects of society, and how social processes affect the form taken by the technology itself.
In the past two years, these issues have become a central element of GIS research, becoming one of the three areas where NCGIA (National Center for Geographic Information and Analysis) encourages new research initiatives and quickly gained growing attention in the academic community. Thus, addressing the impact of GIS and society in terms of research will often be a GIS research component (research in general), focusing more on the relationship between new information technologies and society. However, direct attention to this relationship is also important

I.6.4 Some aspects of the impact of GIS on society.Main Geographic Information Systems (GIS) applications

Numerous fields of activity currently benefit from GIS technology. An active GIS market in time led to a decrease in prices and an increase the performance of hardware and software components. This development has encouraged the implementation of GIS in areas of great diversity: administration, defense, education, business, commerce and industry, in a word, all those areas where decisions are made in the geographical space. The variety of these areas is illustrated graphically showing the main areas of application of the GIS. GIS has wide application in the work of local and public administrations, from urban studies and projects, systematization, to granting construction/demolition permits or organizing the collection and disposal of domestic waste.
GIS has been used in the study and management of natural disasters, internationally, for over 20 years. The clear benefits of GIS have required the use of those techniques in various fields,

including the study of natural disasters. Application of GIS in the study of natural disasters in Romania will go through several distinct phases, with intermediate results. Application of GIS in trade enables solving problems on the identification and maintenance of markets under competitive conditions, organizing the distribution of goods or inventory management.
Today, when the international scientific community recognizes the environmental consequences of human activity, GIS technology has become an essential tool in understanding the process of global change. Numerous satellite maps and information can be combined to simulate the interactions of the complex natural system. This allows a better understanding of Earth processes and better management of human activities to maintain the world's economic vitality and preserve environmental quality.

- **GIS in company management using space resources**

Whether it's a compact company occupying a significant area of land, a chemical plant, refinery, an enterprise manufacturing large machinery and equipment, or a company with geographically dispersed facilities, such as the distribution of liquid and gaseous fuels, telecommunication companies, mining and oil or electricity suppliers, resource management can be appropriately handled through GIS applications. This is because of its higher capabilities of organization and usage of information relating to territorially distributed entities.

- **Patrimony administration**

It can consist of storing and exploiting information on:
Location of patrimony: characteristic derived from the essence of GIS application; shows positions, neighborhoods, overlaps, interference or interdependence between installations, systems, networks, buildings, including the establishment of access roads;
Property inventories (facilities, technological systems and attachments) based on two criteria:
Quantitative: types of materials, parts, buildings and installations, quantities and values;

- **Status of patrimony**: updated information through periodic inventories or explicit interventions can generate detailed reports or synthetic on forecasted or factual conditions of installations and facilities.
- **Overall control of systems**

Administrative actions can also control:
• the general outlook on different objectives and circumstances studied;
• development of scenarios (favorable or unfavorable);
• fault analysis and establishing methodologies for remedial actions.

I.6.5 Modern methods of integrating data into an information system on a GIS platform Relationship between GIS/DSS (Decision Support System) databases, Generic Spatial DSS construction

''Although traditional BI tools are powerful and have delivered proven results, they do not incorporate a crucial component of most business information: location. The majority of business data contains some sort of location information: office locales, customer addresses, sales territories, marketing areas, facilities, and so on. When this data is viewed spatially on a map, patterns and trends that were once overlooked are clearly revealed.
When combining GIS with business intelligence data, organizations can answer questions like these:
Who are my best customers and where are they located?
Are there location-based patterns related to customers' purchase decisions?
Where can I find potential customers similar to existing customers?
Where have our marketing efforts been the most or least successful and why?
Do we have customers at risk from physical phenomena, such as severe weather

events, and what impact might that have on our business?

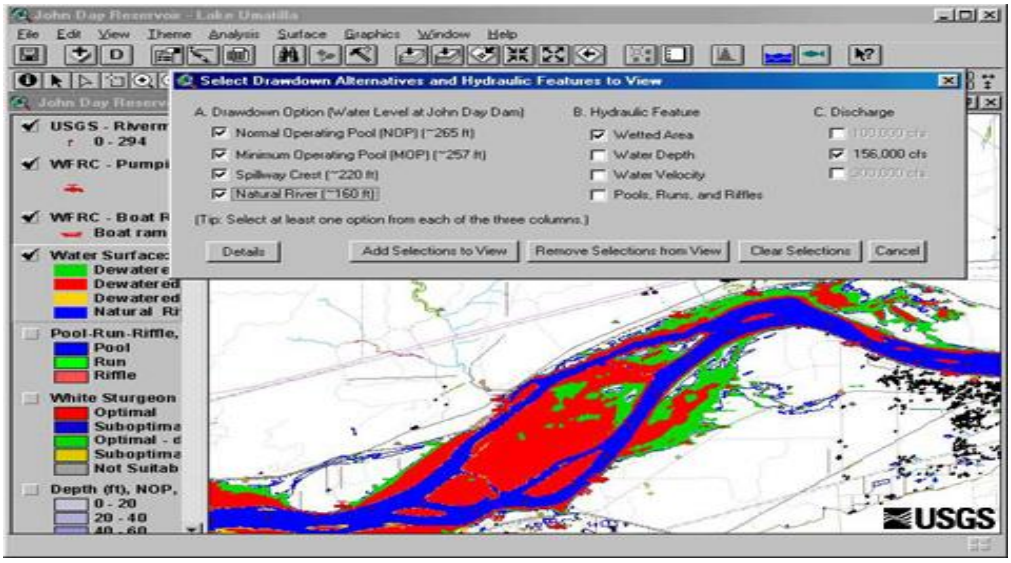


Figure 1.11. Plot of ArcGIS Core Products
Source: Derekenaris,2001

Answers to these and other critical questions are delivered through the successful integration of BI and GIS that provides the following:
Powerful visual analysis capabilities for key BI data such as customers, retail outlets, assets and infrastructure, partner locations, supply chains, operational events, and utility grids
Easy correlation of BI data with demographics, occupational classifications, lifestyle and socioeconomic factors, and consumer information to analyze and optimize product and service sales across multiple geographies'' (Source:ESRI Products).

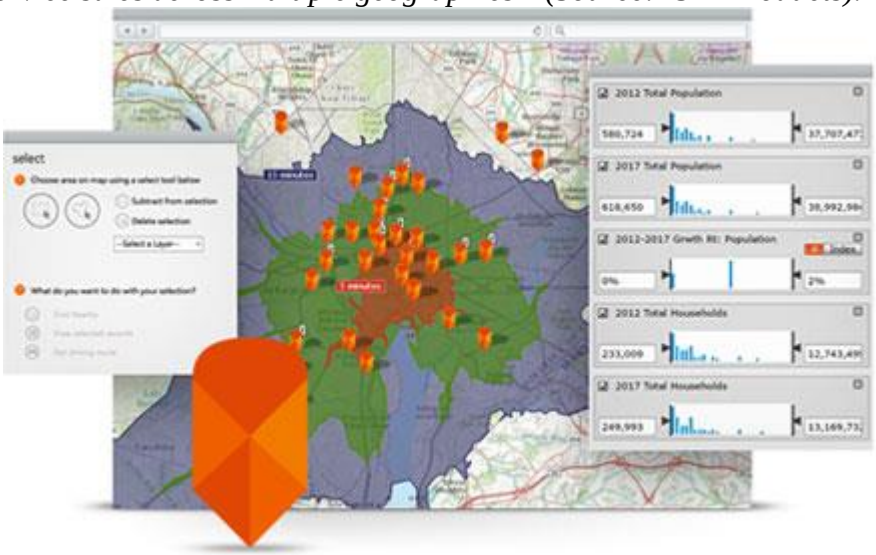


Fig.1.10. Plot of Arc GIS Plarform
Source: http://www.esri.com/products (ESRI)

Immediate insight to enable rapid and informed decision making, including clear visualization of what matters and where it matters, complemented with supporting business analytics, allowing knowledge workers to prioritize efforts and immediately

become more productive

Conclusions

- Basically, local development is grounded on a complex system that includes factors with major roles with respect to the involvement in the decision-making process in a community, and who can significantly change the evolution course. These are the so-called stakeholders who mark their influences by applying strategies.
- The issues related to the elaboration and application of local strategies consist in assuring the real participation of stakeholders in identifying needs, analyzed problems, adopting and especially enforcing the public decisions.
- The real development of local communities should be based on their own strategic notions of development. Therefore, the selection of the development direction is made by the local government, considering their resources and the economic policies elaborated by the central government. Most of the times, the initiative belongs to mayors, as executive authorities of the local public administration.
- Regional industrial strategies must be based on an integrated approach that includes the components of labor employment, training and education, to promote growth sectors capable of creating sustainable jobs at local and regional level, especially for young people for example in innovative SMEs;
- The cities play a special role in the development of regional strategies for industrial areas; in this context, that cities are essential to achieving smart growth, therefore the old industrialized cities with a base offers enormous potential that the EU should fully exploit;
- Need to focus stronger on industrial reconversion support for cohesion policy of former industrial regions ,in the following areas: business innovation and investment, social inclusion, integrated approach to urban development and urban regeneration.
- Decision making process is part of Business Intelligence.
- Although traditional BI tools are powerful and have delivered proven results, they do not incorporate a crucial component of most business information: location. The majority of business data contains some sort of location information: office locales, customer addresses, sales territories, marketing areas, facilities, and so on. When this data is viewed spatially on a map, patterns and trends that were once overlooked are clearly revealed
- The power of GIS consists in increasing competitiveness of Business Intelligence.

CHAPTER II

STRATEGIES AS BASIS OF ENHANCING ECONOMIC AND SOCIAL COMPETITIVNESS OF INDUSTRIAL SECTOR

II.1.Competitivness and promotion of entrepreunership

The competitive environment in which businesses operate is the subject of analysis, evaluation and control for the formulation and selection of strategic alternatives in order to obtain sustainable competitive advantages.

Behaviors that firms can adopt in relation to the business environment can be reactive and proactive.

The reactive behavior is the development, by the firm, of decisions and actions considered a response to the negative effects that come from the turbulence of the business environment. The proactive behavior is a tool which is in the hands of entrepreneurs, and employees alike. The management performances of entrepreneurs can improve the business risk and can increase the degree of proactivity. These elements are presented in this study. The research was initiated some time ago. This paper summarizes the results of previous phases of research and focuses on creating a model for assessing the degree of perception of entrepreneurial proactivity based on the management performance of entrepreneurs and business risk.

Small and medium enterprises represent a vector of economic growth, and are considered "the hidden giant of economy." (Drăguşin, 1999)

This phrase may be justified if we observe the spectacular growth of SMEs in the last two decades.

The enhanced dynamics is because of the objective requirement for diversity, mobility and speed. The observations and analyzes made on the evolution of the various national economies have revealed that the development of SMEs is based on these changes (Radulescu, 2004), (Radulescu, 2007):

• Technical changes are characterized by mutations that occur due to the continuous progress of technology, which generates both business and constraints to existing businesses;

• Economic changes relate to:

- switch from classical economy to information-type economy;
- switch from centralized economy to a market economy;
- international economic activities;

• Social changes aim to reduce social disparities, and the activity of SMEs is meant to meet the increasingly diverse and growing needs of consumers;

• Political changes leading to different policy options on SMEs, at government level;

• Psychological changes are based on the complex development of the population, generated by the growing magnitude of educational and communication processes, by the information revolution.

A business's activity is significantly influenced by a set of external elements consisting of individuals, institutions, bodies, regulations or phenomena.

The environment is the system of the organization, the ambient in which it exists and operates (Nicolescu, 1996). The competition in which businesses operate is subject to review, assessment and control for the design and selection of strategic alternatives towards achieving sustainable competitive advantages. This environment is, for the enterprise system, the environment in which it exists and operates.

The correct perception of the environment and finding the resources necessary for the company to adapt to each new development is the subject of careful consideration, both external and internal (Global Report Global Entrepreneurship Monitor, GEM 2013).

While there has been much research in this area so far, specialists have failed to develop a widely accepted model concerning the generation of aggregated indicators for tracking the behavior of companies, entrepreneurs faced with an ever-changing environment. He who believes he can achieve this, is wrong. There is no universal elixir when talking about entrepreneurship and entrepreneurs. There is no exhaustive list of variants, as the heterogeneity of the forms of expression of environmental variables (external and internal) blocks this process.

II.1.1 Environmental components and their influence on business

The external environment of a company is the totality of the factors beyond it that influence it positively or negatively (Mintzberg & all,1996) . It is a set of factors of a complex and heterogeneous nature in which some factors act independently and others simultaneously. The current features of the external environment are:

- turbulence: a lot of rapid and unexpected changes occur in the environment, each with different magnitude, large or small, overlapping, resulting from various factors, i.e. economic, political, social, legal, technical, etc. Today's environment is turbulent, characterized by extremely frequent changes of very different amplitudes that have a wide incidence on a small firm, changes that can hardly be expected. Dealing with such an environment produces changes in the small company, most being adjustment solutions, which allow it to withstand changes in the environment. A turbulent environment highlights the crucial role that research and development activities have and the need to practice forecasting and ensure managerial dynamism. (Kuan,2005)
- rapid development of business opportunities; there are many economic opportunities in an environment, which, in recent years, alternate rapidly. Among the factors that may contribute to increasing development opportunities I shall mention especially technological advances and competition changes.

Amplification of uncertainty; it is the result of many changes that cannot be accurately predicted and quantified. Economic activity involves a growing number of local, national, international variables, of different nature, which are reflected in the multiplication of situations of risk and uncertainty, difficulties in directing and controlling economic actions.

Today, we see a more pronounced dynamism of the business environment and a dramatic increase in the frequency of changes (Nicolescu, 1996). This environment is very complex, manifesting both through elements of different nature and different coverage plans, such as branch, area, region, country. The evolution of the business environment can be favorable or unfavorable to business development. Depending on the influence of environmental factors

(direct / indirect), the time period in which they operate (short / long) and the companies' opportunity to control them

II.1.2 Ways to respond to the influences of environmental factors

Companies perceive the environment as a source of opportunities and constraints. Any change in the environment reflect on the company, which must analyze and direct its attention depending on the content and extent of the influence of the environmental change on it. The company is not passive in relation to the environment, it can carry out its own actions to influence the environment to evolve in the right direction, favorable to it. In this case, we are dealing with proactive companies. The ones that merely react to changes in the environment are called reactive companies. We emphasize that in this case, as well, the reaction type actions of the company cause changes in the environment.

The company's response to a turbulent environment is either a rapid reactivity, i.e. the company acts in a very short time, once the event that could have consequences on it is identified, or it is a proactive attitude, adopted by the company acting before the time in which it is anticipated the events with undesirable consequences will occur, (Parker and Collins,2010) hereafter entrepreneurial proactivity.

Entrepreneurial proactivity starts from the entrepreneur himself, extending to employees through a participatory, visionary and responsible attitude towards anticipation, prevention and mitigation actions for risks and threats.

This phrase, recently assimilated in management, is little known in the organization, but rather it is known at the level of individuals.

However, we emphasize the need to introduce this concept throughout the company, which must act as a whole.

Entrepreneurial proactivity is a dynamic and evolving concept. For small and medium firms they occur, they act, they adjust according to external environmental factors.

Amplification of uncertainty is a result of many changes that cannot be predicted and quantified with sufficient accuracy (Popa et al, 2002). The fact that there is a growing number of local, national and international variables in the activities of companies, of very different nature, to a greater extent, increases situations of risk and uncertainty, and is reflected in an increased difficulty of perceiving and controlling entrepreneurial actions.

II.1.1.3 The relationship between strategic management and entrepreneurial processes

Numerous studies (Bamberger,1989),(Mintzber et.al,1996),(Nicolescu,1996),

(Drăguşin,1999) show that strategic management is the process of continuous adaptation of the shape and structure of a company's resources, to the opportunities and constraints of the changing environment. Strategic management is the means by which to achieve and keep a balance between the company's resources and environmental opportunities. The importance of strategic management is based on several arguments:

- Allows the organization to adapt to rapid environmental changes, anticipating them or their generation ;
- Provides competitive advantages in a high-risk environment ;
- Enhances the effectiveness of coordination.

Although the entrepreneurial processes associated with strategic management do not have the magnitude of those in large corporations, by their profound implications and examinations, they

become comparable to them. The number of small and medium companies adopting strategic management, however, is extremely low.

The authors of the paper (Nag et.al,2007) state that in an increasingly tense competitive environment it is imperative for small and medium companies who wish to succeed, to develop a true management strategy.

In fact, strategic management is an effective way to guide a business' activity based on environmental developments.

The desire and will to win the competitive fight forces SMEs to establish long-term development strategies and ways of achieving the goals set in conjunction with the resources available.

Establishment of (proactive) strategies in small and medium companies, tracking their implementation, can determine a decrease of a company's risk concerning competitive environment and vulnerability.

The strategic evolution of a company is related to both the development of the environment and that of the organization. This generates a number of sensitive issues regarding organizational change together with strategic pilotage, which is based on technological and trade scanning.

The entrepreneurial proactivity may become a modus vivendi when speaking of strategy formulation

The main actor is the entrepreneur, who, through its dynamic characteristics, or it role (investor, innovator, manager, performer) and its size (actionable, creative, psychological), generates economic effects by the businesses he initiates and develops, causing significant movements of capital, along with its multiplication and an increase in wages. Economic changes entail changes in the configuration of the social structure and its individual components (Ronstadt,1884), (Shane,2000).

The role and directions of involvement of the entrepreneur generate turbulence in the society, in each country(Candea D,CandeaR.,2010). Economically, entrepreneurs determine a significant movement of capital through the business they run. These changes then induce social changes (in the social structure and configuration of the individual components). The management performance of entrepreneurs can be quantified, analyzed and evaluated.

The direct link created between entrepreneurial proactivity and the managerial performance of entrepreneurs makes the business strategy be based on the compnay's relations with its stakeholders, with its partnerships with local actors and the business environment, social responsibility, etc.

The managerial performance of entrepreuners consists both from quantity or tangible factors (e.g. technical,managerial competences,experience,notorius issues ,good relational and partnership networking established etc) and intangible factors ,such AS:decision making ability,team cohesion,empathy etc (Toader et al ,2012),(Dinu and Tăchiciu,2009).

Apparisal of managerial performances ,varies with respect to the firn's activity domain or field.

The entrepreneurship barometer can also include these aspects which become the source for entries into the overall assessment system of the entrepreneurial ecosystem. (''*Antreprenorii vorbesc-Barometrul antreprenoriatului românesc 2013''*).

II.2.Business strategies regarding the evaluation of human resources.

II.2.1.Performance assessment and performance management

Performance management is one of the key processes that, when effectively carried out, helps employees know that their contributions are recognized and acknowledged. Performance management is an ongoing process of communication between a supervisor and an employee that occurs throughout the year, in support of accomplishing the strategic objectives of the organization. The communication process includes clarifying expectations, setting objectives, identifying goals, providing feedback, and evaluating results.

In contrast, performance management is a continuous process that begins immediately following the initial hiring process and continues throughout the employee's university employment. It is through performance management that the supervisor and employee gain a shared understanding of job expectations.

The actual performance assessment serves several purposes. It encourages employee involvement, provides a formal mechanism for employees to receive feedback regarding job performance and expectations, and allows the employee to work closely with the supervisor to establish goals and priorities for the next year. Performance assessment also facilitates growth and development of employees and results in a documented history of employee performance.

Performance assessments are exactly what they sound like: they are an evaluation of how employees' are currently performing on the job and a plan for making any necessary improvements. Performance assessments are an essential tool in the Human Resources arsenal as they provide data for other departmental functions (compensation, position determination, employee training, and employee development, etc).

A performance management system needs to be based on the organization's business strategy and human resources strategy. The most important steps of the performance management process are:

* establishing the aims of the assessment according to the objectives of the organization and the human resources strategy;

* establishing criteria according to the aims of the assessment;

* choosing methods that are consistent with the aims and the criteria;

* planning the process;

* assessing individual performance of employees;

* valuing the results of assessment in human resources management: elaborating the formation and training plans, elaborating the career plans, elaborating the replacement plans, administering remuneration;

* the control of the process via the analysis of observations in the functioning and applying of corrective measures.

The potential problems that need consideration in approaching performance assessment as a component of the performance management system are the following:

--the necessity of creating a performance culture;

--involving managers at higher levels in the assessment process in order to satisfy both individual and organizational needs;

--the influence of performance management upon the role of its assessment through the appropriate functioning of feedback.

The most important performance assessment objectives to the management practice are the following:

* appropriate unfolding of activities in the field of human resources;

* balanced rewarding of personnel;

* providing employees with the information necessary for their own development, by offering them trust in their own resources;

* identifying individual training and development needs of personnel, as well as evaluating the results of the training and development programmes;

* discussing the long term plans of employees, as well as the objectives of their careers;

* integrating human resources planning within the framework of all other personnel activities;

* validating selection programmes;

* improving motivation of employees;

* improving the manager-employee relationship;

* improving communication and intensifying cooperation between managers or superiors and employees;

* applying the equal opportunity principle.

A correct assessment system has to meet the following conditions:

* careful preparation and dissemination of the value system and performance assessment procedures with the aim of preventing adverse reactions or challenging the results;

* the existence of a formal assessment tool;

* using criteria that limit the absolute power of management;

* personally knowing the assessed person and permanent contact with them;

* continuous training for managers regarding the assessment activity;

* the existence of a revising system for incorrect assessments, done by superiors;

* counselling and support for those with poor performances in order to offer them the possibility to improve.

A correct assessment and using efficient performance assessment methods can improve the accuracy of the data according to which employees are lead, and predictions are made in order to ensure human resources.

II.2.2 Modelling performance appraisal in industrial units

Looking at ways by which the performance appraisal of human resources in Wooden products units are found practically the only formal instrument used in performance appraisal at the individual and within a year, is the file that meet certain characteristics evaluation of technology performance through assessment scales.

Using a mathematical model based on the degree of importance of each evaluation criteria and scores given to improve the human performance evaluation of forestry units eliminating some errors in the evaluation.

In the assessment and quantify by how to make attribute evaluator by a particular employee, will take into account not only the quality of their achievement, but also the degree of importance of criteria for assessing human performance.

Were applied in 30 units of human resources performance evaluation questionnaires.

Results of the questionnaires have emphasized that the evaluation methods currently used are not effective, do not take into account the degree of importance of performance evaluation criteria for human resources.

Analyzing responses to questionnaires managers in the 30 units resulted forestry need to introduce a new model of human performance evaluation that takes into account the degree of importance of evaluation criteria.

