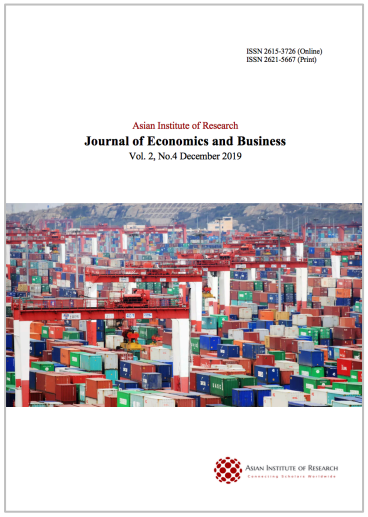

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Factors of Cluster Initiatives Management

Wiktor Adamus[1,2]

[1]Jagiellonian University, Institute of Economics, Finance and Management, Krakow, Poland
[2]College of Business and Entrepreneurship in OstrowiecŚwietokrzyski, Poland

Correspondence: wiktor.adamus@uj.edu.pl

Abstract

The idea of clusters attracts attention of specialists as well as larger public since at least three decades. Presented paper addresses itself to one particularly important aspect of managing clusters*:* cluster excellence and the ways of achieving it. Despite the on-going debate there are still only a few studies that investigate cluster initiatives performance and management phenomena, identify the success factors underlying cluster initiatives management and compare their influence.
The objective of this study was to identify Critical Success Factors of cluster initiatives management. Further development of the field demands constant sophistication of analytical tools and modes of empirical research. There exist a need for selecting and assessing quality of data at researcher's disposal. It is particularly strongly felt when data come from respondents in social surveys, from participant observation, focus groups sessions, content analysis and so on. Methods listed above always bear some risk of subjectivism and arbitrary decisions of what is good or bad in data we have. AHP method adopted in research which paper is based on offers stronger ways of gathering, selecting and interpreting the validity of data. The proposed Analytic Hierarchy Process framework identified the relative importance of different success factors to cluster initiative management and determined the key areas of activity and management focus.
The AHP based interviews conducted among European cluster managers representing 19 cluster initiatives located in 10 countries allowed to identify the following Critical Success Factors: 'Assuring sustainability of financing', 'Development of CI mission, vision, strategy and operational action plan', 'Integration building partnerships inside the CI, creation of interpersonal links, social networks, trust' and 'Development of cluster's critical mass and management of partners' complementarities and interdependencies'. Their joint importance for cluster initiative management success reached 40%, while the remaining 60% was distributed among 16 other factors.
The results of this study support more effective management and better organization of cluster development processes. They are specifically tailored for entrepreneurs, willing to initiate or establishing cluster initiatives, as well as managers, responsible for CIs day-to-day operations and other CI stakeholders. They can also be utilized in the political area, as guidance for policy makers in redesigning policies of cluster initiatives support as well as monitoring and evaluation processes, so that they are based on identified CSFs.

Keywords: European Clusters, Analytic Hierarchy Process (AHP), Management, Critical Success Factors

1. Introduction

Clusters are relatively new organizational phenomenon but they have some predecessors. One of them is well known as an "industrial district" [Marshall 1920] and denotes certain number of enterprises acting in direct geographical proximity, usually surrounding larger city. Example could be Boston District, (described by [Breznitz S. and Anderson W. P. 2004]). Another one is the case of Italian footwear industry, particular case of a very specific organization (factories which group themselves together to better perform certain actions, such as preparation of an exhibition during international fairs or presentation of a tender to customers; see: [Amighini A. and Rabelloti R. 2006]. Still another example can be old industrial district transformed into new one, a form of departure from older industrial monoculture to more diversified one and more eco-friendly (Birmingham District in GB described in details by M.J. Wise in his publication "Essays on the Growth of Birmingham and other Contributions to the Geographical Study of the Birmingham Discrict, Birmingham, 1951; Birmingham's Transformation and Future Prospects, Economic Strategy Development and Culture Directorate, Birmingham City Council, [1951]. And finally we should mention here so called "competitiveness poles", being "a combination, within the same territory, of three components (enterprises, training institutions and research units) and three factors of critical significance (partenariat, innovation and international visibility)" [Largier et al., 2008]. Such poles are sometimes perceived as an intermediating form between industrial districts and clusters, and sometimes as phenomenon closely reminiscent clusters. In the actual research state of the art three cognitive perspectives have emerged, portraying industrial groupings of different subjects: (a) economic perspective, focused on sectoral aspects and stressing the relation "client-supplier" or technological ties, zones of employment or /…/ networks of common distribution, (b) relational perspective, putting stress on actors networks, geographical proximity and leading to great variability, (c) territorial perspective, which sees clusters mainly as the place or pole having a critical mass due to particular concentration of enterprises, research units and training institutions, acting in a particular domain, based on the presence of risk capital, the state and local communities aiming for international excellence" [Largier et al., 2008].