A correct assessment system has to meet the following conditions:

Careful preparation and dissemination of the value system and performance assessment procedures with the aim of preventing adverse reactions or challenging the results;

- The existence of a formal assessment tool;
- Using criteria that limit the absolute power of management;
- Personally knowing the assessed person and permanent contact with them;
- Continuous training for managers regarding the assessment activity;
- The existence of a revising system for incorrect assessments, done by superiors;
- Counselling and support for those with poor performances in order to offer them the possibility to improve.

Scales as follows for this performance appraisal form:

- Unsatisfactory: major improvements needed;
- Needs Improvement: less than Satisfactory, could be doing better;
- Meets Expectations: performing duties as directed with minimal supervision
- Excellent: performing all duties in a cost-effective manner with positive, measurable results
- Outstanding: performing at a level above and beyond the duties of the current position's requirements.

- CONTENTS OF PERFORMANCE APPRAISAL
- 1. Quality of work- ability to meet standards of quality, use of time and volume of work accomplished, work output matches the expectations established.
- 2. Quantity of work-competence and efficiency of work regardless of volume.
- 3. Teamwork-establish and maintain effective working relationship with others, follows instructions of supervisor, contributing work and effort to group performance to meet agreed upon objectives and achieve team success.
- 4. Initiative- recommends and creates own procedures, develop and implement new methods, solutions, accepts additional challenges and responsibilities.
- 5. Interpersonal relations-the extent to which the employee is cooperative, considerate, and tactful in dealing with supervisors and subordinates.

- 6. Communications abilities- ability to listen and understand information, demonstrates respect for all individuals in all forms of communication, regardless of their background or culture.
- 7. Planning and organizing -adapting to changes and using resources effectively, Setting objectives, establishing priorities, developing plans, prioritizing work to meet deadlines.
- 8. Problem analysis and decision making-anticipating problems and facilitate problem resolution, understanding practical and workable solutions, making decisions and providing information.

The evaluation criteria of individual performance are the following:

- The level of meeting the performance standards;
- Assume responsibility;
- Meet the task work;
- Initiative and creativity.

In developing the model of human performance evaluation should be considered in determining variability describing performance and assigning scores, the performance standards.

In order to asses the performance of personnel from the SME's within wooden products and furniture industry from the NW Region of Romania we have proposed the following **MATHEMATICAL MODEL**:

Pt = (p1 x C1) + (p2 x C2) + (p3 x C3) + (p4 x C4) (1)

Pt--total points p1,p2,p3,p4- points given C1,C2,C3,C4- the weight of assessment criteria

Example of individual performance calculation

Table 2.1.

Evaluation criteria	%	EX	VG	G	W	V W
1. The level of meeting the performance standards	35	5p	-	-	-	-
2. Assuming responsibility	25	-	4p	-	-	-
3. Adequate labour complexity	15	-	-	-	2p	-
4. Initiative and creativity	25	-	4p	-	-	-
TOTAL:						

P t=4,05

General equation:
P= f (c1, c2,c3)

$$P=b_0 + b1c1 + b2c2 + b3c3 + b_{12}c1c2 + b_{23}c2c3 + b_{13}c1c3$$

Table 2.2

Variation level	x_1 (%)	x_2 (%)	x_3 (%)
Superior level (+1)	5	4	5
Basic level (0)	3	3	3
Inferior level (-1)	1	2	1
Variation interval (Δx_i)	2	1	2

$P=b_0 + b1c1 +b2c2+b3c3 + b_{12}c1c2+ b_{23}c2c3+ b_{13}c1c3$

Further we establish the experimental matrix EFC 2^3

Nr. exp	x_0	x_1	x_2	x_3	x_1x_2	x_2x_3	x_1x_3
1	+1	+1	+1	+1	+1	+1	+1
2	+1	-1	+1	+1	-1	+1	-1
3	+1	+1	-1	+1	-1	-1	+1
4	+1	-1	-1	+1	+1	-1	-1
5	+1	+1	+1	-1	+1	-1	-1
6	+1	-1	+1	-1	-1	-1	+1
7	+1	+1	-1	-1	-1	+1	-1
8	+1	-1	-1	-1	+1	+1	+1

The matrix being orthogonal, coefficients b_0, b_1, b_2, b_3, b_{12}, b_{23}, b_{13} are determined with the formulae:

$$b_i = \frac{\sum_{u=1}^{N} x_{i_u} y_u}{\sum_{u=1}^{N} x_{i_u}^2} \qquad b_{ij} = \frac{\sum_{u=1}^{N} x_{i_u} x_{j_u} y_u}{\sum_{u=1}^{N} (x_{i_u} x_{j_u})^2}$$

The regression equation obtained according to the proposed model is the following:

$P= f (c1, c2,c3)$

$y_1=44,5 -0,5x_1-1,25x_2-1,5x_3-0,25x_1x_2x_3$

Mathematical model verification

For the values from the higher level:

X1=5 X2=4 X3=5

P=4,5

- The model that we have developed as assessment presents the advantage of performance are you regard to the degree of importance of each evaluation criterion.
- Important advantages of using in practice the proposed mathematical model are correct assessment among employees, model usability evaluation and elimination of errors.
- Performance assessments are exactly what they sound like: they are an evaluation of how employees' are currently performing on the job and a plan for making any necessary improvements. Performance assessments are an essential tool in the Human Resources arsenal as they provide data for other departmental functions (compensation, position determination, employee training, and employee development, etc).

- In order to be efficient, performance assessment has to integrate into an adequate human resources management system, in which the fundamental features of assessors should be professionalism, fairness and reliability.
- The potential problems that need consideration in approaching performance assessment as a component of the performance management system are the following:
  - the necessity of creating a performance culture;
  - involving managers at higher levels in the assessment process in order to satisfy both individual and organisational needs;
  - the influence of performance management upon the role of its assessment through the appropriate functioning of feedback.
- Studies by experts in the field, mainly human performance assessment have, in time developing techniques and assessment methods, which are in a permanent dynamic and have eliminated some errors in measuring.
- Leadership is an essential variable leads to an improved ability to lead and organizational performance. describes the hypothetical relationship between leadership and organizational performance. With time a certain organizational culture, how leadership is exercised largely determines the capacity of management. But increased management capacity does not necessarily lead to higher organizational performance of industrial units (Purcarea et al.,2009)
- Performance evaluation is a necessary and beneficial process, which provides annual feedback to staff members about job effectiveness in industrial units .
- A correct assessment and using efficient performance assessment methods can improve the accuracy of the data according to which employees are lead, and predictions are made in order to ensure human resources.
- The potential problems that need consideration in approaching performance assessment as a component of the performance management system are the following:

➢ The necessity of creating a performance culture;

➢ Involving managers at higher levels in the assessment process in order to satisfy both individual and organisational needs;

➢ The influence of performance management upon the role of its assessment through the appropriate functioning of feedback.

The performance assessment systems constitute an special part within the management system in general and the human resources management system .Performance appraisal feedback research suggests that agreement of others' performance feedback with one's own views strongly determines feedback reactions, yet inconsistent results of feedback interventions motivate a search for additional influences.

Performance appraisal allows a variety of benefits:

- Provides structured opportunity for staff at different levels;
- Provide a forum for individual feedback on work performance;
- Staff can present their views and ideas;
- Allows face to face, one-to-one discussion;
- Clarifies what is expected of an individual and how this relates to the objectives of forestry;

- Chance to explain to staff about developments affecting the ward / department / team;
- Opportunity to thank staff for a job well done;
- Opportunity for you to influence attitudes and behaviours.

Remarks:

- ✓ Using a mathematical model based on the degree of importance of each evaluation criteria and scores given to improve the human performance evaluation of the 30 forestry units eliminating some errors in the evaluation.
- ✓ The model that we have developed as assessment presents the advantage of performance are you regard to the degree of importance of each evaluation criterion.
- ✓ The model performance appraisal can be successfully implemented in the forestry units
- ✓ The professional performance evaluation constitutes an undisputable motivational element with regard to the professional activity of every employee.
- ✓ Performance assessment has a special influence upon the social-economical activity of forestry, the organizational environment in any business organisation.
- ✓ An important aspect of human resources management is represented by performance assessment within the units of forestry, because through evaluation we can better understand the.
- ✓ Some of the major appraisal problems in the units of forestry are the subjectivity and the use of inconsistent criteria which may lead to negative attitude toward the appraisal system.
- ✓ Assessments are influenced by errors systematically placing too much emphasis on individual performance variables and to a lesser extent on the characteristics of current activity, associated with performance.
- ✓ Important advantages of using in practice the proposed mathematical model are correct assessment among employees, model usability evaluation and elimination of errors.
- ✓ Of the 30 questionnaires forestry units resulted in a great interest of managers to implement the mathematical model to evaluate human performance, because the model takes into account besides Ede evaluation criteria and their degree of importance.

II.3. Entrepreneurial risk and its perception

In the process of opening an SME, of particular importance is the assessment of risk and possible consequences of business failure.

During the period in which the decision to enter into a business is made, by crystallization of motivations for creating a business, the entrepreneur is full of optimism, the concept of risk is difficult to accept, and failure is seen as a phenomenon that occurs to other entrepreneurs.

The author (Rădulescu,2004) identified four critical areas of risk:

financial risk: their savings and bank guarantees;

career risk: those who fail can have difficulties in being accepted as employees or in establishing future business relationships;

family risk: stress, emotions for the family, loss of prestige;

mental risk: the entrepreneur can identify so much with his business that he can perceive business failure as personal failure.

The entrepreneur's attitude towards risk is a very important feature of the management of SMEs.

The more market risks advance, the more the notion of protectiong by security disappears, being replaced by a series of measures related to:

- Leadership management and management of the structures built;
- Personality of the leader

During its growth, all the new needs that the company feels are perceived as new risks, because their intensity is unpredictable or because they meet certain thresholds of growth (Iosif, 1999).

The company's vulnerability in the face of uncertainty and risk requires the implementation of strategic business management aimed at protecting the company against special situations such as: credit risk, giving up control, loss of a client, staff absenteeism, competition from former employees, insolvency of a debtor, the negotiating strength of a supplier.

The authors Allaire & Fârşirotu,(1999) show that usually an entrepreneur's investment in his own firm is guided by psychological rather than economic considerations. Although the entrepreneur is seeking to obtain an appropriate return for his risk, this assessment is generally personal and empirical.

Even if the actual or foreseeable yield is not at the level of risk compensation, he still continues to invest and maintain the company "on track", due to reasons associated with: the possibility of having their own business, lack of career prospects, the degree of specialization of assets.

However, many entrepreneurs want to evaluate any project or business commitment (Allaire & Fârşirotu,1999,pg .52),

There is a direct link between the activity of the company and risk. It is illustrated below:in (Table 2.3)

Table 2.3 Levels of risk

Initial capital available	**The level of risk**	**Business field / business profile**
Low	Small	Commerce, services to the public, consulting, etc.
Moderate	Moderate	Units in the hospitality industry, small workshops (productive), specialized services
High	High	Productive units, supermarkets, construction companies, private freight and air transport etc.
Very high	Very high	Private banks, insurance companies, financial companies, etc.

The risk associated to the firm's activity domain is a major threat. The risk level might influence the perceived degree of entrepreneurial proactivity .Such a matrix is represented in (Fig.2.1)

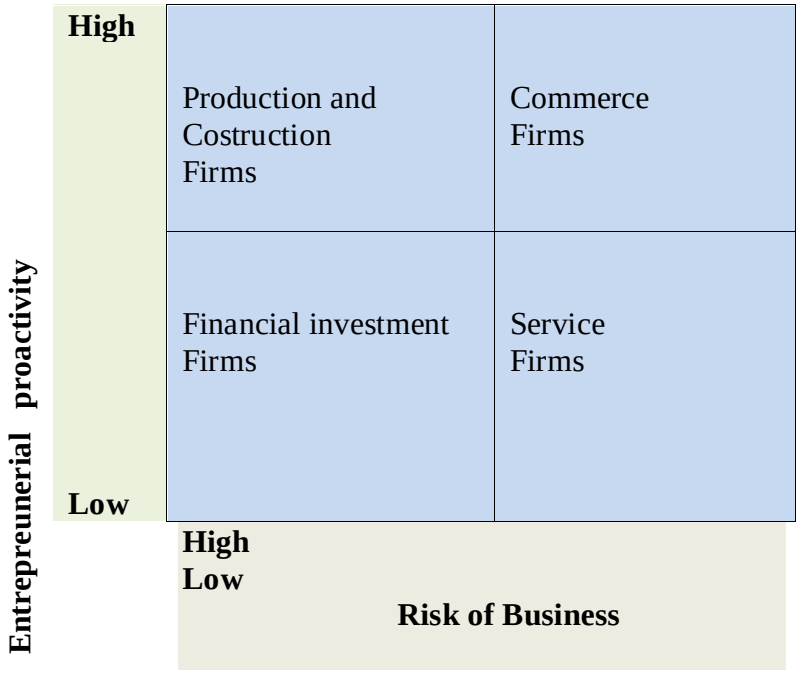


Figure 2.1: Intensity of Factors depending of Firm's Activity
Source: The author

As first conclusion ,regarding the described assumtions, firms gain competitive advantage when they can quickly accumulate skills. It involves commitment from a company, rapid circulation of information on products, technology, management.

An item of particular importance is the existence of a national and regional environment that stimulates competitive advantages

II.3.1.Research methodology

The research is based on creating a mathematical model that can be successfully used in management practice, with the aim of using it in assessing entrepreneurship, both nationally and locally. The purpose of research is to facilitate the work of decision-makers who can intervene to improve or at least mend entrepreneurial processes in Romania.

The research objectives were based on the release of two hypotheses and, later, on developing the mathematical model.

Hypothesis 1:

there is a link between management performance of entrepreneurs and entrepreneurial proactivity

Hypothesis 2:

there is a link between business risk and the management performance of entrepreneurs

Hypothesis 3:

If one can assess the level of entrepreneurial proactivity depending on business risk and management performance of entrepreneurs

To find answers to these presumptions secured a research plan has been developed consisting of the following steps:
a. presenting the context in which firms operate in the business environment-company system
b. identifying factors that influence entrepreneurs' performance management, company's proactivity, business risk undertaken by businesses.
c. Developing questionnaires, scaling study categories
d. Assesment of questionnaires, multi-criteria analysis and result testing
e. Developing an evaluation model :***Gp=f(P, R)***

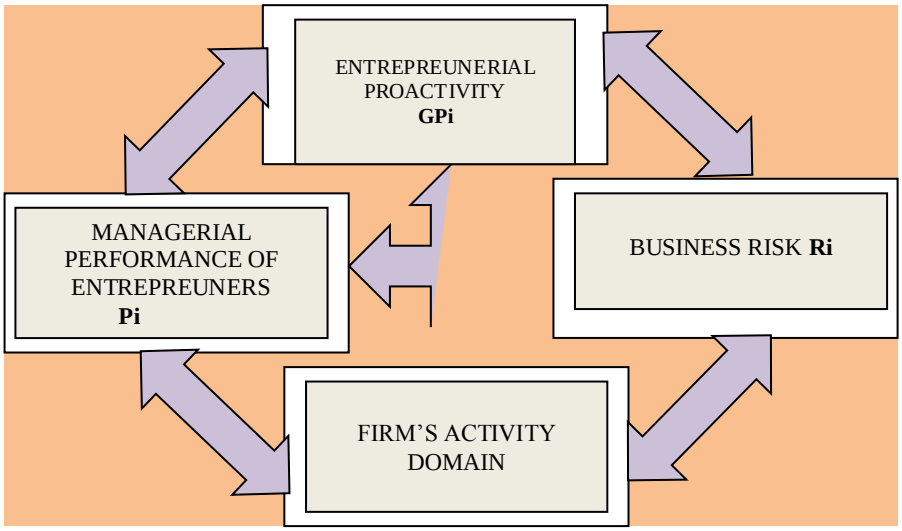


Figure 2.4:The Model of Factors Inter-dependency
Source: The author

The model was developed with data from the following studies and prior research:

1. Diagnosis of Maramureş County, focusing on the situation and development of SMEs between 2008-2009;
2. Study on identifying business opportunities in disadvantaged areas;
3. Model of entrepreneurial school for women in NW Romania between 2009-2011;
4. Survey on identifying obstacles to the development of small and medium enterprises in Maramureş County between 2011-2012;
5. Study on expanding the offer for entrepreneurial education in the tertiary sector between 2010-2012;
6. Steps towards the association in clusters of firms in the furniture industry in Maramureş County between 2012-2013;

In total, over 1000 questionnaires were designed, implemented and interpreted. Around 10 inquiries were conducted, and more than 200 results interpreted.

II.3.2.Results

The research will provide information on the final approach proposed in this paper, namely to develop a model for assessing the perceived degree of entrepreneurial proactivity of a company considering the management performance of entrepreneurs and business risk.
The limitations of the model.

The qualitative input variables are influenced by the many changes, such as contamination with contextual situations and unexpected structural changes.
The quantitative input variables are influenced greatly by the timeframe.
This model is intended to be a flexible one, as input variables may undergo adjustments based on changes in macro-environmental factors, especially corrections to the rules or laws and rapid changes in technology.

II.3.2.1 The mathematical Model

The developed mathematical model has a flexible degree of the perception of the entrepreneurial proactivity GPi, by analyzing the two variables P and R.
R- business risk,
P –performance of entrepreneurs
GP- perceived degree of entrepreneurial proactivity

Based on sample data a maximum value has resulted for the variables P, R
By using a value scale from 1...10. the following values have been obtained

Rmax= 9,5 , Rmin= 1,5
Pmax= 9, Pmin= 3

Nivel	R	P
Superior	9,5	9
BaSE	5,5	6
Inferior	1,5	3

Considering K the number of the model's variables, the business risk respectivly the performance of entrepreneurs we obtain a matrix of the form:
$Md = 2^k = 2^2 = 4$
Full experimental matrix is given by the matrix EFC $2.^2$
Based on the properties of business decision, according to the usefulness of the embodiment $X_{0i,}$ we have:

$\Delta R = \frac{R_{1\max} - R_{1\min}}{2} = 4$

$\Delta P = \frac{P_{2\max} - P_{2\min}}{2} = 3$

$R_b = R_{max} - \Delta R = 5,5$

$P_b = P_{max} - \Delta P = 6$

Decoded variables

$R = \frac{R' - R_b}{\Delta R} = \frac{R' - 5,5}{4}$

$P = \frac{P' - P_b}{\Delta P} = \frac{P' - 6}{3}$

The measurement of the perception of the proactive entrepreneurial GPi is shown in the model EFC 2^2

Matrix EFC 2^2

Nr. det	X_{0i}	Ri	Pi	RPi	GPi
1	+ 1	+ 1	+ 1	+ 1	98
2	+ 1	+ 1	-1	-1	95
3	+ 1	-1	+ 1	-1	60
4	+ 1	-1	-1	+ 1	45

Based on mathematical model: GPi(R, P) = b_0 + b_1 R+ b_2 P+ b_{12} RP, and taking in account the variables R, P,we'll calculate the values :b_0, b_1, b_2 şi b_{12}

$$b_0 = \frac{\sum_{i=1}^{n} X0i * GPi}{4} = (98+95+60+|45)/4 = 74{,}5, \quad b_0 = 74{,}5 \qquad (1)$$

$$b_1 = \frac{\sum_{i=1}^{n} Ri * GPi}{4} = [(98-95)+(60+45)]/4 = 22, \qquad b_1 = 22 \qquad (2)$$

$$b_2 = \frac{\sum_{i=1}^{n} Pi * GPi}{4} = (98-95+60-45)/4 = 4{,}5, \qquad b2 = 4{,}5 \qquad (3)$$

$$b12 = \frac{\sum_{i=1}^{4} RPi * GPi}{4} = [(+1)98+(-1)95)+(-1)60+(+1)45)]/4 = -3 \qquad (4)$$

b12= -3

The perceived degree of entrepreneurial proactivity:GPi will be :

$$GP(R, P) = 74{,}5 + 22R + 4{,}5P - 3RP = 74{,}5 + 22\frac{R' - 5{,}5}{4} + 4{,}5\frac{P' - 6}{3} - 3\frac{R' - 5{,}5}{4}\frac{P' - 6}{3}$$

$$GP(R;P) = 25{,}35 + 7{,}3R' + 3{,}15P' - 0{,}3R'P'$$

II.3.2.2. Verification of mathematical model.

Based on the sample and the ranges

$$R \in (1{,}5;9{,}5) \quad P \in (3;9) \quad GPi \in (45;98)$$

Consider random values R=2 şi P=6 based on the model we get:

$$GP(R;P) = 25{,}35 + 7{,}3R' + 3{,}15P' - 0{,}3R'P'$$

$$GP(R;P) = 25{,}35 + 7{,}3.2 + 3{,}15.6 - 0{,}3\ 2.6 = 55{,}25$$

It follows that the condition is satisfied $GPi \in (45;98)$.

II.3.3 Conclusions and discussions

- In the context of an unstable economic, social and political environment, SMEs in Romania are very vulnerable. It requires careful study of the causes that generate problems, major obstacles in developing their business objectives and setting priorities for supporting this sector.
- The success of an SME and the ability to accommodate economic variables and maintain an upward trajectory are determined largely by the quality of its leaders.
- The entrepreneur's personality, characterized by strong motivation, gives SMBs a powerful entrepreneurial dimension.
- Business - management relations are focused on identifying business opportunities and, in comparison with conventional management relations, are highly customized, and the risk, innovation, change elements, are more visible.
- The entrepreneur is one of the main actors in the market economy.
- Harnessing the potential of SMEs and entrepreneurs, while reducing their shortcomings, is determined - to a considerable extent - by the foundation and promotion of entrepreneurial activities.
- Companies gain competitive advantage when they can quickly accumulate skills. It involves commitment from a company, rapid circulation of information on products, technology, management.
- An item of particular importance is the existence of a national and regional environment that stimulates competitive advantages.
- The model developed allows to determine the degree of entrepreneurial proactivity depending on business risk and the management performance of entrepreneurs. It has a great influence on economic and social activity, the organizational climate of each economic unit.
- The proposed model can be successfully used in practice to calculate the degree of proactivity for different maximum or minimum risk situations and for different categories of entrepreneurs for which a performance evaluation has been conducted, according to specific evaluation criteria.
- The model allows comparative analysis of the degree of entrepreneurial proactivity depending on variables chosen for the study.
- The indicator on entrepreneurial proactivity can be an eficicient tool on customizing measures to promote entrepreneurship.

II.4.Territorial approach to competitiveness

According to J. A. Schumpeter, one of the most famous Austrian economists, change is fundamentally linked to technical progress, and it is its irregularity that explains the irregularities of economic growth and development. Periods of strong technical progress come after periods of weak technical progress; innovation in a sector causes a "choking" of complementary sectors which are pushed to innovate themselves. This innovation, in the context of market globalization, puts additional pressure on enterprises, pressure requiring innovation of the entire management system. Although regional economic development is not a new concept, the manner of achieving this goal, in the new context, is fundamentally innovative. Therefore, a typical representation of economies characterized by industrial agglomerations can be described at the same time by:

• economic activities *concentrated in a particular area;*

• *critical mass* of businesses;
• *specialized* economic agents;
• *multiple businesses* that addresses multiple markets;
• *competition and cooperation* strategies involving all participants;
• *adaptation over time* of various businesses that are interconnected through the industrial group.

II.5.Clusters

The poles of competitiveness, growth poles, urban clusters, are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions in a particular field, which work while remaining in competition. The spread of this particular form of organization seems to have accelerated in the last decade.
Industrial clusters are geographic concentrations of inter-related companies, specialized suppliers, service providers, companies in related industries and associated institutions (e.g. universities, standards agencies and trade associations) in fields that compete but also cooperate.
Understanding the *new economic geography* provides basic data for the formation of economy based on industrial clusters:
The concentration of economic activities depends on the concentration and dispersion forces.
When transaction costs are very high, industries will need to develop locally.
When transaction costs are very low, the necessary inputs can be distributed into areas which record the maximum cost of production factors.
Industrial clusters strengthen the relative force of attraction of regional economies.The new diamond model developed by Michael Porter (1998) ,includes in his previous model The Value chain as a conseqence of the horizontal and vertical integrate industry attracted by Cluster creation and development.

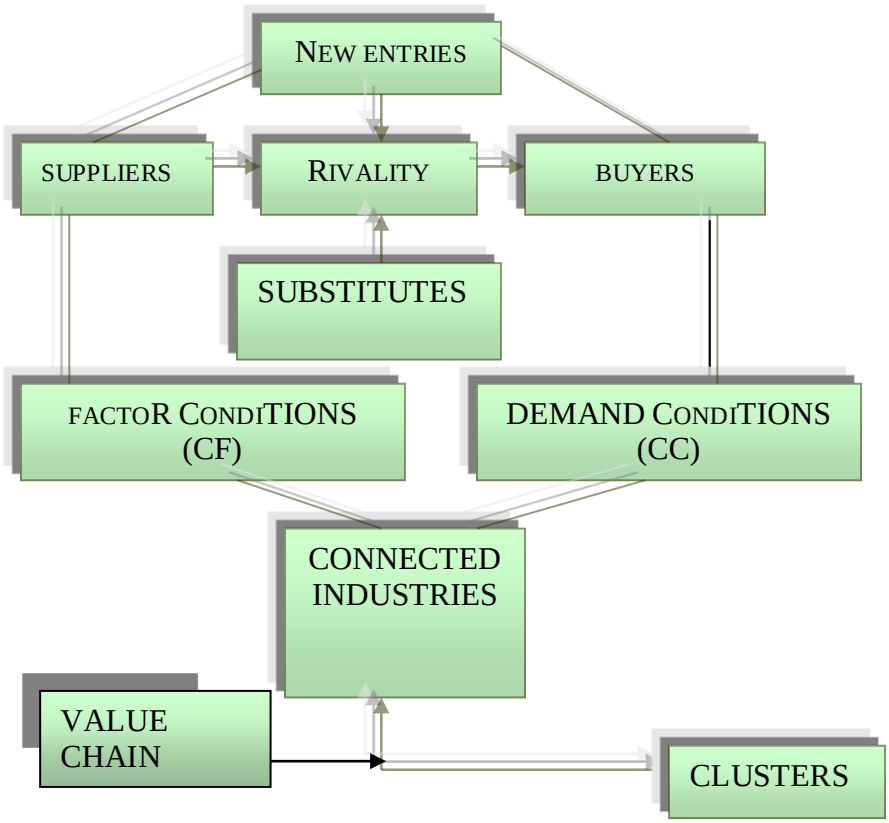


Figure 2.5 New ‘’diamond ” Model
Source: Adapted by Author from Porter (1998)

Theories on clustering showed an extraordinary capacity to adapt to new realities generated by economic progress, providing a suitable methodological framework for analysis and rational solutions to the problems of the growing complexity of the space-economy relationship. Even the research method used to identify clusters is called "clustering method".

II.5.1.The Basic Characteristics of Clusters

An analysis of the process of initialization, development and functioning of clusters could outline their following basic characteristics:

- **Clusters are based on systemic relations** between the component companies, relations that could be build around some basic or complementary products, processes or technologies, or production processes, requirements of natural resources, the ability, experience of each participant, the existence or opportunity to develop some distribution channels.
- **Clusters have a degree of geographic boundary** defined by the distances that labor is ready to parse for daily work and by the vision of company owners concerning the profitableness of the connections with other companies, with respect to the distance between them.

The definition of the operating distance cannot be generalized, the rank of distances being influenced by the transportation and traffic systems, by the cultural identity, social requirements, homelikeness and personal preferences.

- **Clusters have life cycles that parse the following phases:**

❖ The embryonic phase, which can be generated by inventions, innovations, investments in the area, or some opportunities.

❖ Example: inventing a new system for assembling bulk wood boards in a locality could become a center for both horizontal and vertical development, from sylvan exploitation to furniture trade.

❖ Such an example can be seen around Comanesti, Bacau County, where the development of such a system led to the advance of the area as one of the main suppliers of bulk wood boards, having as indirect effects the important decrease of unemployment in the area, a better use of wood and, in general, the prosperity of the entire area.

❖ The increase phase, in which the market is developed enough to attract imitators and competitors. For example, the existence of an established pottery producer on the external market from Maramures County led to the emergence of other similar companies, each having a well defined segment of the market, and which, through cooperation and cluster-like organization, will have the opportunity to develop, in the same time limiting the risks of such an action.

❖ The maturity phase, produced when the products and services are very well outlined, the costs and quality of products representing the key competitive advantages.

❖ It is known in this case that Metro supermarkets have developed a producer that delivers exclusively to the mentioned distributor packed food products, under the Aro trademark, having competitive quality and prices.

❖ The decline phase, when the products offered by the cluster are partially or completely replaced by less expensive products or more efficient replacements.

❖ Thus, on worldwide level, the appearance of cell phones led to the final stop of pager production, and the development of the Internet led to the significant decrease of the turnover concerning the production and trade of fax machines.

- **Clusters are defined not only through the direct members of the organization.**

The associations of clusters can have members that support the existence of the association through subscriptions and because of the interest for localizing common needs, they become active members of each cluster.
For example, the Association of Furniture Producers from Romania has SMEs as subscribed members, some of them being organized in clusters, which the association can offer data concerning business opportunities and can promote their products on various markets, increasing their turnover and, taking into account that the subscription is proportional to the turnover, we can conclude that the Association is in fact an active member of each cluster.

II.5.2. The operation model of clusters

There can be defined some common points that facilitate the functioning of clusters, whose participants could be divided into (Malecki, 2002, p. 934):
a. Basic business – central, direct business that ensure its income from the direct clients of the cluster;
b. Support business – direct or indirect, which support the basic business, including: Raw material suppliers; Suppliers of half-finishes, preforms or subassemblies; Suppliers of equipment, installation, spare parts; Suppliers of measurement and control instruments; Service companies;Technical, economical, financial or juridical counselling companies; Prospect and research institutions, universities; Training or professional conversion institutions; Financial, banking services, juridical assistance, marketing, media companies.
In most of the cases, these companies are specialized and are located in the nearby of the cluster centre.
c. Soft infrastructure– consisting of schools, universities, other professional trainers, professional associations, developmental agencies, territorial or interregional cooperation Chambers of Commerce, Industry, Agriculture; the quality of this infrastructure contributes to the successful development of the cluster;
d. Hard infrastructure– that is, the physical infrastructure of the cluster, consisting of the traffic routes, utility networks, environmental conditions, the existence of an environment protection system in the area, that would ensure recycling or depositing the residues resulting from the production activity of the organization.

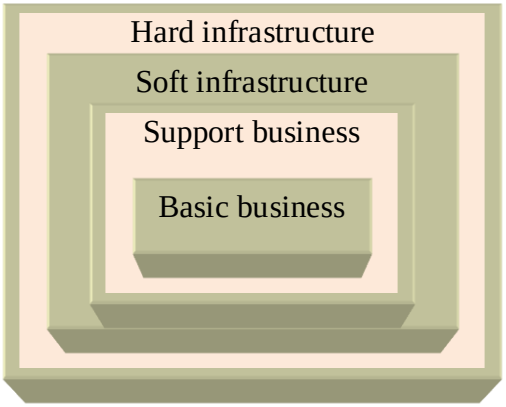


Figure 2.6: Dependence degree of the basic business and other components of the cluster
Source:The author

Figure 2.6 presents the dependence degree of the basic business and all the other components of the cluster.In the same time, periodically, in the basic business there can appear products or services from outside the cluster, fact that can be explained either by certain production "peaks" that the components of the support businesses cannot handle in that moment, or by testing actions and drawing of some potential partners. (Radulescu, 2004)

II.6.The clustering process.Main factors

To start a real prospect of success strategy , has become increasingly clear that companies need to participate in clusters, networks, alliances and collaborations, to reduce the risks of any kind. In this context innovative regional clusters is a step forward, as it ensures economic growth through regional and national companies interrelation of cluster components at a high level, leading them towards functioning in an integrated system.The paper is based on a study that outlines the importance of the equilibrium of key success factors related to clustering process. The survey and interviews, adopted as research techniques, indicates that there are two main groups of factors hard success factors (knowledge, institutional support and management) and soft success factors (education and human resource development and entrepreneurial behavior) which can contribute significantly to foster any clustering process.

II.6.1.Introduction

In recent years, many studies have appeared on the analysis of the role clusters, both in developed countries, especially in high technology sectors, and in developing countries, where clusters can become tools for increasing the competitiveness of companies and provide a better international positioning for the region/country. (Ketels and Memedovic, 2008).
Most work regarding clusters refers to the theory of location (Porter, 2000), (Krugman, 1991) or of conditions that favor the emergence of clusters in certain regions and countries (De Miguel-Angel,2009).
A review of the literature reveals two main lines of study: analysis of the cluster formation process and its dynamism, and the effect of clustering on business competitiveness.
In terms of methodology for the analysis of clusters the literature shows a few basic trends.
Another variant exploits the benefits that cluster members can get as an effect of agglomeration.
In this research on clusters, a central pillar is the social aspects, in particular networking processes. The conclusions that can be drawn after studying these two aspects of the research manifest in two derived trends: (a) cluster analysis which focuses on hard which influence the enterprise in the process of building a competitive advantage (Porter 1998); (b) cluster analysis which focuses on social factors that increase the need and opportunity of network and learning processes. (Rašić-Bakarić,2007)
Regardless of the approach, the foundation of implementing clusters consists of organizational learning capacity and transfer of know-how, which are manifestations of a knowledge-based society, which can easily find practical application, following the adoption of such investment strategies. Without being in a relationship of subordination or dependence from each other, companies tend to combine complementarity advantages, which they possess in order to increase the competitiveness of their products, both domestically and primarily on external markets, the goal being a synergy effect.
The resources involved in the clustering process may be human, social, physical and organizational.
In the increasingly integrated and holistic economic concept of training, in the current process of formation, consolidation and development of clusters, we do not necessarily try to preserve a balance between the economic and the human side of the cluster.

II.6.2.Type of factors involved in the success of the clusters

Numerous recent empirical studies reveal through a smart combination as hard and soft factors we can find the key to success within any cluster, reducing threats and maintaining a favorable position.
We can therefore define two sets of success factors in the clustering process: Hard factors and Soft factors (Figure2.7)
Each of these forces are powerful sources of change and individually contribute to the overall goals of the cluster.

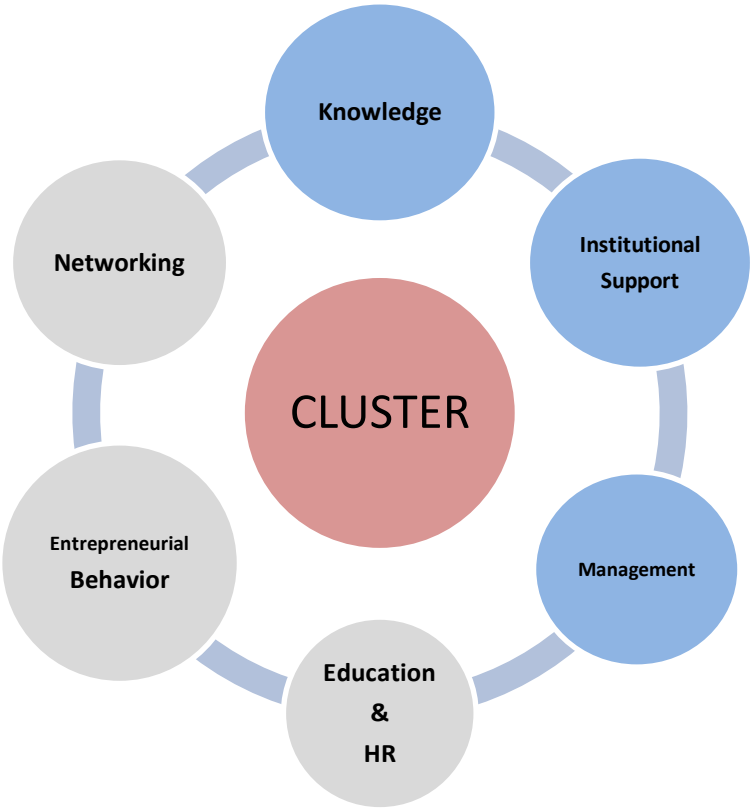


Figure 2.7 Success factors in clustering process
Source:The author

Hard factors

- **Knowledge**

We live in an information society where knowledge has become the key factor of production, being the key element of economic competitiveness at organizational, national and global level.
Currently, world states and most organizations are aware that the generation and exploitation of knowledge are essential factors, vital sources of global wealth growth.
Consequently, the major concern of clusters in particular, is the systematic generation of knowledge through the development, in this regard, of effective management systems.

Belonging to an innovation cluster becomes a real advantage for small and medium companies because of quick and easy access to research results in order to implement them in production and the realization of innovative products, advanced technologies, and because of common development strategies, starting from production cooperation, acquisition of technology and advanced equipment designed for common use, and also marketing strategy (Popa and Popescu, 2013,p.588).
This process should be continuously and permanently improved. Knowledge is based on information. The result of their combination is a formidable weapon (Figure 2.8).

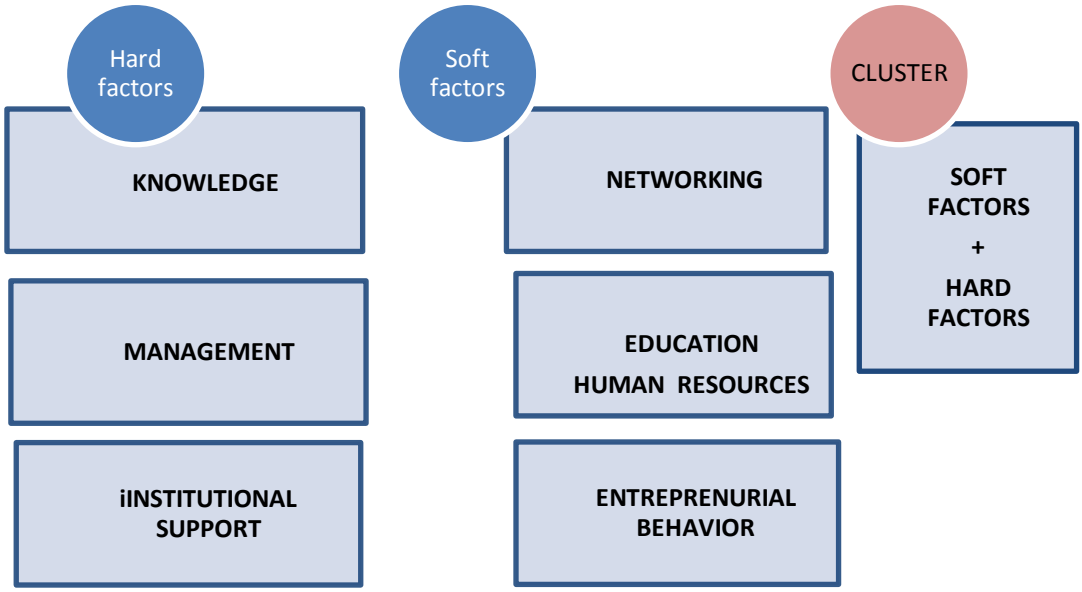


Figure 2.8 Hard and Soft factors in clustering process
Source:The author

The main advantages
Due to easier access to a wide range of information, knowledge, market analysis and contacts, clusters generate an environment that facilitates innovation.
However, the competitive pressure created by companies of the same kind constitutes a permanent incentive to improve processes, technologies, products and services offered by each company within the cluster.
In addition, geographical proximity facilitates the uptake of new ideas and innovations in terms of technologies, products and services from one firm to another, contributing to a rapid spread of best practices.
Clusters facilitate the innovation process of companies by:
• Improving the ability of firms to perceive opportunities for innovation by facilitating contacting of sophisticated clients and establishing long-term business relationship with them, allowing supplying companies to quickly become aware of market needs, technological developments, the availability in production equipment, the offer of new products and services, and the innovative concepts arising in marketing;
• Providing facilities to be in permanent contact with numerous companies and institutions gives companies the ability to quickly supply themselves with what is required;
• Creating a competitive environment encourages companies to respond with innovation to competitive pressure and the comparisons that are consistently made among firms in a cluster;

• Facilitating experimentation at lower costs - compared to the situation of a company that would try experiments in isolation; as a result of collaboration between companies and the availability of local resources, the cluster provides more favorable conditions.

Interest in innovation and technological externalities created can help improve long-term competitiveness and ensure the sustainability of local businesses. Externalities may involve direct forms of cooperation (facilitated by meetings between buyers and sellers, or by linking companies using the same technology and the same occupational categories of employees, without being in direct competition), or indirect forms of cooperation (facilitated by professional associations, chambers of commerce and other organizations).

Knowledge resources suggest the ability to organize, to create and use knowledge in order to serve as a source of sustainable differentiation, with general application (Hahn,2007).

Knowledge management is considered to have the ability to increase:

- the competitive advantages of the cluster,
- the cluster's innovation ability to uncover necessary opportunities.

In conclusion, there is a relationship between knowledge and the innovation process, the knowledge base represents unique resources for radical innovation.

❖ **Institutional support**

The regions can guide their principles of organizing the development based on cluster-like associations. The limits or constraints for activating the participation in a cluster mainly depend on the connections of access to social resources.

The connection agents that have to operate as open gates towards information, know-how, labor, are represented by the brokers of the activity of network creation and the negotiators of collectively planning the actions performed by the companies of goods or services.

They can more easily identify the measures concerning the optimization of the entire process of cluster forming and development, whose conception they were involved in.

This is why regions and localities should have a greater responsibility in creating the conditions favorable to clusters. In this case it is necessary to redefine the various governing levels.

Thus, while the basic objective of the national government should be to create macro-economic conditions, offering a positive economic climate, the role of regional government should be to focus on infrastructure, education and professional training.

In the same time, the task of the local government is to ensure the placements and associated services.

Thus, the national, regional and local governments can each contribute distinctly to the positive political environment requested for the successful development of the region, having as result the economic improvement and the development of SMEs.

A recent paper of OEDC (2013) mentions the following priority elements:

- Facilitating the establishment of local partnerships, involving private companies, non-governmental organizations and various levels and sectors of public administration.
- Stimulating the private sector towards the initiation of leadership and development of clusters, in which the public sector would have a catalyzing role.
- Placing initiatives at the most appropriate governing levels.
- Selecting a portfolio of clusters grouped by geographic areas, which present the best opportunities for immediate regional development, with respect to the existing resources.
- Facilitating the development of networking among the components of the cluster and the public authorities, with the purpose to foster the cooperation between them.
- Specifying a realistic deadline, required for covering the business development programs in the area.

- Establishing the funding levels for launching the organization of the cluster and the feasibility studies.

The association within clusters based on very well established functioning rules and criteria can define the role of each component, for a long period of time, thus ensuring the frame for its specialization and obviously for increasing the competitiveness of the cluster.

❖ **Management**

At the same time, we can talk about a management of clusters, and experts are in the process of identifying the skills and competencies necessary for successful management. The main challenges of an efficient management and organization of the cluster relies on the advantages of diversity and complementarity of the cooperation between members of the cluster cumulated with the intense cooperation between the activities involved.

These are features largely similar to those of large organizations. The main of clusters is flexible organization, each company carrying out certain activities according to market demands and cluster strategy.

The cluster is also the ideal setting to present a lot of companies under the same brand, as a common marketing policy to harness resources and shared competence.

The concept of regional cluster brand is expanding rapidly; this brings advantages by bringing the individual brand closer to that of its members. (Kaminski,2009).

We mention here another platform created by the European Commission, namely www.cluster-excellence.eu. This platform is aimed at cluster managers and aims to support interaction and cooperation between clusters, to increase competitiveness.

Soft factors

❖ **Education and Human Resources Development**

A continuous process of recruitment of specialized human resources takes place in the cluster, helping them identify people with the skills required for the innovation process, i.e. the outcome of the innovation cluster.

The cluster introduces a new type of company culture, that goes beyond the company borders and is based on a series of values of which the most important is innovation.

Specialized training in the cluster appears as a continuous process, which is a key condition to strengthen and develop it and it is supported both by businesses and by specialized institutes.

Thus, the cluster can have staff with general experience but also specialists, which gives a certain stability of employment and even a better delineation of tasks.

An important role is played by specialized knowledge, innovative business ideas and technological knowledge in the cluster.

(Martin-de Castro, et al,2013,p.125) (Tödling, Lehner and Trippl 2004):

Clusters promotes learning processes and skills development (Anderson,et. al,2004) (Lundvall B. 2003).

They are attractive to companies with the same profile, or to those which relate to the activity in question, precisely because newcomers are keen to exploit the common basis of knowledge already present and take part in interactive learning processes that occur in a cluster. From this point of view, clusters highlight two realities:

a) skills are created over time, by interactive learning, which requires proximity;

b) skills are strictly localized, being embedded in people, organizations, networks, and some of this knowledge is tacit and therefore difficult or impossible to separate from the cluster.

The links established between the organizations belonging to a cluster allow each of the participants to be more productive and innovative than he would have been if he had remained in isolation. (Ketels, C. 2004):

- **Networking**

The companies within a cluster and the relationships among them - is another area of the variety of contexts, from one cluster to another (Lut,2012, p.265).
Some clusters are dominated by small firms that subcontract activities between themselves. In other cases, subcontracting systems may develop around one or more larger contractors. Sometimes one or more transnational companies, or industrial conglomerates, are present in clusters, with suppliers from the firms of different sizes existing there. Sometimes, the cluster is dominated by SMEs, which are specialized in narrow market segments.
Although between similar firms a competitive-type background remains, also a parallel phenomenon of development of relations occurs between them in fields that ensure an increase of competitiveness for all involved.
This is materialized in the creation of consortia, supply chains or networks of firms, which include essential information flows for achieving mutual trust and better overall coordination.
Relationships of trust are the foundation of greater capabilities of association between cluster firms. It has become increasingly clear that companies need to participate in networks, alliances and collaborations in order to reduce the cost of technology transfer.

- **Entrepreneurial Behavior**

More than 75 % of cluster's members from Romanian Clusters are established from SME's.
The entrepreneurial behavior is a leading management.(Wennberg and Lindqvist,2008)
The organization culture (Abrudan,2012) bears the imprint of a proactive behavior performed by the main components companies' managers themselves .
This requires taking risks, identifying and valuing rapid business opportunities, induction of team spirit, innovativeness, etc.

II.6.3.Empirical study

The empirical study performed by the authors was based on a questionnaire which was sent to the members of Transylvanian Furniture Cluster with an association of 34 organizations ,21 manufacture companies that have established the cluster in 2012.
Eighteen companies responded to the survey. Further information necessary to evaluate the study was obtained through interviews of managers.
Sampling was purposive; only those managers who had been included in the clustering process from the very beginning were interviewed.
In the study, the respondents were asked to indicate how much importance had been given to each of six success factors in the clustering process.
The responses were recorded on a standard Likert scale from (1) = no importance, (2) = low importance, (3) = moderate importance, (4) = high importance to (5) = very high importance.

The study shows that TFC cluster members are paying more attention to soft success factors and believe they are more important for overall success of the cluster than hard success factors.

Table 2.4: Key success factors according to average grades

Factors	Mean	Std. Deviation	N
Hard factors	**4,277**		
Knowledge	4,3889	,84984	18
Institutional support	4,3333	,59409	18
Management	4,1111	,67640	18
Soft factors	**4,5778**		
Education	4,3667	,78591	18
Networking	4,8111	,69780	18
Entrepreneurial behavior	4,5556	,61570	18

II.6.4. The analyze of correlation between the Factors

The study ,suggests that key success factors differ in their importance for individual companies, but all six success factors are considered relevant for the success of cluster.
Thus the average of soft factors is slightly higher than of the hard factors. That indicates that the firms which participated to the survey are more confident in the success of the cluster by developing more trust, more skilled personnel, sharing experience ,good practices.
In order to analyze the date provided in sample we can consider simple linear regression and Pearson's correlation.

Pearson's correlation coefficient when applied to a sample is commonly represented by the letter *r =sample correlation coefficient* or the *sample Pearson correlation coefficient*. into the formula The formula for *r* is:

$$r = \frac{\sum_{i=1}^{n}\left(X_i - \bar{X}\right)\left(Y_i - \bar{Y}\right)}{\sqrt{\sum_{i=1}^{n}\left(X_i - \bar{X}\right)^2}\sqrt{\sum_{i=1}^{n}\left(Y_i - \bar{Y}\right)^2}} \quad (1)$$

An equivalent expression gives the correlation coefficient as the mean of the products of the standard scores. Based on a sample of paired data (X_i, Y_i), the sample Pearson correlation coefficient is

$$r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{X_i - \bar{X}}{s_X}\right)\left(\frac{Y_i - \bar{Y}}{s_Y}\right) \quad (2)$$

Where:

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i \quad (3)$$

and

$$s_X = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(X_I - \bar{X}\right)^2} \quad (4)$$

are the sample mean and sample standard deviation, respectively. Thus, the first parenthesized term in the previous summation is the standard score. (The terms for *Y* are similar.)

The correlation coefficient ranges from −1 to 1. A value of 1 implies that a linear equation describes the relationship between X and Y perfectly, with all data points lying on a line for which Y increases as X increases. A value of −1 implies that all data points lie on a line for which Y decreases as X increases. A value of 0 implies that there is no linear correlation between the variables.

More generally, note that (Xi − X)(Yi − Y) is positive if and only if Xi and Yi lie on the same side of their respective means. Thus the correlation coefficient is positive if Xi and Yi tend to be simultaneously greater than, or simultaneously less than, their respective means. The correlation coefficient is negative if Xi and Yi tend to lie on opposite sides of their respective means.

Data gathered from the questionnaire were introduced in the SPSS software.

First a bivariate correlations procedure has been performed, which computes the pairwise associations for a set of variables and displays the results in a matrix. It is useful for determining the strength and direction of the association between two scale or ordinal variables

Then a Paired-Samples T Test procedure was used to test the hypothesis of no difference between two variables. The data may consist of two measurements taken on the same subject or one measurement taken on a matched pair of subjects.
Additionally, the procedure produces:
• Descriptive statistics for each test variable
• The Pearson correlation between each pair and its significance
• A confidence interval for the average difference (95% or a value you specify)

The study of correlation (Pearson Corr. > 0,3) between hard and soft factors suggests that there exist both negative and positive correlations.
For example, Knowledge has a negative correlation to Networking, the higher the value of knowledge, the lower the Networking value of and vice versa.I t shows that there is lack of collaboration between cluster members, exchange and flow of information, creative groups(generation of innovative ideas) or best practice hubs. A positive correlation can be observed between Networking and Entrepreneurial and Education and Knowledge.
The most significant positive correlation is between Management and Institutional Support .It indicates that these factors lie on the same side of their respective means and it is obvious that governmental policies and institutional aid foster the administrative strategies of the cluster.

FACTOR		Knowledge	Institutional support	Management	Education	Networking	Entreper Behavior
KNOWDLEGE	Pearson Correlation	1	,194	-,080	,161	-,424	,125
	Sig. (2-tailed)		,440	,754	,522	,079	,621
	N	18	18	18	18	18	18
INSTITUTIONAL SUPORT	Pearson Correlation	,194	1	,488*	-,126	-,095	-,054
	Sig. (2-tailed)	,440		,040	,618	,709	,833
	N	18	18	18	18	18	18
MANAMENT	Pearson Correlation	-,080	,488*	1	-,148	-,028	-,016
	Sig. (2-tailed)	,754	,040		,559	,913	,951
	N	18	18	18	18	18	18
EDUCATION	Pearson Correlation	,161	-,126	-,148	1	,340	-,203
	Sig. (2-tailed)	,522	,618	,559		,168	,420
	N	18	18	18	18	18	18
NETWORKING	Pearson Correlation	-,424	-,095	-,028	,340	1	-,015
	Sig. (2-tailed)	,079	,709	,913	,168		,952
	N	18	18	18	18	18	18
ENTREPR. BEHAVIOUR	Pearson Correlation	,125	-,054	-,016	-,203	-,015	1
	Sig. (2-tailed)	,621	,833	,951	,420	,952	
	N	18	18	18	18	18	18

*. Correlation is significant at the 0.05 level (2-tailed).

Remarks:

That paper it is focused on furniture industry, an important sector in our country which is unable to achieve economics scale, logistics and technology innovation.
The flexibility for a regional specialization of interdependent firms and their cooperation with other public and private institutions will create the synergies, increase the productivity and lead to economic advantages for the region.
The study suggests that the six key success factors which were tested .These factors differ in their importance for individual companies in the sample. All of the tested success factors are considered relevant for the Clustering performance.
The study also suggests that soft success factors (response grade average is 4,577) are considered more essential than hard success factors (response grade average is 4,277) to increasing the success rate of corporate combinations.
Every member of the cluster has a major interest in creating value with clustering process, but a new integrated approach is required in order to enhance success rate.
Transylvanian Furniture Cluster is a recently created cluster which has to take into account that an important reason contributing faster clustering process lies in the integrated approach of balanced management of hard and soft success factors , which are essential for success of any business combination.
The study indicates that managers of TFC see are not entirely confident in the actual management and organization of the cluster .Immediately operational decisions have to be implement as solution to mitigate risks. As well as a better lobby of the governmental institutions

is required ,mostly as an effective tool of promotion the Cluster on national and international mediums.

The integrated approach makes clustering work better as it combines economic performance with non-economic (soft) factors.

II.6.5 Clustering initiative process

In Romania ,cluster based national policy has been established o few years ago. The clustering process is still in the emerging phase. No relevant conclusions can be taken if clusters actually have reached their desired strategic or financial objectives. Yet, cultural differences, management deficiencies, lack of communication, poor business fit, among others, are all closely aligned with less actual members value than initially planned.

- **Analyzing the experience cumulated worldwide so far, can be given solutions concerning the distance between the components of the clusters? Do there exist accepted thresholds of maximal distance?**

Few specialists believe that the development of telecommunications will be able to completely replace personal interactions.
If the proximity between the members of the cluster has a great impact upon informal knowledge that appear within a cluster, the external connections are equally vital for new input and innovative ideas for the cluster.
Analyzing the external relations of the cluster, there should be taken into account that it can represent a basic part of the local economy, or the national or worldwide economy, containing leaders, research and development companies, suppliers, clients, competition.
Thus, the permanent informational flow, the know-how acquisition, building mutual trust requires person-to-person contacts of commercial, professional or business nature.
The existence or the degree of development of the clusters in a certain area does not represent an essential condition for initializing new clusters in the area.
Analyzing the status of industry and businesses in the regions, it could be seen that there does not exist a sufficient concentration scale for creating typical clusters, but through a relevant analysis of the adjacent areas microclusters can be identified, which could be co-opted through inter-regional cooperation and would complete the structure of the members needed to form a certain cluster.
In a supra-specialized economy, involved in global competition and with well defined production cycles, the decrease of demand could have negative effects upon the remaining of clusters on the market, leading even to their disappearance.
No cluster has an undetermined life span. Areas dominated by mature clusters should identify their strengths and weaknesses, in order to determine the possibilities to remain on the market: innovations, new products, reorganization, giving up technologically staled products, etc.
In what concerns the dynamics of the cluster generation process, M. Porter (2001) reveals the following aspects: clusters should not be seen statically, they go through a continuous, flexible, revolutionary process, which is essential for regional economies, which they operate in, and are part of the national initiative concerning global competitiveness. Renewing clusters should be one of the objectives of governmental politics and a concern on the agenda of strategic managers.

- **Identifying clusters**

The experience of countries with tradition in organizing clusters, especially by concentrating some compatible SMEs for a given field of interest, proves that these clusters have helped those governments to better understand how the economies in these areas operate as systems and which is the highest impact policy for promoting them.

If the economy of underprivileged areas is analyzed from the perspective of regional production, there can be identified both the imperfections of the market and the points of pressure, but also the systemic failures. Only a good knowledge as result of this analysis can lead, in the general context of establishing the impact intervention measures, to identifying the opportunities concerning implementation, initiation, forming and development of clusters,

Numerous methods have been created to identify the opportunity for the emergence of a cluster in a certain area, either by comparing the economical sizes and concentrations, or by other systemic or performance relations.

Thus, M. Porter proposes four steps to identify and emphasize clusters:

- Identifying some concentrations of companies in a region and their connections with companies from outside the regions, which fuel their activity;
- Locating the horizontal industries or the companies that produce complementary goods or services within the cluster;
- Locating the key institutions through which networking is carried on with the companies from the technological field, informational field, banking, infrastructure;
- Analyzing the role that the government or other institutions play in supporting and stimulating the activity of clusters.

While the analytical instruments are valuable in the activity of cluster identification, the results of analyses wouldn't be better unless the input has appropriate quality.

Clusters can be formed around **a product or range of products, production processes, activities from the value chain, basic technologies, exploitation of natural resources**.

❖ **Identifying systemic relations between the members of clusters**

In order to identify these relations, the diagram of relations will be used.

The easiest is to build the diagram of relations with the chain of supplier sector, usually known by the development agencies and there are difficulties in marking the moment suppliers and the institutional relations that require knowing the actual sells of the products and services and locating the specialized support functions.

In the graphical presentation, with respect to an underprivileged area of clusters and of their members, in general less data is mentioned concerning the amplitude of the connections between the participant companies and especially the level of knowledge and innovations flow.

In order to facilitate this action mentioned previously, we recommend the leaders of the companies members of the clusters or susceptible to be co-opted to fill in a questionnaire.

In solving this questionnaire, honest, spontaneous and personalized answers are not excluded and neither is the confidentiality that could cover the identity of the interviewee nor the complete or partial non-mentioning of the partners mentioned in the questionnaire.

We believe that the limitation of the level of partners (3-5) for each question is not always relevant, because, for example, in my work I have experienced that requiring 5 main partners, an interviewee that usually works with 3 partners, would add 2 others for complaisance, which are irrelevant, therefore no restrictions should be imposed.

The questions could be:

- Specify the units (companies, organizations, institutions) that:
  - Represent important information sources concerning the educational system, competition, clients, suppliers and specify the main concluded contracts;
  - Have given in the last 5 years qualified personnel or which you have resorted to for training your staff (educational institutions – technical and professional schools, universities – other institutions for professional reorientation);
  - Have been means for promoting your products (media, fairs, expositions, general or specialized catalogues, agents); can you establish some correlation between a certain

publicity-promoting means for your products and the immediate or long-term effects concerning the increase of your turnover?

- Have offered consulting for drafting contracts, certification documents, juridical, technical, managerial consulting;
- Are associations that you have subscribed to;
- Represent other formal or informal organizations for professional, educational, economical consultancy that you work with;
- Are important partners in the last years (common participation to auctions, fairs, equipment rental, staff training) and the type of cooperation;
- Belong to the sector you operate in and you see as leaders;
- Represent specialized companies for staff selection you have resorted to, indicating for each staff category the percent they represent from the total number of employees;
- Represent the national, regional or local government, non-governmental organizations, chambers of commerce, agencies that you have resorted to and the main problems solved with their help

.

II.6.6.The assessment of the main external factors of cluster

The external factors which do influence the formation and then the development of clusters is a object of discussion ,classification and analyse.

Table 2.6 :Assessment guide for the clusters
Source:The author

CONSIDERED FACTOR	DESCRIPTION	INDICATORS
1. Research and development	- Public research institutions, including those from within universities, in the field of the activity of the cluster - Private research institutions or independent researchers	- Number of research contracts funded by the government or other organizations or self-financed - Associations with other companies for solving some thematic research problems
2. Labor qualification and availability	- The qualification degree of labor, needed by the cluster, in management, IT, field of specialty, technology, etc.	- Number of employees involved in different programs - Number of graduates employed in the cluster
3. Education and improvement	- Education and improvement for the most important functions within the cluster - Experienced trainers for specialization or technological and organizational exchanges	- Number of financed or non-financed programs for the cluster
4. Supplier availability	- Sources of raw materials - Materials and services situated nearby, which minimize the costs of transactions and maximize interactions	- Percent of income and outgo - Hierarchy of suppliers of rank 1, 2, 3
5. Financing sources	- Local banks that know the needs of clusters, their composition, the availability of start-up funds, the accessibility to financing the new opportunities	- The value and percent granted from the working capital - The quantum of loans

	- Other institutions authorized to grant refundable or non-refundable credits	made in the cluster - Number of contracts between bankers and representatives of the cluster, which they get involved in
6. Specialized services	- Public services sector - Consultancy companies - Juridical, technical consulting companies that know the activity of the cluster	- Number of consultancies - The value of externalized local services
7. Equipment, installations, computers	- Access of the cluster to companies that design and build equipment, software and relations of cooperation between SDV producers and the cluster	- Number of companies that produce and sell equipment to the cluster
8. Alliances and networks	- The frequency of formal cooperation between the members of the cluster in joint venture activities, production, marketing, professional training and improvement or solving actual problems of the cluster	- Number of joint ventures - Specialized alliances - Marketing consortia
9. Social relations	- The degree of involvement of the business community, professional and civic associations in the local economy - Informal networks of personal contacts in business	- Number of involved professional, commercial and business associations - Number of members on each activity level - Diagram of relations
10. Entrepreneurial climate	- The process of continuous building of new activities based on new products, complementary products or basic components, situated in the center of competition	- Number f new activities generated by the cluster - Number of new activities attracted into the cluster
11. Innovation and imitation	- Technologies and products conceived, developed or promoted on the market - Dispersion of the innovations of the cluster towards other local companies	- Number of invention patents and copyright - Invested money in new technologies - Number of new launched products
12. External connections	- Acknowledged leaders on the market - Products sells on other markets, not those of the cluster - Joint ventures, contracts, alliances with other companies, contacts with experts from other regions - Information concerning global level field aspects	- Number of subsidiaries - Values of exports performed by the cluster - Values of sells outside the region - Marketing seminaries - Fairs and expositions - Business travels - Alliances with informative purpose, with external members
13. Organizational culture and leadership	- Fostering intangible common values of the cluster - Leaders that take responsibility for	- Mission statements, accepting the name and trademark of the cluster

	increasing local competitiveness	
14. Connections with institutions granting fiscal and legal facilities fiscal for underprivileged areas	- Regional development agencies - AJOFS - Financial administration - Regional customs office	- Number of investor certificates granted within the cluster - Number of unemployed people hired within the cluster - The value of relief from taxation granted to the cluster - Value of paid back VAT - Value of paid back customs taxes for raw material import

This self-analysis/assessment can be useful for the leaders of the cluster, for knowing the actual situation of the organization and for taking the measures for improving it and/or for establishing the development strategy, and in the same time, it is useful for the stakeholders, if it is presented to them, so they could see the general picture concerning supporting clusters.

II.6.7.Key factors which determine the success of a cluster

Based on the rapid development of clusters ,in practice occurs a paradox: lasting competitive advantages for the global economy are linked more increasingly with locally based issues (knowledge, relationships, connections, reasoning) that are not easy to reachable for competitors geographically dispersed.By modeling the cooperation process in the cluster can be identified new types of relationships that facilitate innovation, creativity. Social networks created and consolidated in a cluster are quickly driven toward exchanging ideas, information, best practices etc. This paper presents several models of social networking, which is a useful tool in identifying and optimizing social capital within a cluster.The paper analyzes and presents graphical methods Transylvanian Furniture Cluster example effective parameters obtained in the case of the small-worlds networks

II.6.7.1.Clusters are based on systemic relations

Between the component companies,relations that could be build around some basic or complementary products, processes or technologies, or production processes, requirements of natural resources, the ability,experience of each participant, the existence or opportunity to develop some distribution channels (Radulescu, 2006, p.568), (Tantau,2011).
They are able to self-select partners, companies or institutions in the region, thus defining their mission, objectives, resource and relationship building (Iammarino and McCann, 2006, p.1021).
In this context, the subject of cooperation is to create competitive advantages between partners, as result of capitalization of their resources. The relation of cooperation between enterprises increase the chances of obtaining a competitive advantage, in the context of the increasing complexity of the competitive environment interactions thereof (Radulescu, C.,2006,p.569).

II.6.8. Collaborative models for economic clusters

The main forms of cooperation between enterprises are established according to the form of interaction between them: horizontal cooperation, vertical cooperation and cooperation within the network.

Horizontal co-operation takes place between entities in the field which have the resources complementary. For example, cooperation between undertakings for the purchase of materials allows to join forces to increase their purchasing power and gain price reduction.
Another example of cooperative relationships is offered by cooperation between two undertakings whose products are in competition, but who have different strengths. The companies may independently develop products, but can cooperate in order to sell them as well
This form of cooperation appears as a necessity for enterprises in Romania, in conditions in which most of them are small and medium sized and have lack of distribution channels (Tantau,2011).
Knowledge and network cluster analysis is a key element to establish strategies that emphasises capital, communication and valorises all the intangibles factors that lead to the success of a cluster and generates a consolidation of knowledge and adds new knowledge.Social networking is a factor of change (Iammarino and McCann,2006,p.1023).
Thus, cooperation between cluster members has to be reconfigured according to the new context in which they operate. Traditional cooperation between functional areas directed in the sense of increasing economic return, is completed by oriented cooperation in the market scope of struggle with competitors. The Cluster power lies in establishing new strategic forms of cooperation(Zima and Sabou,2010,p.56).
In cooperation relations in cluster analysis must be issued the following assertions:

- The main actors are the members of the cluster. They are endowed with their own systems of assessment values, which differ from one person to another;
- Relations of cooperation between enterprises in the clusters are not only the intentions shown by isolated individuals within the organization ,so that their implementation should take into account the objectives, strategies, organizational structures and personnel that influence this process.

Links between nodes of each cooperative relationships in the cluster is communication characterized by the quantity and quality of information which ought to be exchanged (Tantau,2011).
At exploring conditions under which the need for knowledge exchange within a small firms' cluster generates a structure of links between firms (Iandoli, 2012, p. 238).
Cluster structure is based on a dense and strong network of relationships among autonomous and heterogeneous actors (that is, firms, and local institutions). Cluster competitiveness is the result of the co-evolution of the region's productive organization and of local formal and informal institutions (Eisingerich et al., 2010).

II.7.Social network analysis

The social network analysis is used extensively in a wide range of applications and disciplines. Some common network analysis applications include network modeling, network sampling, user attribute and behavior analysis, community-maintained resource support, location-based interaction analysis, social sharing and filtering, recommender systems development, and link prediction and entity resolution. (Borgatti et al.,2013). In the private sector, businesses use social network analysis to support activities such as customer interaction and analysis, marketing, and business intelligence needs.

II.7.1.Small-world network

According to QK Telesford (2011,p .370) Small-world networks, developed by Watts and Strogatz, are a class of networks that are "highly clustered, like regular lattices, yet have small characteristic path lengths, like random graphs."

These characteristics (Wasserman and Faust, 1994) result in networks with unique properties of regional specialization with efficient and global integration (Telesford et al., 2011, p. 371), (Giuliani and Pietrobelli, 2014)**.**
According to Watts and Strogatz, (1998), a **small-world network** is a type of mathematical graph in which most nodes are not neighbors of one another, but most nodes can be reached from every other by a small number of steps.
Specifically, a small-world network is defined to be a network where the typical distance *L* between two randomly chosen nodes (the number of steps required) grows proportionally to the logarithm of the number of nodes *N* in the network, that is: $L \propto log\ N$.

A. The Erdős and Rényi *G* (*n, p*) model

According to Erdős and Rényi model (1958), one may find a definition of what it means for a property to hold for almost all graphs, when a graph is constructed by connecting nodes randomly. Each edge is included in the graph with probability *p* independent from every other edge. Equivalently, all graphs with *n* nodes and *M* edges have equal probability of:

$$p^M (1-p)^{\binom{n}{2}-M} \quad (1)$$

The parameter *p* in this model can be thought of as a weighting function; as *p* increases from 0 to 1, the model becomes more and more likely to include graphs with more edges and less and less likely to include graphs with fewer edges.

In particular, the case $p = 0.5$ corresponds to the case where all $2^{\binom{n}{2}}$ graphs on *n* vertices are chosen with equal probability.
The behavior of random graphs: If ***n*** = the number of vertices $\rightarrow \infty$ then almost every graph in $G(n, 2\ln(n)/n)$ is connected.
It means: As $n \rightarrow \infty$ the probability that a graph on *n* vertices with edge probability $2\ln(n)/n$ is connected $\rightarrow 1$.

B. The Watts–Strogatz model

A powerful small-world network is presented in the **Watts–Strogatz model** (1998), which is *''a random graph generation model that produces graphs with Small-world properties including short average path lengths and high clustering''.*
The Watts and Strogatz model was designed as a simple model that integrates the first of the two limitations. For clustering it is properly used and takes into consideration the short average path lengths of the to Erdős and Rényi (1958) model.
N = number of nodes, ***K***= the mean degree (assumed to be an even integer), and β= a special parameter,

N satisfying $o \le \beta \le 1$ and $N \ge K \ge \ln(N) \ge 1$, the model constructs an undirected graph with ***N*** nodes and $\frac{NK}{2}$ edges .The structure of the model produces a locally clustered network, and the random links dramatically reduce the average path lengths.

The algorithm introduces about $\beta\frac{NK}{2}$ non-lattice edges. Varying β makes it possible to interpolate between a regular lattice *(β=0)* and a random graph *(β =1)* approaching the Erdős–Rényi random graph.

II.7.2. Properties of the small-world networks

The three properties of interest are the average path length, the clustering coefficient, and the degree distribution.

A. Average Path Length

Average path length is a concept in network structure. It is defined as the average number of steps along the shortest paths for all possible pairs of network nodes. (verticesV). It is a measure of the efficiency of in V= the set of vertices; d (v_1, v_2) = shortest distance between v_1 and where v_1 , $v_2 \in$ V denote the v_2. Assume that d (v_1, v_2) = 0 if v_2 cannot be reached from v_1, then, the average path length l_G is: $l_G = \frac{2}{n(n-1)}.\sum_{i\neq j} d(v_i, v_j)$, where n, is the number of vertices in G.

B. Clustering coefficient

The Clustering Coefficient of a node quantifies how close the node and its neighbors are to being a clique. This is used to determine whether a network is a small-world or not. This option calculates and displays the clustering coefficients of all nodes. A variant of measure **clustering coefficient** is the global and local.The global version is designed to give an overall indication of the clustering in the network

The **global clustering coefficient**.The global clustering coefficient is the number of closed triplets (or 3 x triangles) over the total number of triplets (both open and closed). The global clustering coefficient is defined as:

$$C = \frac{3\_x\_number\_of\_triangles}{number\_of\_connected\_triplets\_of\_vertices} = \frac{number\_of\_closed\_triplets}{number\_of\_connected\_triplets\_of\_vertices}$$

C. Network average clustering coefficient

The overall level of clustering in a network measured by Watts and Strogatz is the average of the local clustering coefficients of all the vertices *n* (Opsahl, T, 2009):

$$\bar{C} = \frac{1}{n}\sum_{i=1}^{n} C_i \qquad (2)$$

A weighted average where each local clustering score is weighted by = k_i (k_i - 1) is identical to the global clustering coefficient.

''A graph is considered small-world, if its average local clustering coefficient is significantly higher than a random graph constructed on the same vertex set, and if the graph has approximately the same mean-shortest path length as its corresponding random graph''.

D. Degree distribution

In the study of graphs and networks, the degree of a node in a network is the number of connections it has to other nodes and the **degree distribution** is the probability distribution of these degrees over the whole network.

The simplest network model, is the (Bernoulli) random graph, in which each of n nodes is connected (or not) with independent probability p (or 1 − p), has a binomial distribution of degree.

With the notation given by Erdős and Rényi, a graph in *G*(*n*, *p*) has on average $\binom{n}{2}p$, edges.

$P(\deg(v)=k)=\binom{n-1}{k}p^k(1-p)^{n-1-k}$, where *n* is the total number of vertices in the graph.

Since, $P(\deg(v)=k)\to\frac{(np)^k e^{-np}}{k!}$, as $n\to\infty$, and $np=const.$, this distribution is Poisson for large n and np = const.

If , $p<\frac{(1-e)\ln n}{n}$, then a graph in $G(n, p)$ will almost surely contain isolated vertices, and thus be disconnected.

- If $p>\frac{(1+e)\ln n}{n}$, then a graph in $G(n, p)$ will almost surely be connected.

II.7.3. Study case: Transylvanian Furniture Cluster

II.7.3.1. Background and performances

Transylvanian Furniture Cluster is an innovative cluster specializes in design, manufacture, marketing and distribution of furniture.

Table 2.7a.Presentation of Transylvanian furniture cluster (TFC)
Source:Official web site of TFC

cluster	**TRANSYLVANIAN FURNITURE CLUSTER (TFC)**
Start up	2011
MISSION	**The members of TRANSILVANIAN FURNITURE CLUSTER were joined together in order to offer support to the existing furniture industry, to increase the competitiveness strength of the cluster and also, of each individual cluster company member, both on domestic and foreign markets.**
Overall objective	Contribute to positioning the industry as world range leader for integrated solutions in furniture domain, with high specialization, design and quality.
Topics of interest:	- increasing interaction between companies, academic institutions and other entities involved in supporting the furniture industry; - designing a platform dedicated to research, development and innovation, in order to increase access to innovation and technology transfer for the private sector; - supporting the accommodation of academic curricula with the growing business needs in the furniture production sector; - encouraging cooperation among public institutions and furniture producers, also facilitating access to information, designing common databases; - increasing visibility of the cluster, by successful promotion activities, including the creation of a strong cluster brand; - increasing the economic influence of the cluster in the furniture production sector; active involvement at a legislative level, initiating project proposals and undertaking the following projects, developing strategies on a local, national, and international level; - Initiating strategic partnerships both on domestic and on foreign

		markets, with the goal of increasing cluster dimensions.
Members	Companies	24
	Universities	3
	Research instit.	4
	Public Authorities	1
	Facilitators	3
Main products / services / projects		The main products of Transylvanian Furniture Cluster are: • Kitchen Furniture, Dressing Room - sites, doors, office furniture, school furniture for nurseries, bedrooms, living room furniture, youth rooms, kids rooms, terraces and lawn furniture, upholstered chairs, ergonomic chairs, seats parts, accessories seat, pegs, wooden chairs and tables, upholstered couches, fireplaces, furniture retail, restaurants and clubs furniture, hotel furniture, laboratory furniture, furniture components. The main raw materials used in the manufacture of products are: • Solid wood, MDF, chipboard, metal, plastic • The main services offered are: • Using specialized 3D design software to achieve furniture depending on requirements and customer needs • Processing Services panel • Electrostatic Painting Services • Services of transportation and installation
MAIN MARKETS		Domestic and European market
TURNOVER		154,691,769.00 – 2011 190,809,248.00 – 2012 Dynamics 2012/2011 23,35%
No.of employees (agregated, indicator and year)		741 – 2011 841 – 2012 Dynamics 2012/2011 12,15%
EXPORTS (agregated, indicator and year)		10,074,227.00 – 2011 13,673,572.00 – 2012 Dynamics 2012/2011 35,73%

Table 2.7.b.TFC members
Source:The author

TRANSYLVANIAN FURNITURE CLUSTER MEMBERS			
1. Antares Romania ,	11. Old Mob Prod ,	21. Mobam	31. SAL CDI
2. AB Concret ,	12. PAL Mobex ,	22. S.C. Taparo S.A.	32. Unitatea Administartiv-Teritoriala Judetul Cluj
3. Ax Perpetuum Impex,	13. Palrom Impex ,	23. S.C. Perpetum Furniture	33. Asocoatia Patronilor si Meseriasilor Cluj
4. Confort Mob ,	14. Promtinter Expert ,	24. S.C.Art Stil SRL	34. Camera de Comert si Industrie
5. ECO Blue ,	15. Rotsin Prod Com ,	25. Universitatea Tehnica din Cluj Napoca	35. Hygia Consult,
6. JRD Industries ,	16. Salice Comprod,	26. Universitatea de Arta si Design	36. BMM Consulting
7. Marlex Impex ,	17. Terminsu Prod ,	27. Universitatea de Stiinte Agricole si Medicina Veterinara Cluj Napoca	37. Remat Maramures ,
8. Miracolo Import Export ,	18. Trend Furniture,	28. Seinbeis Europa Zentrum Steinbesi Innovation	38. TCI Invest
9. Mobiprod,	19. Artena Furniture,	29. PROELI Concept	39. S..C. Taparo Training Center
10. Napochim	20. 4 Brands	30. SMART Furniture	

Relationships are established (Figure 2.9) between the following actors: manufacturers, design consultants and public institutions, networks that rely on the SMEs and other entities innovative academic research and innovation

Figure 2.9: Relationship between TFC members
Source:The author

Feedback relete these relationships can be measured using the results, namely the cluster‘s competitiveness. Competitiveness in this case is the result of developments in the organization, of the region’s productivity and of regional and local institutions as a result of formal and informal communication and information well applied (Long , 2013)

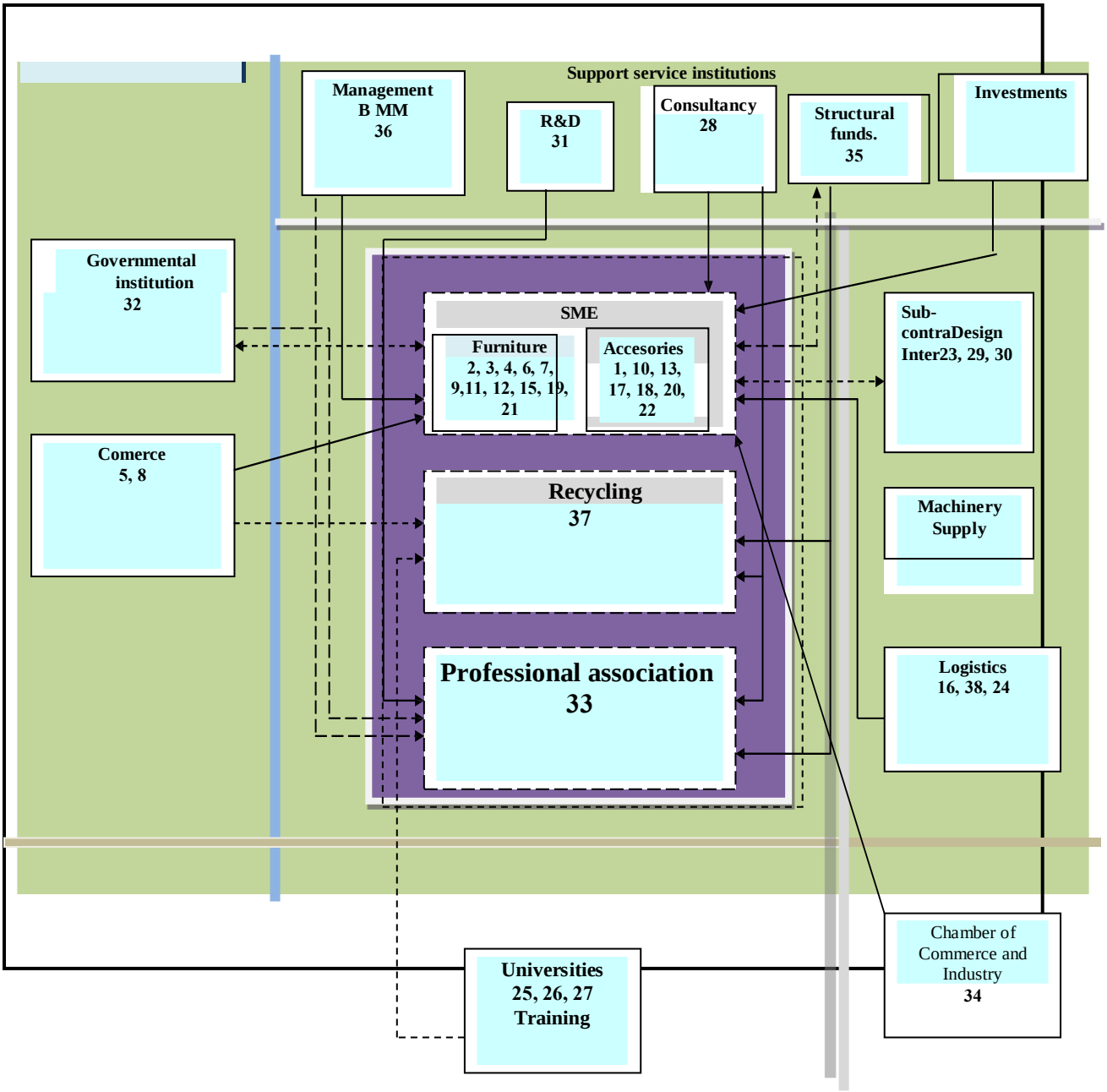


Figure 2.10 :Informational Relaion Diagram of Transylvanian Furniture Cluster
Source :The author

The cluster's competitivness depends on many factors belonging to both of the external environment and internal environment.
Key capabilities are synthesized by generating competitive advantages in the context of internationalization of markets which involves strengthening and maintaining a favorable position in the market.
One of the success factors in ensuring competitiveness cluster is social capital. This intangible resource creates and maintained a strong social network and shares information among all members inside and outside of the cluster.

The regional model for Transylvanian Furniture Cluster has the following actors and local networks in respect with the case study, as presented in Figure 2.10 and Table 2.8.

Tabel 2.8:Participant actors to Transylvanian Furniture Cluster
Source: Adapted by author from: http://www.mobiliertransilvan.ro/membri

CLUSTER MOBILIER TRANSILVAN	**TRANSYLVANIAN FURNITURE CLUSTER** **CLUSTER MOBILIER TRANSILVAN**
Public Institutions	Unitatea Administartiv- Teritoriala Judetul Cluj
Manufacturers	Antares Romania , AB Concret , Ax Perpetuum Impex,Confort Mob , ECO Blue , JRD Industries , Marlex Impex , Miracolo Import Export , Mobiprod, Napochim, Old Mob Prod , PAL Mobex , Palrom Impex , Promtinter Expert , Rotsin Prod Com , Salice Comprod, Terminsu Prod , Trend Furniture, Artena Furniture, 4 Brands Mobam,Taparo,Smart Furniture
Academics and R&D	Universitatea Tehnica din Cluj Napoca Universitatea de Arta si Design Universitatea de Stiinte Agricole si Medicina Veterinara Cluj Napoca
Suport Organisations	Asociatia Patronilor si Meseriasilor Cluj Camera de Comert si Industrie Hygia Consult, BMM Consulting Remat Maramures , TCI Invest , Taparo Training Center
Consultancy Design	Seinbeis Europa Zentrum Steinbesi Innovation PROELI Concept SMART Furniture SAL CDI

Knowledge of effective ways through which social capital will be stimulated in the cluster is a prerequisite to ensure the success of business process. Intelligence of networks lies in developing a complex social network that ensures maximum levels performormance at Transylvanian Furniture Cluster.

II.7.4. Research methodology

The research is analysing and presents graphical methods on Transylvanian Furniture Cluster example the parameters effective obtained in the case of the small- worlds networks.
In the modeling patern the high performance parameters will be seeked: maximum.of Clustering coefficient, minimum. of average path length, maximum. of degree of distribution.
The small-world network theory has been adapted to construct a random graph based on Erdős and Rény model (1958) and impoved by Watts and Strogatz (1998).
The initial actors (member of cluster) are N=39 nodes and N*d/2 edges, where *d* is the mean edge degree.

The survey was applied on the 39 entities which form the Transylvanian Furniture cluster.It was design was designed so that it can check the number of links and the frequency of information between the cluster members.

The three levels of scale and the response options are presented in the tables below

Frequency of Link

Very week frequency	Week Frequency	Medium Frequency	High Frequency	Very High Frequency
1	**2**	**3**	**4**	**5**
Never-1 year	1 year-6 months	6 months-3 months	3 months -1 months	monthly - weekly

Type of Link

Phone contacts	email contacts	Working meetings	Mutual meetings
a	**b**	**c**	**d**

Scope of business Link

research	supply	Profess. training	innovation	technology	logistics	Consul tancy	Funding	Promo tion	Sales	Best practices	regulations
a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**

On a Lickert scale of 1 -5 which notes 1 =very week ... ..5=very high, responses was achieved after a 39x39 matrix containing the aggregate scores of responde varriants ,which were completed in interviews conducted with managers string of cluster.

Intensity matrix connections between cluster members is shown in tabale

Through the analysis of social networking **software SocNetv** was built cluster networking chart of Transylvanian furniture Cluster
In the case of industries in which innovation, design, creation is a key factor for successful market development and maintenance, as the garment industry, footwear, furniture social etc.relationship between cluster members and outside, will lead to a high speed for diffusion of information, when developing a new product a technology diffusion as an efficient action for testing consumer preferences.
Networking within a cluster is an important factor for both the development and further strengthening cluster.

II.7.5. Results .Performance indicators

- **Centrality**

In graph theory and network analysis, centrality refers to indicators which identify the most important vertices within a graph (Hanneman and Riddle, 2011, p.365).
Applications include identifying the most influential actor in a social network, key infrastructure nodes. Centrality refers to a group of metrics that aim to quantify the "importance" or "influence" (in a variety of senses) of a particular node (or group) within a network. Centrality include betweenness centrality, and degree centrality (Hanneman and Riddle, 2011, pp .365-366).

A. Degree centrality

Degree centrality, is the number of links incident upon a node. The degree can be interpreted in terms of the immediate risk of a node for catching whatever is flowing through the network (like some information).

DEGREE CENTRALITY (DC)

In undirected graphs, the DC index is the sum of edges attached to a node u.
In digraphs, the index is the sum of outbound arcs from node u to all adjacent nodes.
If the network is weighted, the DC score is the sum of weights of outbound edges from node u to all adjacent nodes.
DC' is the standardized DC

DC range: $0 < C < 38$
DC' range: $0 < C' < 1$

Max DC' = 0.316 (node 1)
Min DC' = 0.105 (node 39)
DC classes = 39

DC sum = 276
DC' sum = 7.26
DC' Mean = 0.186
DC' Variance = 0.00399

The relationship between centrality nodes components can be shown about overall structure of a network. A very centralized network is dominated by very few nodes centrally positioned. If these nodes are removed or affected, the network will quickly fragment into several groups unconnected between them. Nodes located central can be points of weakness. Weak centralized networks better withstand attacks from the outside or accidents and not collapse rapid. There is a good situation in TFC DC' Mean = 0.186 The network is weakly centralized
GDC range: $0 < GDC < 1$
GDC = 0, when all out-degrees are equal (i.e. regular lattice).
GDC = 1, when one node completely dominates or overshadows the other nodes.

(Wasserman and Faust, formula 5.5, p. 177)

BETWEENESS CENTRALITY (BC)

B. Betweenness centrality- BC

Betweenness is a centrality measure of a vertex within a graph and quantifies the number of times a node acts as a bridge along the shortest path between two other nodes. (Wasserman and Faust, p. 101)
The BC (betweenness centrality) score of each actor can be interpreted as a measure of potential control as it quantifies just how much that actor acts as an intermediary to others.
An actor which lies between many others is assumed to have a higher likelihood of being able to control information flow in the network.
In essence, BC assumes that communication in a network occurs along the shortest possible path, the geodesic. It totally neglects the possibility of communication along non-geodesic paths between actors.
For each node u, BC is the ratio of all geodesics between pairs of nodes which run through u. It reflects how often that node lies on the geodesics between the other nodes of the network
BC' is the standardized BC.

BC range: 0 < BC < 1406 (Number of pairs of nodes excluding u)
BC' range: 0 < BC'< 1 (C' is 1 when the node falls on all geodesics)

Max BC' = 0.0736 (node 35)
Min BC' = 0.00578 (node 18)
BC classes = 39

BC' sum = 1.09
BC' Mean = 0.028
BC' Variance = 0.000213

BETWEENNESS CENTRALITY (BC)

The BC score of each actor can be interpreted as a measure of potential control as it quantifies just how much that actor acts as an intermediary to others. An actor which lies between many others is assumed to have a higher likelihood of being able to control information flow in the network.In essence, BC assumes that communication in a network occurs along the shortest possible path, the geodesic. It totally neglects the possibility of communication along non-degree Betweeness Centrality in Transylvanian Furniture Cluster is weekly represented no significant number of members takes the role of imermediary between others .This shows a negative aspect upon the decisions taken in the cluster.The situation might change a lot when we add or remove avertex or an edge,BC is very sensitive to network dynamics.

INFORMATION CENTRALITY (IC)

The IC index measures the information flow through all paths between actors weighted by strength of tie and distance
IC' is the standardized IC (IC divided by the sumIC).
To compute this index, SocNetV drops all isolated nodes and symmetrizes (if needed) the adjacency matrix.

IC range: 0 < IC < inf (this index has no max value)
IC' range: 0 < IC'< 1

Max IC' = 0.0321 (node 35)

Min IC' = 0.0166 (node 39)
IC classes = 39

IC' sum = 1

IC' Mean = 0.0256

IC' Variance = 1.1e-05

Variance = 0, when all nodes have the same IC value, i.e. a complete or a circle graph).
Larger values of variance suggest larger variability between the IC' values.
(Wasserman and Faust, formula 5.20, p. 197)

The Information Centrality (IC) is an index suggested by Stephenson and Zelen (1989) which focuses on how information might flow through many different paths. IC metric uses all paths between actors weighted by strength of tie and distance.
The IC' score is the standardized IC (IC divided by the sumIC) and can be seen as the proportion of total information flow that is controlled by each actor.
Note that standard IC' values sum to unity, unlike most other centrality indices. IC has a minimum value but not a maximum.

Remarks: Information Centrality in TFC **for actor 34** information flow weighted by strength of tie and distance through all paths between actors is significant

DEGREE PRESTIGE (DP)

The DP index of a node u is the sum of inbound edges to that node from all adjacent nodes.
If the network is weighted, DP is the sum of inbound arc weights (inDegree) to node u from all adjacent nodes.
The DP index is also known as InDegree Centrality.
DP' is the standardized DP (divided by N-1)

DP range: 0 < C < 38
DP' range: 0 < C'< 1

Node DP DP' %DP

Max DP' = 0.289 (node 1)
Min DP' = 0.0789 (node 5)
DP classes = 9

DP sum = 276
DP' sum = 7.26
DP' Mean = 0.186
DP' Variance = 0.00353

REMARKS:For each node u, this metric counts the number of inbound arcs at u. The index is meaningful in directed graphs as a measure of the prestige of each members of TFC . Actors with higher DP are considered more prominent among others [Max DP' = 0.289 (node 29) Min DP' = 0.0789 (node 5)]because they receive more nominations or choices (they have larger inDegree).

The largest the index is, the more prestigious is the actor.

CLUSTERING COEFFICIENT (CLC)

CLC range: $0 < C < 1$
Node CLC

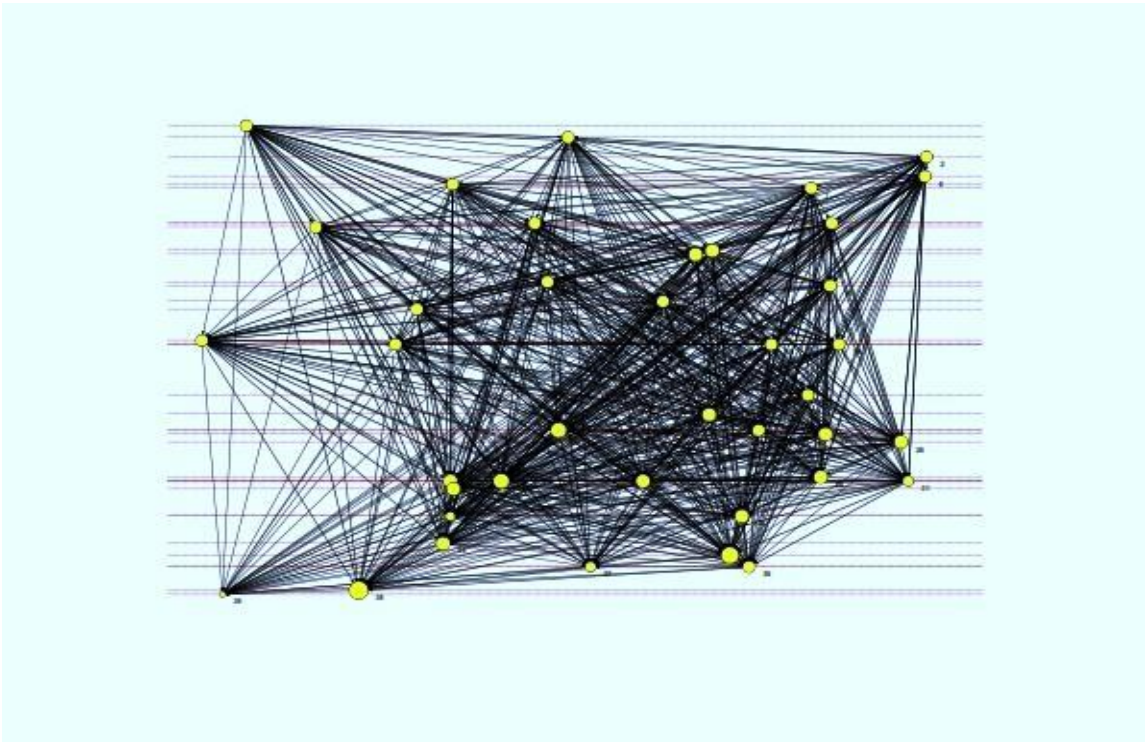
Average Clustering Coefficient= 0.235

it shows a week Clustering Coefficient,it means that :

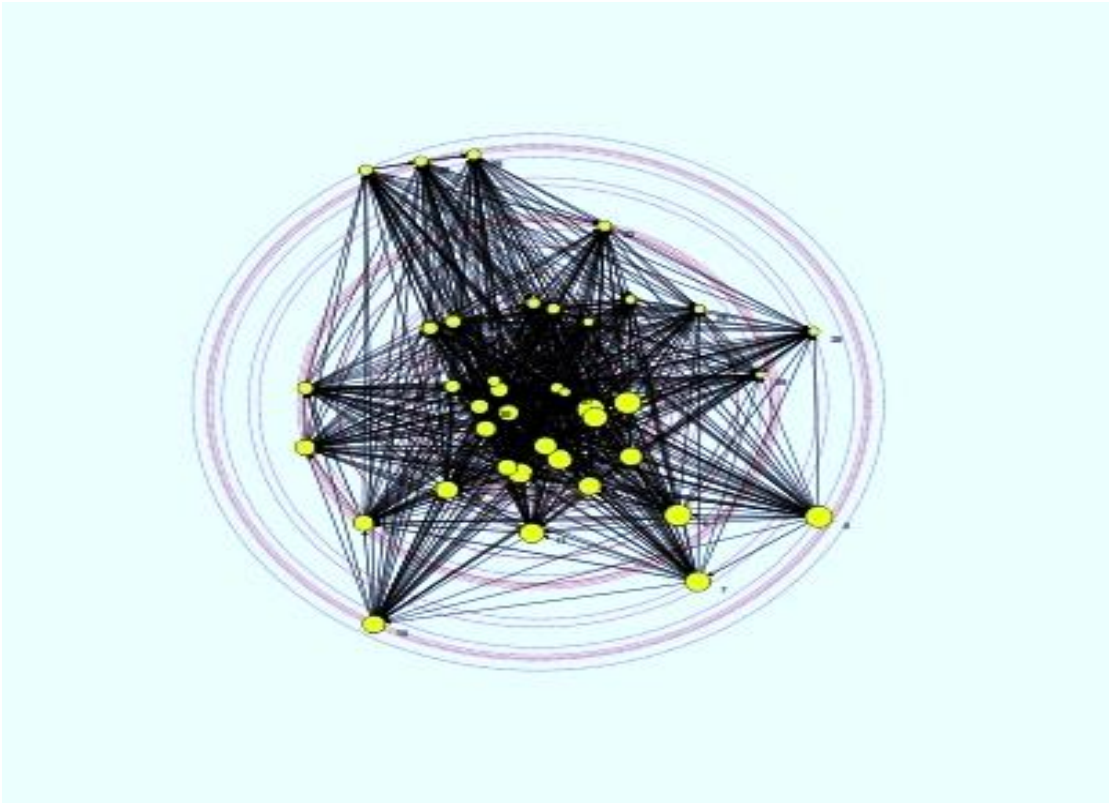
Node 12 has the maximum Clustering Coefficient: 0.66

Node 17 has the minimum Clustering Coefficient: 0,132

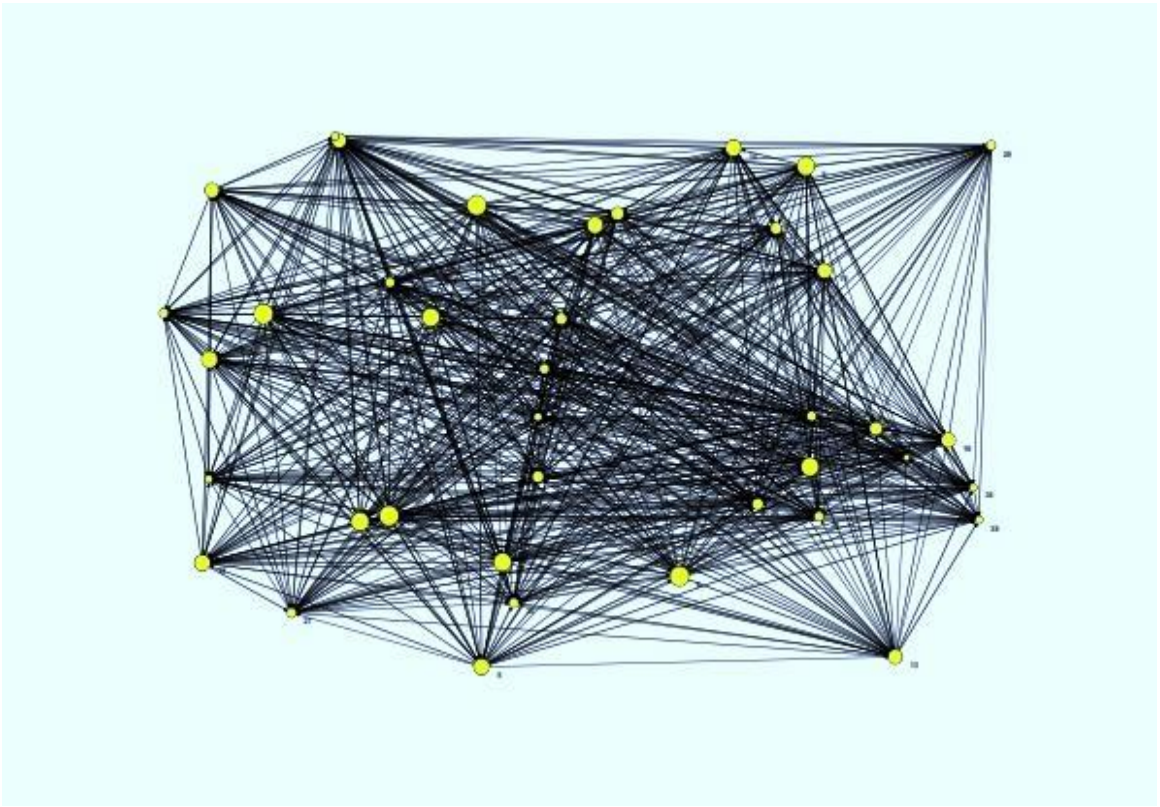
All members of the TFC where indexed, number of node in this study corresponds to a member of the TFC. A preparatory work has been performed before (may,2014) related to develop a clusteing methodology in order to determine the member's correlation and position within the cluster.
A quantitive approach has been relised in previous works,(may-september 2014) in order to conclude about:
d = mean edge degree each node will have,
β = parameter of probability of rewireing.
The questionnaire applied to all members of the Cluster, relieved that there is a medium connectivity between members.(some pairs are disconnected).



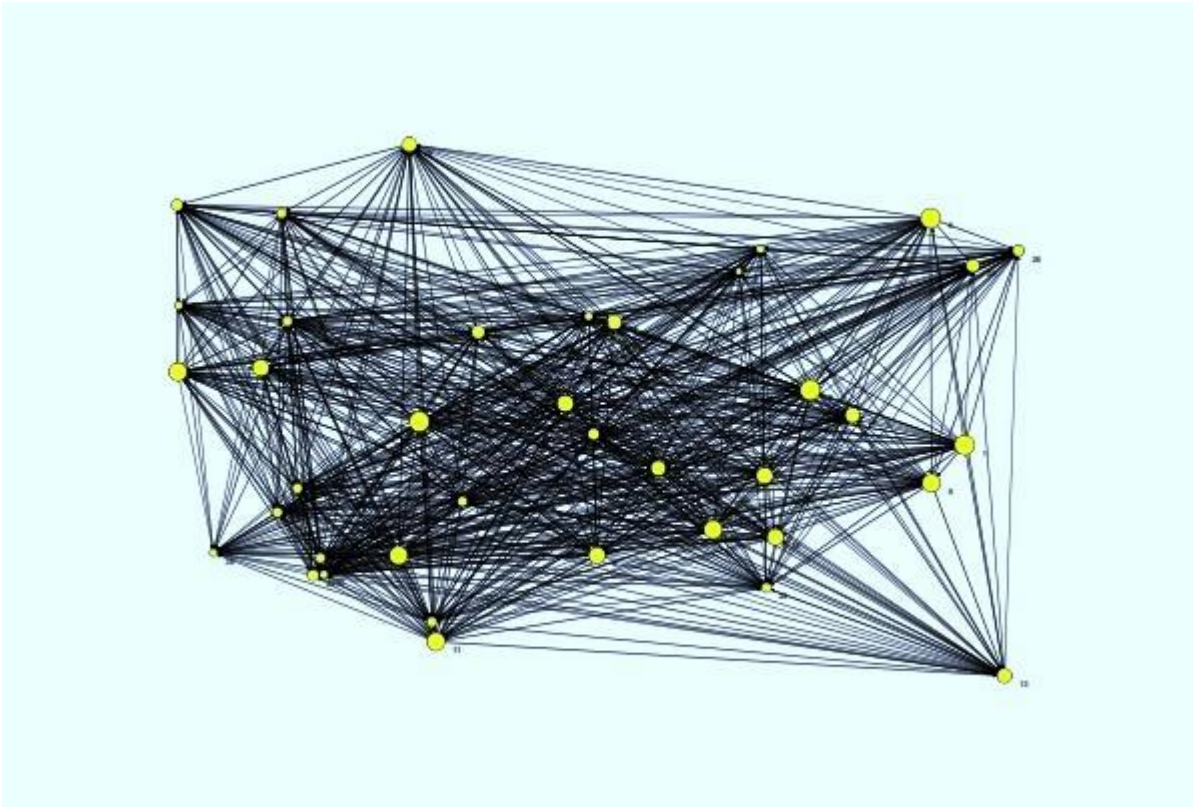
Plot 2.1 Degree centrality



Plot 2.2 Betweeness centrality



Plot 2.3 Information centality



Plot 2.4 Degree prestige

Remarks:

1. If the overall context of the economy is using some certain assessment indicators of performance within clusters, the trend of performance analysis is a results - based approach.
2. The result is an indicator of innovation performance of the cluster.
3. Factors that influence the evolution and development of a cluster are: presence of specialized research centers; existence of a base of talented professionals; existence of specialized trainings; intensity of competition between enterprises; degree of cooperation between enterprises of the cluster; extension of the cluster and related industries outside; special request of the cluster's products and services; cluster specific regulations; existence of specific institutions, cluster cooperation. Cluster specific attitude towards the source of economic prosperity, all these factors are specialised features, developing a source of competitive advantage.
4. The study is an example of applying patterns Small-world networks in industrial clusters with respect to Transylvanian Furniture Cluster.
5. The simulation has to undertake a various number of factors and risks.
6. This is a dynamic model suffers major changes according to the inputs and turbulence of the environment.
7. The model can face o lot of changes, due to its flexibility and represents a robust basis in the continuous improvement of the cluster's competitivy.

As major recommendations involving the avtive participation of the members of cluster and different categories of stakeholders we can relieve the followings:

II.7.6.An efficient way of enhancing cooperation and networking process is establishing and reinforcing some traditions in involving public and private institutions in various collaborations

This action is based on:

a) Identifying the associations of clusters, and if they do not exist, creating them.

In order to understand how cluster associations work, first the existing professional, commercial, and civic associations should be identified, especially the actual members or those who should be part of them, as well as the services they offer.

Obtaining the recognition of local governments, delegating responsibilities, such as informing or planning, represents some important parts concerning launching associations of clusters.

The organizers of cluster associations can take into consideration some data for the analysis of different members of the association, which would generate an image concerning the opportunity for including them into the association:

- The statute of the association;
- The management of the association;
- The professional structure and the structure of the activity;
- The position on the market;
- The openness towards new relations, etc.

b) Diversifying communication channels

The need to obtain specialized information being large, a simplified mechanism simplifies and facilitates this requirement.

The Internet can facilitate the creation of some communication systems, which could bring new businesses in the region, this being one of the reasons to develop its support, with the help of local authorities.

An efficient website should include information about the products, the production capabilities, a database of suppliers, data concerning human resources, business opportunities in the area.
Also, creating a coordinated informational system is of vital importance for the need of information as value creator and knowledge as a strategic capability.

c) Fostering the cooperation between companies

The organizers of the association should clearly establish, within a document, the rules that the collaborations between the participants into the association operate by. In the same time, the ability of the organizers of the network to extend the area of cooperation, appropriately selecting the future collaborators, presents a vital importance for the competitiveness of the cluster.

II.7.8.Improving the level of organization and operation of services in the former industrialised areas

The clusters offer information centered on the needs of the business.
Actually, most services are distinctly offered by different agencies: professional training, reorientation, and financial, technical, or marketing assistance.
The most important changes at regional level will consist in creating new agencies that would respond to the essential requirements of the clusters, facilitating the creation of some specialized services, such as:

a) Collecting, organizing and distributing information within the clusters;
b) Establishing pivot clusters;
c) Outlining some possible associations into clusters;
d) Creating some governmental departments for clusters;
e) Services concerning facilitating external connections.

II.7.8.1.Actions for creating specialized labor

The institutions for training and education that operate within a cluster can produce more informed labor in what concerns the labor market and more connected to the employees.
Nothing is more important for the clusters from underprivileged areas than developing human resources. From among all categories of resources, clusters depend mostly on the implication of government into human resources, the government being the greatest investor in education and training.

Objectives:

- Qualification for employment;
- Using the cluster in the context of learning;
- Founding career centers;
- Founding partnerships between educational institutions and cluster, flexible distance learning programs, evening classes, part time classes.

II.7.8.2.Actions for stimulating innovation and entrepreneurial spirit

The innovation and entrepreneurial spirit are the engines for developing a cluster. Both the innovation and the entrepreneurial spirit are strongly influenced by the regional educational process and cultural norms, which can be facilitated by creating some support policies:

- Investing in innovations and creation of new companies;
- Founding business incubators;
- Founding technological centers specific to the clusters.

II.7.8.3.Actions for allocating resources and investments

- Advisable allocation of resources for maximizing the impact of the action upon the economy;
- Creating initiatives in financing competitive programs;
- Investments in clusters for research-development;
- Encouraging financing factors.

II.7.9. Obstacles for the clusters from underprivileged(former industrialised) areas

The most important obstacles are:

- Weak infrastructure;
- Limited access to capital, technology, innovation;
- Regional isolation;
- Law level of education and qualification.

The deficit of physical infrastructure creates a non-adequate frame, which inhibits capital investments. The locations where transportation of goods and people is difficult represent a handicap of the region and an obstacle for the cluster.

The insufficient access to capital

Clusters live or die through the entrepreneurial and innovative abilities of the managers of local companies. Developing and trading new ideas requires resources and capital.

In many countries, strengthening banks has created a distance between the sources of capital and local communities. However, there exist counterexamples: especially the clusters from small communities were able to find sources of capital from institutions that understood the business. Thus, the Castel Goffredo Credit Cooperative, from Italy, has subscribed to the Center of Knitwear Technology, and financed the cluster studies and gave loan to the companies.

Weak technology and institutional structures

Clusters depend on regional institutions in what concerns the information regarding high technologies, economical prospecting, brokering, and education. Almost all regions have an institutional educational frame, but have few focuses towards explicit economical development. The technological infrastructure is the connective for building an economy based on clusters.

Regional isolation and closeness

While the social capital represents the mean for transporting information in a cluster, competitiveness depends on the ability to import new ideas or information from large distances. Successful clusters include leader companies that are part of the global network and are subjected to the opportunities of the global market and those that hire personnel operating in international professional associations. These companies usually compare themselves to the best practices worldwide. Because the knowledge comes from very different sources, the interconnected managers will win. Poor regions or the periphery have limited access to these practices of benchmarking, innovations or markets. Without a large access, the companies have to learn only within their regional boundaries and have difficulties in reaching competitive positions.

Low level of education and qualification

Companies do not consider appropriate to choose some locations or activity extensions in communities with weak educational programs and which do not aim the needs of the employees. The formal educational needs are required in many sectors, and those that do not have them, remain with few options. Even on the tightest markets, the import of qualified labor is better than the local non-qualified and not familiarized labor, except for the non-qualified jobs. This

requirement can become a vicious circle. Without the opportunity to gain experience and skills, labor remains passive and not active.

Remarks: The analysis of industrial clusters must become an integral part of the competitive assessment, together with companies and industry analysis. The correct question which companies must ask themselves is not whether to compete or cooperate, but rather on what plans to compete and on which to cooperate.
Of course, there are obstacles on the road to regional development based on industrial clusters, mainly due to sclerotic industrial clusters (too many small companies) and technological threshold (lower limit of high-end technology).
In the new economic realities, the implementation of a coherent territorial approach in Romania must meet the challenges arising from the need for better capitalize on the existing economic potential. The experience of recent years (2007-2013) shows that:
The territory is exploited in a very limited extent in adding value to business processes through its features of economic dynamics, economic functionality and spatial alignment of activities. Although polycentric indicators show comparable values with European regions, urban centers insignificantly influence economic activity networks and allow the formation of an urban and industrial vacuum.
Investments supported by structural and cohesion funds are designed punctually (in cities, companies, individuals) and not for intervention areas defined as areas of integrated development. Despite efforts to date, the associativity (public-public, public-private or private-private) is weak and this is the first obstacle. Other obstacles relate to the initiation and management of projects (especially large ones), in the context of institutional and operational differences and the lack of an integrated vision of territorial development.
Intervention measures are not justified by and do not include the training of value at territorial level. Expected benefits of operational programs cannot be effectively transferred into results because of neglect of effects due to spatial agglomeration of economic activity, that generates positive and negative effects on added value. Interventions by various operational programs / are not territorially integrated, and there is no mechanism to monitor spatial impact.
Formation of competitive advantages in industrial clusters has very recently become a public concern, where the most important role is played by the training projects for competitiveness poles initiated since 2009 by the Ministry of Economy, Trade and Business Environment through the Industrial Policy Directorate.

II.8. Competitiveness perspectives

II.8.1.Possible directions for future action to increase the competitiveness of Romanian economy, industry and industrial companies

A.Increased industrial specialization and complementarity with the European industry

Romania's excessive industrial diversification pursued during the regime of centralized economy, was painfully punished after 1989, when the lack of competitiveness of products / services and Romanian industrial companies on international markets led, among other factors, to a strong contracting of demand for such products / services and thus their production.
Creating and strengthening competitive advantages – related to costs, technology, quality, brand, image, etc. - in the economy, its sectors, the industrial sectors and companies, which became the most redoubtable strategic weapon in the battle on the international markets, is based precisely on the progressive specialization of the listed economic entities, on the essential idea that acquiring a higher level of competitiveness is conditioned by deepening specialization in areas where it has actual or potential competitive advantages in relation to competitors.

The lack of industrial policy focused on creating competitive and superior capitalization of the existing or potential advantages in Romania after 1989 had negative effects manifested in several major directions:

- **Insufficient restructuring of the manufacturing industry** as a whole and of its sectors, caused both by the lack of clear signals regarding the objectives of the Executive in progressively "forging" a new industrial structure, more efficient and more competitive, and the **poor capitalization of location advantages** available or possible in Romania;modest attracting of foreign investors, **the low level of foreign direct investment** compared to the levels in other countries of Central and Eastern Europe;**precariousness of the innovation potential,** the poor link with research and development activities, with technological innovation and diffusion to comply with the requirements of productive work etc.

The optimum level of specialization / diversification of the Romanian manufacturing requires high capitalization of the competitive advantages conferred by the tradition of industrial activity in some sectors, the existence of a production and marketing know-how provided by foreign companies or acquired through licenses acquisition, by the favorable endowment with certain production factors (raw materials from domestic production, suitably qualified workforce and low costs); the dissemination of favorable results obtained by numerous companies in competitiveness and gaining advantageous positions on domestic and international markets; increasing the contribution of manufacturing to the recovery and modernization of other sectors of the national economy - primarily agriculture and transport and telecommunications infrastructures; the unceasing development of industrial activities of medium and high technology, with a high capital intensity and of highly qualified workforce, with significant added value, the importance of these being a relevant standard of the degree of modernity and competitiveness of industry.
http://www.minind.ro/PROPUNERI_LEGISLATIVE/2014/SNC_2014_2020.pdf
In relation to these requirements, the structural changes foreseen in the medium term are as follows (expressed in the share of the respective industries in the total output of manufacturing):

- **The possible development of the following industries**: garment, footwear, furniture and woodworking, oil processing, machinery and equipment, metal, glass, ceramics and building materials, tractors, agricultural machinery, vehicles, computer and electronics, food and beverage;
- **Maintaining the following industries at a relatively constant share**: chemicals, cellulose, paper and carton, rubber and plastics, electrical machinery and equipment.

The main factors that will influence future developments in industrial sectors, alongside the crucial role of the market, will be:

- the pace achieving the technological, financial, organizational and management restructuring, designed to significantly improve the total productivity of factors and the competitiveness of products / services;
- the capacity of efficiently adapting production to the dynamic requirements of domestic and international rules and standards that govern the functioning of these markets;
- the endowment with tangible factors and the availability of intangible factors (the abilities in research and development, technological innovation and diffusion, the skill level of the workforce);
- the ability to find funding sources for the modernization of the productive activity;
- harnessing the benefits of location in order to attract more intense foreign direct investments;
- the development of industrial services, especially professional ones (financial, marketing, computers, environmental, legal).

B.Increasing national innovation potential and the potential of firms

In a less developed economy like that of Romania, a strong investment in education, research & development, technological innovation, technology transfer, is a sure way to reduce the significant gaps that separate it from the economy of developed countries and to ensure a sustainable, stable economic development, much less sensitive to cyclical fluctuations.

'Non-technological' innovation, however, is more feasible for Romanian companies and should be supported and investigated more carefully.

Here we include innovative solutions tailored to each company and the context in which it operates in terms of strategic management and internal organization.

Therefore, we believe that in the ongoing process of increasing the competitiveness of Romanian companies, the management consultant's role is revealing (identifies untapped potential advantages), a booster (helps the company implement the necessary changes) and an accelerator (enables faster completion of required transformation milestones).

In terms of industrial policies:

According to Cojanu et al.(2012),we need more systemic and integrated strategies for the recovery of industry, regional development and greater coherence between different policies at European, national, regional, interregional and cross-border level in order to ensure that the European industry potential is exploited; the need to create economic areas with regional significance and high-tech parks based on public-private partnerships and contributions to the improvement of human and economic resource at local and regional level, by using the latest technologies available.

II.8.2.Trends and perspectives of competitiveness

The main trends that occur in the environment in which they work are:

- Change, heterogeneity and instability will be the normal state of activity.
- The pace of progress in science, technology, education, communication, will continue to grow. The lifetime of ideas, concepts, technologies or equipment will be shortened even more, and consequentlythe renewal and diversification of products and services will be well above the previous period, and markets will be slightly different.
- As a result, the company will be changing in a fluid environment, in which the state of stability and balance is replaced by a dynamism which is seldom balanced.
- In Romania, the pace and scope of economic changes will acquire specific dimensions, due to factors arising from the transition to a market economy, and the privatization and restructuring process, which undoubtedly will increase in future periods.
- The individualization and personalization of products and services will increase.
- There is a new approach in terms of diversity, consumer preferences.
- Increasingly more consumers will demand customized products. This mass personalization and customization will benefit SMEs.
- The internationalization of economic activity will have a greater impact on how SMEs operate.
- Traditionally, the small company was a local trader, with supply sources, clients, information, institutional relations. The strong internationalization of economic activity in the last decade tends to alter this situation.
- In their development, increasingly more SMEs identify foreign markets and foreign sources of supply as a major part of their strategies.

- The competition among manufacturers and service providers in other countries is more and more present. This competition puts a strong pressure on SMEs in terms of innovation, price, quality control, marketing experience, customer satisfaction and business efficiency.
- Computerization will condition the competitiveness of SMEs.
- Technological changes in the past year focused especially on computers and integrated production systems. Initially, only a few companies were able to afford widespread use of computers and embedded systems of production, due to high cost of equipment and specialization of employees. Amid substantially cheaper computer equipment and software, the use of computers and specialized software is spreading.
- A revolution in communications has emerged, which will help increase the flexibility and ability of SMEs to provide products and services, to compete in new markets and existing ones.
- Increased competitiveness among companies.
- In the next decade a very effective and broad increase of connections between companies and markets is expected to take place.
- Externally, companies are already electronically connected with customers and distributors. Connectivity determines the promotion and development of new forms of organizational relationships between firms and allows the creation of strategic alliances for the development of creative activities for the manufacturing and marketing of goods and services in terms of superior effectiveness and competitiveness.
- The high level of training, education and skill of labor force
- For SMEs to be successful, they will need a higher educated and well trained workforce. Currently, the public and private education system corresponds only to a small extent to SME needs. The "gap" between theory and practice exists everywhere in Romania. Frequently, graduates of institutes of higher education are good theoreticians but only partially are they also practitioners. In the next years, graduates of institutes of higher education will need to become familiar with the mechanism of our economic system, have the skills necessary for the execution of management activities specific to SMEs.
- The nature and types of enterprises will continue to develop

The changes taking place in: technology, markets, staff training, management, communication, will encourage progress towards new types of companies. In order to meet the demands of a complex, fluid and contradictory environment, companies will be modeled according to an innovative plan.

- Most economic and social activities include ICT elements that significantly contribute to increase competitiveness, quality of life, mobilize the development potential as a whole. ICT has been identified as a priority sector for Romania, with a competitive potential for intelligent development. However, horizontal ICT interventions in governance processes become increasingly more important factors for Romania's competitiveness; ICT infrastructure development and promotion of a regulated, efficient and secure digital environment will enable businesses and citizens to interact in an efficient and effective way with public administration.

CHAPTER III

CAREER DEVELOPMENT PLAN

Preamble

The study of regional development and disadvantaged areas in the context of the potential for increased competitiveness of SMEs is an interesting field, both theoretically and practically.
From the beginning, my scientific approach was to draw a picture of the impact of the application of the disadvantaged areas on the development of the NorthWest region of the country and especially of Maramureş county.
Mainly, all studies revealed that competitive advantage involves a rapid circulation of information on products, technology and management. In the thesis and in previous work I have emphasized the importance of creating a coordinated computer system, useful both to SMEs and the entire economic environment of disadvantaged areas, one that would focus important information regarding a certain area.
Regarding the possibilities to increase competitiveness as a basic objective of SMEs in disadvantaged areas, I addressed a new economic concept and theory that was in its infancy then, even in the most developed countries: the cluster, seen as a way to increase the competitiveness of companies, both regionally and nationally, or worldwide.
Also, in this thesis I studied the appropriateness of creating clusters in Maramureş county as a prerequisite for increasing the competitiveness of SMEs in this area.
The natural continuation of these concerns and research led to the need to address competitiveness in a new context, with a different take on the issue.
My career is based on hard, daily and constant work, leading to expected scientific results and quality. I do everything I can to pass on the knowledge and information available to the next generations of students.
The career plan is designed as a project that runs through the entire cycle of justification and its components.

III.1.The relevance and justification of research in the field of competitiveness in the context of career development

Competitiveness has been identified in AP as one of the five challenges in Romania's development, highlighting the need to improve the capacity for innovation and research for the development of products, services, business processes and social models, and to improve the business environment by implementing value chains on a large scale and therefore create links within and outside the country.
The Engineering and Management PhD School at the Technical University of Cluj has a rich and prodigious experience in managerial and economic strategies.
The development of this area primarily responds to the challenge of developing Economic Competitiveness, manifested globally, and a primary objective of Romania between 2014-2020, which contributes to the achievement of three other development challenges, namely: People and Society, Infrastructure and Administration and Governance, thus allowing horizontal intervention in economy and society.
The themes suggested will ensure that the research of doctoral students is directed towards obtaining solutions to the needs and challenges related to the low level of national economic competitiveness, especially in terms of key areas of Research & Development and Innovation, together with other structural deficiencies such as fragile business environment or low

productivity in industry and services, that make it impossible to use the existing competitive potential.

Introducing a new range of strategic themes in the doctoral school directly contributes to supporting and promoting all top areas addressed in it, such as technological systems research, production management, marketing research, research on human resources, environment, quality etc.

The issues covered will promote research for new growth opportunities, particularly in the areas of smart specialization, will propose several research projects that integrate strategic interventions (to be addressed in a multidisciplinary manner), with a major impact on the economic and social organizational environment, in order to be aligned to European competitiveness requirements.

The field of research aims mainly to train specialists whose own research can provide viable solutions that generate competitiveness through smart specialization, high added-value, internationalization. Furthermore, innovation, seen as "transformation", applied in the sectors of economic activity, can thus contribute to obtaining valuable results in terms of efficiency and quality.

Addressing a range of needs identified in the industrial sector, such as creating a more modern and compact environment for research and development, oriented towards market needs and the principles of smart specialization, and the creation of an innovative entrepreneurial culture.

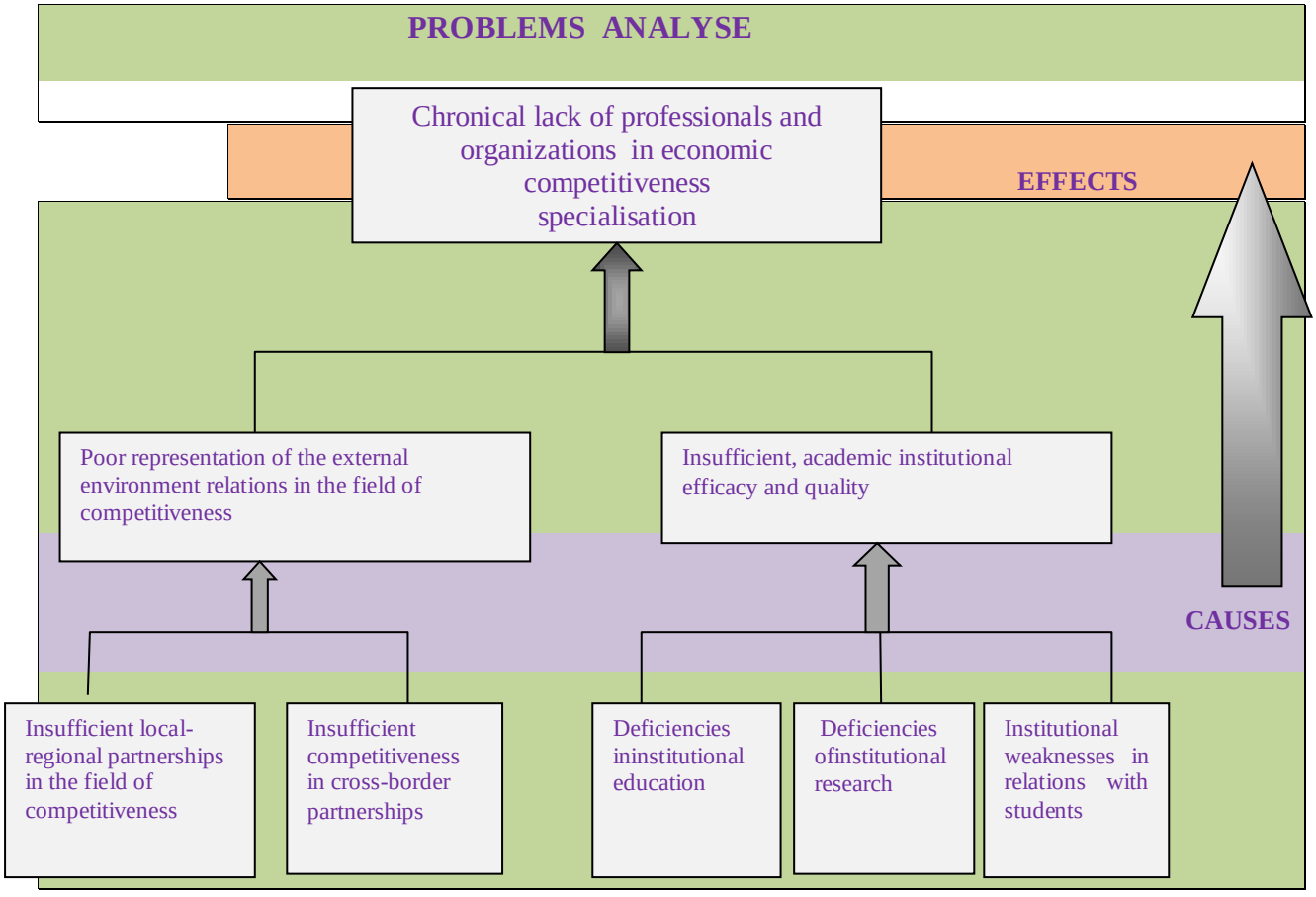


Figure 3.1 Problems Analyses
Source:The author

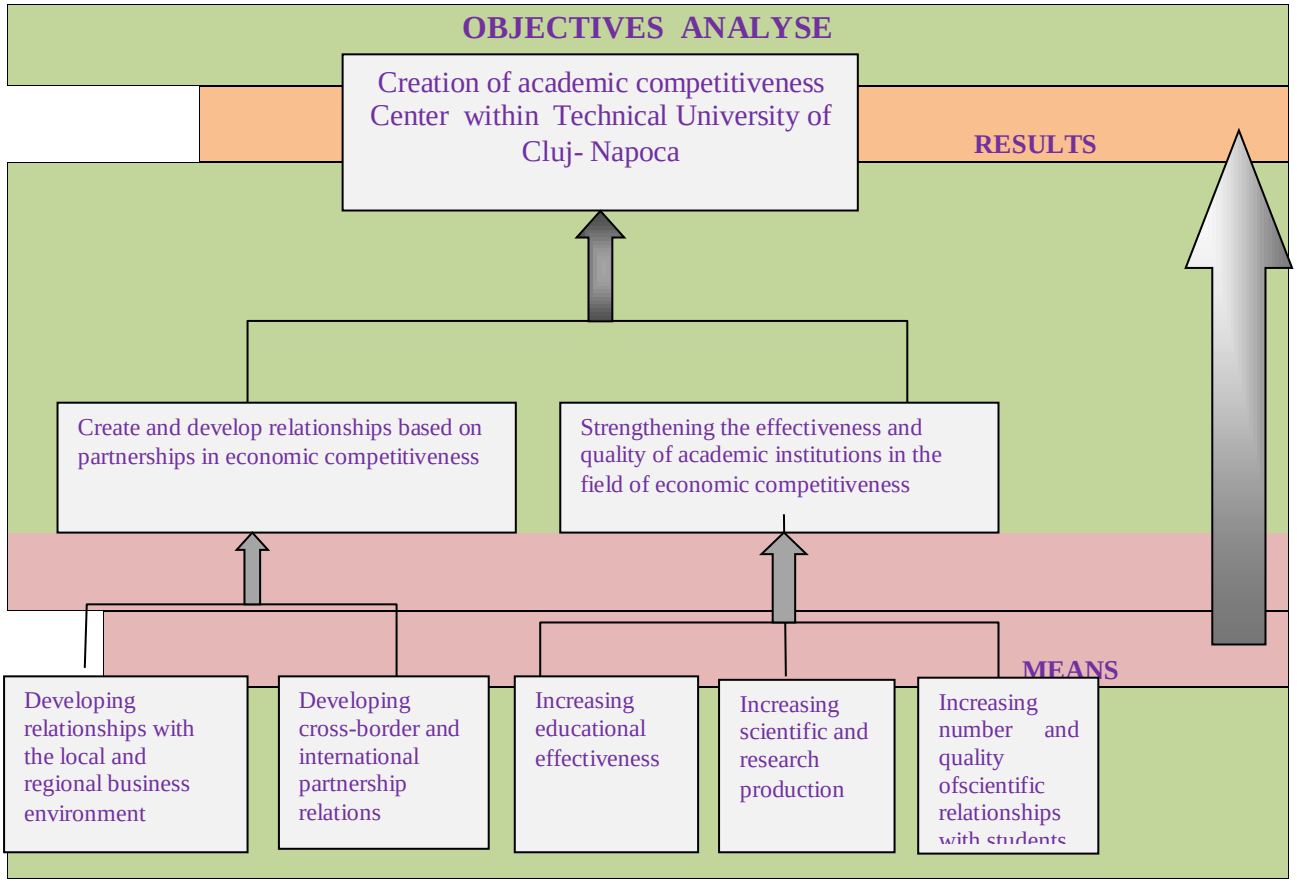


Figure 3.2 Objectives Analyses
Source:The author

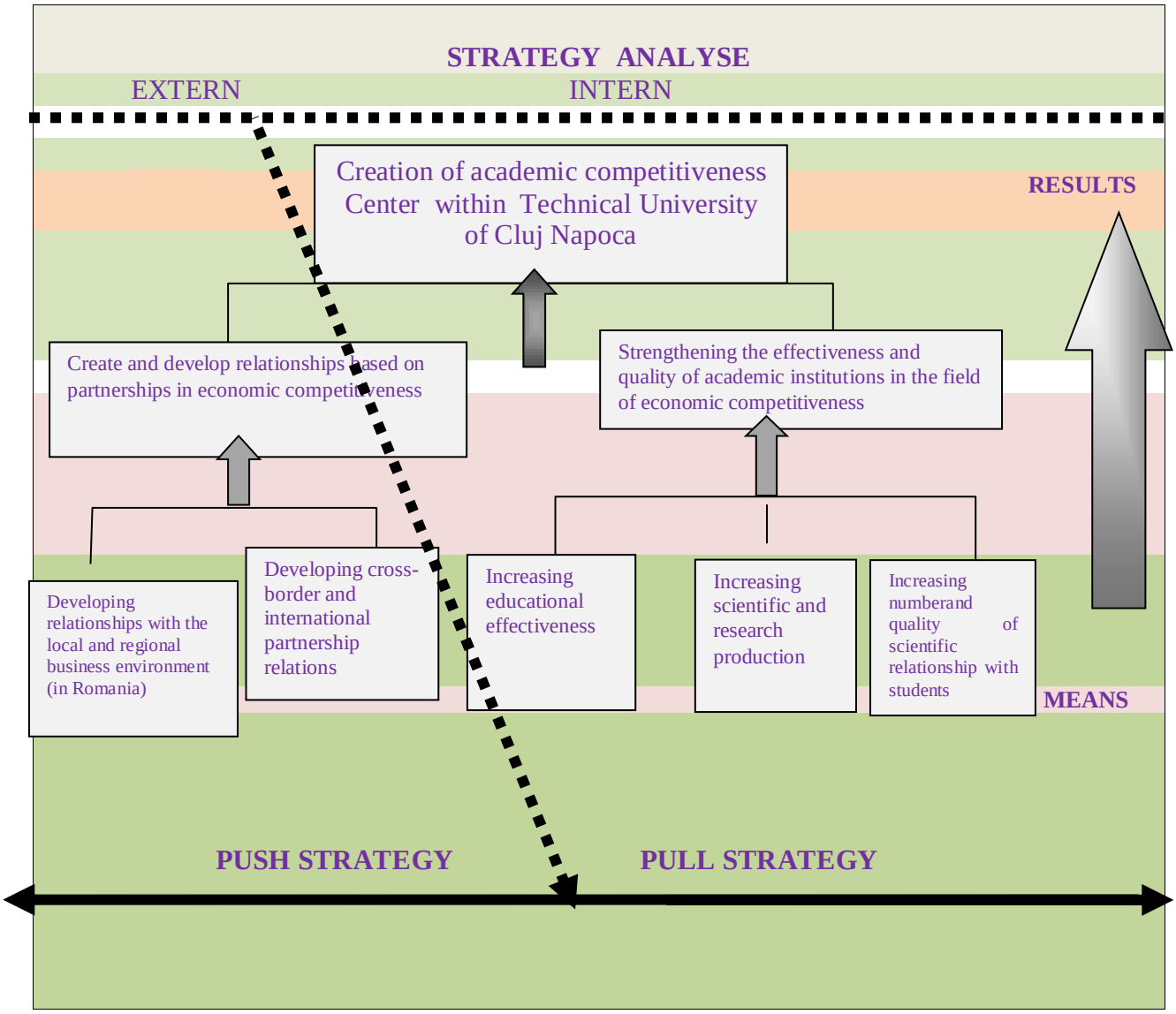


Figure 3.3 Strategies Analyses
Source:The author

Table 3.1 Plan of actions
Source:The author

Strategy	Symbol	Obiective	Action	Terms	Out put
Internal Environment	A_1	Increase educational efficiency	A_{11} A_{12} A_{13}	ST ST ST	CUNBM UT Cluj
	A_2	Increase of scientific and research production	A_{21} A_{22}	MT MT	CUNBM UT Cluj
	A_3	Increase of number and relationship quality whith students	A_{31} A_{32} A_{33} A_{34} A_{35}	ST ST MT MT ST	Sciences Faculty CUNBM UT Cluj
External Environment	B_1	Development of partnership whith actors in romania	B_{11} B_{12} B_{13} B_{14} B_{15} B_{16} B_{17}	ST ST ST ST MT MT LT	Local organisations SME's Public Instit. Associations NGO from Romania
	B_2	Development of partnership whith cross border actors, EU actors, international actors	B_{21} B_{22} B_{23} B_{24} B_{25} B_{26}	ST ST MT MT LT LT	Hungary Slovakia Ukraine partners

A_1 = Implementation of educational strategies based on development of cognitive, technical or professional skills and emotional value which are made by the doctoral training program.
Monitoring the professional performances of students, master and doctoral students through activities that combine individual study with a well established learning pace and expected results.

A_{12} Adopting a certain flexibility in the transmission of knowledge through the individual and quantitativ differentiation of pace of learning units.

A_{13} Modern educational techniques and methods based on information technology and computer applications.

A_2
A_{21} Application and implementation of research grants.
A_{22} Capitalizing on the research potential by applying and implementing research grants and projects funded by national and international programs.

A_3
A_{33} The establishment of research centers and subsidiaries.

A_{34} Organizing career oriented seasonal intershipuri by making the most out of skills acquired in competitiveness.

A35 Ensuring maximum discipleship with PhD alumi, regular meetings to disseminate their results.

B1

B11 Identification of businesses with concerns in the area of economic competitiveness in order to ensure an organizational recruitment base, recruiting future students and PhD students.

B12 Establishing partnerships to strengthen the legal framework, the initiation and implementation of joint projects to increase competitiveness.

B13 Identification of financial resources to support research in competitiveness and offer financial support to doctoral students through scholarships, sponsorships, donations. Promotion of the Research Centre at departmental level by providing highly qualified specialists.

B14 Dissemination of research results through conferences and workshops to increase competitiveness.

B15 Ensuring the transfer of best practices, applications, case studies through doctoral and postdoctoral internships.

B16 Providing labor market absorption of future students and PhD students.

B17 Support, participation in cluster membership, creating spin offs by providing highly qualified specialists.

B2

B21 Studies and analyzes on the current situation of increasing competitiveness in the trans-border area. Applied research in the cross-border area.

B22 Identifying principles for assessing competitiveness. Initiation and implementation of joint cross-border projects.

B23 Development of student and research mobility in the cross-border area.

B24 Development of best practices in the cross-border region.

B25 Establishing a trans-border area research platform. Starting the establishment of a cluster in the cross-border area.

B26 Adoption of joint research programs and doctoral schools in the field of competitiveness in the cross-border academic environment, organization of follow-ups, monitoring for each program, project.

III.2.Impact and expected results

Impact:

- **Institutional level:** will reflect directly on the quality of education and research,
- **Local, national level:** growth of image and prestige, broader opportunities for exploitation of results, institutional outputs, to all those who wish to increase competences in the field of competitiveness.
- **Trans-border level:** increasing exchanges, mobilities within UT Cluj.

Expected results:

- **Short-term:** diversification of the doctoral school offer by adding new doctoral specializations in CUNBM.

- **Medium-term:** establishment of new doctoral fields and new economic engineering specializations.
- **Long-term:** establishment and development of a research center and a cross-border doctoral school. Establishment of a regional academy of sciences.

REFERENCES

Abrudan, I. (2012), *Managerial Culture*, Editura Digital Data Cluj, 2012, Chapter :*Management and lateral thinking* pp.212. 297

Abrudan, I., *The man in the globalized world, in the transition from resource to destination* Review of Management and Economic Engineering,Volume 13, No. 2 (52) ,2011

Acar, W., and Sankaran, K. (1999), T*he myth of the unique decomposability: Specializing the Herfindahl and entropy measures?*Strategic Management Journal, Vol. 20, No 10

Aiginger, K., Rossi-Hansberg, E. (2006). *Specialization and concentration: a note on theory and evidence*, Empirica, 33:255-266.

Aiginger, K. (2004), *Industrial specialisation and geographic concentration: two sides of the same coin?*, Journal of Applied Economics, Vol. VII, No. 2.

Aiginger, K., et al., (1999) *Specialization and (geographic) concentration of European manufacturing*, Enterprise DG Working Paper No 1, Background Paper for the "The competitiveness of European industry: 1999 Report", Brussels

Alker, S., Joy, V., Roberts, P., Smith, N.,*The definition of brownfield* ,(2000),Journal of Environmental Planning and Management 43(1), pp.49–69.

Allaire, Y., Fârşirotu,(1999),*Management Strategic*, Editura Economică, Bucureşti

Andersson,T., et.al, *The Cluster Policies Whitebook*, IKED,(2004) International Organisation for Knowledge Economy and Enterprise Development.

Anghel C., Policies . *Improvement of Public Management Policies Used in Local Public Administration*,(2013),SNPSA,Bucharest,Ph.D. Thesis

Arbia, G. *The role of spatial effects in the empirical analysis of regional concentration*. Journal of Geographical systems 3.3 (2001): 271-281.

Bacali, Laura, and Silvia Avasilcai.*Research Regarding the Implication of Resources and Performances of a Firm from the Perspective of Sustainable Development*. KSI T ransactionson (2008) 38.

Bamberger, I.,(1989),*Strategies of Small and Medium Sized Firms in Globalising Markets*, State University of Limburg, Maastricht / The Nederlands

Bhatta, B., *Analysis of Urban Growth and Sprawl from Remote Sensing Data'*, (2010),Series: Advances in Geographic Information Science ,e -book Springer,http://www.springer.com/978-3-642-05298-9.

Borgatti,S.,P.,Everett,M.,G.,Johnson,J.,C.,(2013), *Analyzing Social Networks*, Sage Publications Ltd.,2013

CABERNET – *Concerted Action on Brownfield and Economic Regeneration Network*, ,[Online] available at: www.cabernet.org.uk,accessed on 5 May 2014.

Candea, Dan, and Rodica Candea. *Emotional Capital for Building Sustainable Business Performance*. Proceedings of the 2nd European Conference on Intellectual Capital: ISCTE Lisbon University Institute Lisbon, Portugal: 29-30 March 2010. Academic Conferences Limited, 2010.

Capello, R. (2006), *Regional Economics*, Routledge, London;

Cioca, Marius, Lucian-Jonel Cioca, and Sabin-Corneliu Buraga. *Spatial [Elements] decision support system used in disaster management*.Digital EcoSystems and Technologies Conference, 2007. DEST'07. Inaugural IEEE-IES. IEEE, 2007.

Cojanu, V., Munteanu, C., Neagu, F. (2012), *Noi direcţii de politică industrială şi modificările structurale necesare*, Editura Economică.

Constantin, D. (2004), *Economie regională. Aplicaţii şi sinteze*, Editura Oscar Print, ISBN 973-8224-70-0;

Constantin, D. (2006) *Cuantificarea competitivităţii teritoriale. Abordări exploratorii în spaţiul internaţional*, Analiză şi prospectivă economică, nr. 3(1), ISSN 1841-5490;

De Miguel-Angel, G.,et al,edit. *Entrepreneurship and Business: A Regional Perspective*,e-book,Springer-Heilderberg Berlin ,2009

Department of Environmental Protection Brownfield Development Guide,Pensylvania,[Online] available at:http://www.depweb.state.pa.us/portal/server.pt/community/brownfield_redevelopment/20540,accessed on 5 May 2014

Derekenaris, Grigoris, et al. *Integrating GIS, GPS and GSM technologies for the effective management of ambulances*. Computers, Environment and Urban Systems 25.3 (2001): 267-278.

Dinu,V.,Tăchiciu,L.,(2009),*Selling with entrepreneurial spirit: the sales-entrepreneur* ,Amfiteatru economic,Vol. XI ,Nr. 25 , February

Drăguşin,M.,(1999).*Managementul întreprinderilor comeciale mici şi mijlocii*,Editura ASE Bucuresti

Durand, M., J. Simon and C. Webb (1992),*OECD's Indicators of international trade and competitiveness* ,OECD Economics Department Working Paper No. 120.

Eisingerich, A.B.; Bell, S.J.; Tracey, P. (2010). *How Can Clusters Sustain Performance? The Role of Network Strength, Network Openness, and Environmental Uncertainty*. Research Policy. 39, pp., 239–253.

Eisingerich, A.B.; Boehm, L. Group Analysis: *Why Some Regional Clusters Work Better Than Others*,2007, The MIT Sloan Management Review Journal Report 3: 1–3.

Erdős,P.,Rényi,A.,(1959), *On Random Graphs*.I, Publicationes Mathematicae No.6,pp.290–297,online at :http://www.renyi.hu/~p_erdos/1959-11.pdf

Ernst and YoungRomânia,2013,*Antreprenorii vorbesc-Barometrul antreprenoriatului românesc 2013*

European Comission (2013). *Towards Knowledge-Driven Reindustrialisation*, European Competitiveness Report, Commission Stuff Working Document SDW (2013)347 final, chapter 5: EU production and Trade Based on Key Enabling Technologies,

European Commision Science for Environment Policy Brownfield Regeneration issue 29,May,2013 [Online] available at:

http://ec.europa.eu/environment/integration/research/newsalert/pdf/39si.pdf

European Urban Knowledge Network, Home/E-library/UrbanRenewal/Bownfield development/Regeneration of a former industrial zone – Seraing.[Online] available at:http://www.eukn.org/eukn/,accessed on 5 May 2014

Ferrara, V.,*Brownfield identification: diffrent approaches for analyzing data detected by means of remote sensing*' ,(2008),Brownfields IV: Prevention, Assessment, Rehabilitation and Development of ed. Beriatos,E., Brebbia ,C., A., Witt Press,p. 46.

Ferry D. J., Brandon P. S.,*Cost Plannings of Buildings'*. Blackwell Scientific Publication Ltd.BSP Professional Books. Oxford, Uk,1994.

Foray, D. & Goenaga, X. (2013). *The Goals of Smart Specialisation*, JRC Scientific and Policy Reports, European Commission, S3 Policy Brief Series, No. 01/2013.

Giuliani,E.,Pietrobelli,C.,2014,*Social Network Analysis Methodologies for the Evaluation of Cluster Development Programs*, Centre for Innovation, Research and Competence in the Learning Economy, Lund University

Global Report Global Entrepreneurship Monitor,GEM 2013 ,online at:

http://www.gemconsortium.org/docs/3106/gem-2013-global-report,accesed la 22

Hahn ,R.,F.,*Contributions regarding regional development management (with examples from the Maramureş county)*, Ph.D Thesis ,(2007),West University of Timisoara

Hahn, R.,F.,*Management strategic* ,Ed. Universitatii de Nord,Baia Mare,2007

Hall, P. *Towards a general urban theory*, in Brocthie,J.,Batty,M., Blakely,E., et al. (Eds) Cities in Competition, Melbourne: Longman, pp. 3-31. 1995.

Hanneman,R.,A.,Riddle,M.,(2011). *Concepts and Measures for Basic Network Analysis*. The Sage Handbook of Social Network Analysis. SAGE. pp. 364–367

Iammarino,S.,McCann,P.,2006, *The structure and evolution of industrial clusters: Transactions, technology and knowledge spillovers*, Research Policy, Vol. 35,pp.1018-1036

Iandoli L,et al , (2012),*Knowledge exchange processes in Industrial Districts and the emergence of networks* ,Central European Journal of Operations Research, Volume 20, Issue 2, pp 231-250

Iosif,Gh.,(1999),*Riscurile IMM: asumate, asigurate sau gestionate*, Revista Tribuna Economică, nr.1

Ketels,C.,Memedovic, O., *From clusters to cluster-based economic development* ,Int. J. Technological Learning, Innovation and Development, Vol. 1, No. 3, 2008 , pp.375-392

Kim, S. (1995). *Expansion of markets and the geographic distribution of economic activities: the trends in US regional manufacturing structure*, Quaterly Journal of Economics, No. 110, pp. 1860-1987

Krugman, P. (1991). *Geography and Trade*. MIT Press. 1-142pg

Krugman, P. (1994) *Peddling Prosperity: Economic Sense and Nonsense in the Age of Diminished Expectations*. ,New York, Norton.

Kuan,Y.,. W.,2005,*Critical success factors for implementing knowledge management in small and medium enterprises*, Industrial Management & Data Systems, Vol. 105 No. 3, pp. 261-279

Long, D., *Delivering High Performance: The Third Generation Organization*, Grower Ltd.,2013.

Lundvall, B.-Å. *Why the New Economy is a Learning Economy*, Economia e Politica Industriale : Rassegna trimestrale diretta da Sergio Vaccà ,Milano ,2003,Nr. 117, pp 173–185.

Luț, D., M., *New approaches on innovation process in the context of knowledge-based economy. implications for romanian enterprises*. Anale. Seria Ştiinţe Economice. Timişoara, 2012, XVIII/2: 264-271.

Malecki,E.,J.,2002, *Hard and Soft Networks for Urban Competitiveness*, Urban Studies, vol. 39 ,no. 5-6,pp. 929-945

Mallach,A.,*'Laying the Groundwork For Change: Demolition*, Urban Strategy, and Policy Reform',2012 ,[Online] available at: http://www.brookings.edu/research/papers/2012/09/24-land-use-demolition-mallach,accessed on 17 June,2014.

Marot,S., '*Sub-urbanism and the Art of Memory'*, London, AA Publications, 2003.

Marot,S., '*The reclaiming of Sites'*, in Corner,2003, Ed., Recovering Landscape, pp.48-49

Martin-de Castro, G., et al. *Linking human, technological, and relational assets to technological innovation: exploring a new approach*. Knowledge Management Research & Practice, 2013, 11.2: 123-132.

Mintzberg,H.,Quinn,J.,1991,*The Stategy Process*, Englewood Cliffs,Prentice- Hall International

Mitchell, Andy. *The ESRI Guide to GIS Analysis: Geographic patterns & relationships*. Vol.1. ESRI, Inc., 1999.

Nabi,I., Luthria,M., *Building Competitive Firms: Incentives and Capabilities*, (2002), World Bank Publications

Nag, R.; Hambrick, D.C.; Chen, M.-J., 2007,*What is strategic management, really? Inductive derivation of a consensus definition of the field*. Strategic Management Journal 28 (9), pp.935–955.

Nicolescu O., Ceptureanu S., Ceptureanu E. *Nivelurile de determinare a competitivităţii*. In: Tribuna Economică, 2007, nr. 37, p.61-66

Nicolescu,O.,1996, *Strategii manageriale de firmă*, Editura Economică

Nuissl,H., Schlaack,C.,S.*'On the economic approach to the containment of land consumption*',2009, Environmental Science & Policy,Volume 12, Issue 3, pp. 270–280.

Nyerges,T., Jankowski ,P.,*'Regional and Urban GIS: A Decision Support Approach'*, Guilford Press,New York,2010.

OECD (2012), *Mapping Global Value Chains*, disponibil la adresa: http://www.oecd.org/dac/aft/MappingGlobalValueChains_web_usb.pdf

OECD (2014),Competitive Regional Clusters :National Policy Approaches ,online at: http://www.oecd.org/unitedstates/competitiveregionalclustersnationalpolicyapproaches.htm,accessed 12.12.2014

OECD, 2000. *Urban Brownfields*, Retrieved May, 7, 2004, [Online] at:http://www1.oecd.org/tds/bis/brownfields.htm, accessed on 16 June 2014

Önsel, Şule, et al. *A new perspective on the competitiveness of nations*. Socio-Economic Planning Sciences 42.4 (2008): 221-246.

Opsahl, T.,*Clustering in two mode networks*, retrieved at:

http://toreopsahl.com/2009/09/11/clustering-in-two-mode-networks, accessed online : 12.12.2014

Parker, S. K., & Collins, C. G.,2010. *Taking stock: Integrating and differentiating multiple forms of proactive behavior*. Journal of Management.36, pp.633-662,disponibil la:

Perrault,P.,*'Park in an Old Siderurgical Plant*, Caen(France)', 2001, AV Monographs: Pragmatism and Landscape no.91.

Popa H.L., (coordonator),Fărcaş,D.,2002*,Relaţia mediu intern-extern şi analiza influenţei lor simultane* , Management Strategic, Editura Dacia, Cluj- Napoca, .

Popa, Ioan and Belu, Mihaela Gabriela, (2009), *Growth poles and national competitivness*, Annals of Faculty of Economics, 1, issue 1, p. 33-39,

Popa,I.,Popescu,D.,*The importance of innovative clusters' proliferation for sustainable economic growth of Romania*,2013,Proceedings of the 7th International Management Conference"New Management for the New Economy", 2013, Bucharest,pp.583-595

Porter M E, (1990), *The Competitive Advantage of Nations* London: Macmillan

Porter M.E. *Competitive Strategy: techniques for analyzing industries and competitors*. New York: The Free Press, 1998. 422 p.

Porter, M.,*Location, Competition, and Economic Development: Local Clusters in a Global Economy*,2000,Journal-Economic Development Quarterly, vol .14, no.1, pp 15-34.

Porter, M.E. (1998) *On Competition*, Boston: Harvard Business School, 1998.

Porter, Michael E. – On Competition, Harvard Business School Press, 2008

Purcarea, A. A., E. Fleaca, and Dan Dumitriu. *The Influence of Leadership on Employees Behavior*.Bulletin UASVM Horticulture 66 (2009): 2.

Rădulescu, C.(2007).*Incertitudinea mediului concurenţial şi vulnerabilitatea firmelor*, Buletin ştiinţific, seria A, Ştiinţe economice, Vol. XXIV, Editura Universității de Nord Baia Mare,pp.71-77

Rădulescu, M., (2011), *TNC's plans regarding FDI during 2009-2011.Investment policy measures*, Annals-Economic Series, University Tibiscus Timişoara, vol. XVII

Rădulescu,C.,(2004).*Conducerea şi strategia afacerilor mici şi mijlocii*, editura Risoprint Cluj-Napoca

Rădulescu,C.,(2004)*Competitivitatea IMM-urilor şi dezvoltarea regională* ,editura Risoprint, Cluj-Napoca,

Radulescu,C.,Rădulescu,G.,M.,(2006),*Guide concerning the cluster association of companies from less favored regions*, Proceedings of International Conference on Business, Management and Economic, İzmir, Turkey,pp.567-579

Rădulescu,C.,Toader,R.,Hahn,F.,Rădulescu,A.,(2009)*Aspects Concerning Urban Competitivness*, The International Symposium Sustainable Development Strategies, Baia Mare, North University Publishing, Baia Mare, p. 395

Rašić-Bakarić, I. (2007). *Uncovering Regional Disparities–the Use of Factor and Cluster Analysis*. Croatian Economic Survey, (9), 11-34.

RESCUE - *Regeneration of European Sites in Cities and Urban Environments,Best Practice* Guidance for Sustainable Brownfield Regeneration, May2005,[Online] at: http://www.rescue-europe.com/,accessed on 16 June 2014.

Roberts,P.,W., Sykes,H.,*The evolution, definition and purpose of urban regeneration*' Urban Regeneration.A handbook. Sage,2000.

Rogerson,R.,J., '*Quality of Life and City Competitiveness'*,Urban Studies, Vol. 36, Nos 5-6, 969-985, 1999 ,[Online]available at:

http://ww.simonpoulter.co.uk/iod/iodpdf/Urban%20Studies%20Article.pdf, accessed on 16 June 2014.

Ronstadt, R.,1884, *Entrepreneurship*, Mc Graw-Hill BookCompany, New York

Russu, Corneliu, (2008), *Strategii de competitivitate industriala*, Business&Leadership, 1, issue 1, p. 37-47

Săvoiu, G., Crăciuneanu, V., Ţaicu, M. (2010), *A New Method of Statistical Analysis of Markets' Concentration or Diversification*, Romanian Statistical Review, Vol. 58, No. 2

Schädler, S., Morio, M., Bartke, S., Rohr-Zänker, R.,Finkel, M. '*Designing sustainable and economically attractive brownfield revitalization options using an integrated assessment model*',2011, Journal of EnvironmentalManagement 92 (3), pp.827–837

SEPA Project,2013,www.sepaproject.eu, accessed on 5 May ,2014

Shane,S.,A.,2000, *A General Theory of Entrepreneurship: The Individual-opportunity Nexus*, Edward Elgar Publishing, U.K

Strategia națională pentru competitivitate 2014 – 2020

Sui, Daniel, and Michael Goodchild. *The convergence of GIS and social media: challenges for GIScience*. International Journal of Geographical Information Science 25.11 (2011): 1737-1748.

Tanţău,A.,D.,coord., *Ghid de bună practică pentru clustere şi reţele de firme*, Print Group, Bucureşti,2011

Telesford,Q.,K.,et all,2011, *The Ubiquity of Small-World Networks*, Brain Connect, Dec 2011; 1(5), pp.367–375

Toader,R.,Cherecheş,C.,Rădulescu,C.,Hahn,F.,(2012),*Comportament organizaţional*, Editura Universităţii de Nord Baia Mare, Colecţia Scientia, Editura Universitatii de Nord.

Tödling, F., P. Lehner and M. Trippl (2004): *Knowledge Intensive Industries,Networks and Collective Learning*.,44th European Congress of the European Regional Science Association, University of Porto, Portugal, 25-29 August 2004.

Vaccarino,R., Johnson,T.,*'Recycling Landscape: Recycling for Change'*, (1997),Landscape Architecture: Stretegies for the construction of Landscapee ,vol.3, no.2G

Wasserman, S., Faust, K., *Social Networks Analysis: Methods and Applications*. Cambridge University Press,1994

Watts, D., J., Strogatz, S., 1998. *Collective dynamics of 'small-world' networks*, Nature 393, pp.440–442.

Wasserman S, Faust K. Social Network Analysis: Methods and Applications. Cambridge: Cambridge University Press; 1994

Wennberg, K. and Lindqvist, G. (2008) *How Do Entrepreneurs in Clusters Contribute to Economic Growth*, SSE/EFI Working papers in business administration, No. 2008:3, SSE, Stockholm

Wessa, P. (2015), *Free Statistics Software*, Office for Research Development and Education, version 1.1.23-r7, URL: http://www.wessa.net/

World Economic Forum (WEF) The Global Competitiveness Report 2014-2015 http://www.weforum.org/reports/global-competitiveness-report-2014-2015

World Economic Forum, The Global Competitiveness Report 2009–2010

www.clusterobservatory.eu; accesed at 10/10/2014

Yang, Qin, and Crystal X. Jiang. *Location advantages and subsidiaries' R&D activities in emerging economies: Exploring the effect of employee mobility*. Asia Pacific Journal of Management 24.3 (2007): 341-358.

Zaman,Gh., Goschin, Z.,2012. *Industrial R&D Investment In Eu: Recent Trends And Lessons For Romania*, Romanian Journal of Economics, Institute of National Economy, vol. 34(1(43)), pages 68-83, June.

Zima, L., A., Sabou, S., 2010, Quality and the Consumer , Studia Universitatis "Vasile Goldis" Arad Seria Stiinte Economice, Issue 3, p. 59.

http://www.cluster-research.org/gcis.htm.accessed at 11/12/2014

http://www.minind.ro/PROPUNERI_LEGISLATIVE/2014/SNC_2014_2020.pdf,accessed on:26/02/2015

http://www.nord-vest.ro/planul-de-dezvoltare-regionala-2014-2020--eID1724.html,accessed on:17/02/2015

http://www.wall-street.ro/files/143876-401.pdf,accessed on 20 August 2014

https://en.wikipedia.org/wiki/Graph_%28mathematics%29,accessed on 15/09/2014

http://ec.europa.eu/enterprise/initiatives/cluster/index_en.htm.Accessed at 12/03/2014

http://parker.zydec.net.au/publications/Parker&collins_ProactivityDimensions_JOM_InPress.pdf, accesat la 23 august 2014

http://s3platform.jrc.ec.europa.eu/home accessed on:17/02/2015