One common trait of these cluster-preceding forms was their grass-roots genealogy. In almost every case listed above, district or "network" was initiated mainly by entrepreneurs seeking for market opportunities or just trying to commercialize on them. However, local or even country-wide policies of economic development played here certain role. In the case of Birmingham District there was some support from local as well as central government reflecting the public authority's desire to overcome pitfalls of an older industrial order such as growing unemployment in the region, dying economic dynamics, and ecological degradation of an area. Rarely questions asked by practitioners or researchers dealt with identification of key success factors of such districts or – to put it more precisely – identification of key factors of districts' successful management. We may say that such questions were rather absent due to slightly different "ontologies" of older industrial districts and newer clusters.

What is so revolutionary new in all these cases of industrial clusters which demand for search of specific ways of cluster initiative management? Do clusters really need something we call (following others) "cluster initiative management"? Mentioned older forms of grouping entrepreneurial agents differ in several important points from today's clusters. Let us briefly point out these differences. First of all - clusters become part of regional and countrys' development policy and are seen as ways to promote this development. As such, clusters are now instruments of stimulating and promoting economic and social development of regions/countries. Secondly, clusters emerge as an international ventures, and – as in the case of EU – sometimes cross the borders of national states. There exist several examples of European initiatives fostering cross border cluster initiatives: European Policy Cluster Group, European Cluster Observatory, Cluster Innovation Platform, Cluster Excellence Initiatives. The common aim of all these efforts is the promotion of more world-class clusters in EU. Third, as the example of EU shows, clusters are now not only tools for reinforcing national economies but also for initiating international business cooperation [Meier zuKöcker, G., 2009]. Fourth – clusters incorporate not only enterprises, but also universities, research units and many other organizations. They demand more engagement from local and even governmental authorities. Fifth, cluster grow in number and size, conquer new areas of activity and focus on innovation to growing extent. All this traits demand some measuring instruments, since clusters today are not exclusively self-governing entities but are also co-governed by differentiated set of bodies.

This situation calls for common standards of measures applying to clusters' performance and its correlates. Let us list some specific reasons for the need of precise measuring of cluster or cluster initiatives' performance:

- Internal pragmatic reason: since clusters are now tools for promoting countries' and regions', economies, there is the apparent need to introduce indicators enabling the architects of national economic reforms to exercise control over (at least) the use of government's capital and other resources invested in clusters
- External pragmatic reason: comparative statistics regarding international performance of clusters; this reason calls for a separate set of indicators permitting to hierarchize clusters according to a clear and preferably simple measures of their success in the globalized context
- "Social auditorium" reasons: clusters functioning is carefully observed by a number of agents; public is informed about the input of clusters into regional/national prosperity and progress; interests groups use lobbying to gain some legal regulations in favor of their interests, future financial support for some cluster initiatives may depend on satisfaction of local communities from cluster and cluster initiative success;
- Cognitive reason: cluster theory remains one of the prominent currents in contemporary economics; its further development demands constant sophistication of analytical tools and modes of empirical research; this can be done mostly due to elaboration of new indicators or excelling of existing ones

Our attempt to study the success of cluster management initiatives through the application of AHP method stems from this fourth reason. And as in the case of social sciences one can notice that part of progress in empirical theory (theory founded on empirical testing of hypothesis) depends heavily on precise notions, strictly defined independent and dependent variables, proved methods of gathering data, and good measuring scales. Statistics certainly cannot offer a ready, satisfying patterns and procedures of drawing conclusions from any set of data. So there is a need for selecting and assessing quality of data at researcher's disposal. It is particularly strongly felt when data come from respondents in social surveys, from participant observation, focus groups sessions, content analysis and so on. Methods listed above always bear some risk of subjectivism and arbitrary decisions of what is good or bad in data we have. Thus AHP method can partly reduce the above mentioned uncertainty offering stronger ways of gathering, selecting and interpreting the validity of data.

Of course, previous studies already delivered a lot of interesting data on determinants of success of cluster initiative management. Moreover, some of these studies had explicitly formulated comparative aim of success factors measuring. Authors from Linkoping and Uppsala Universities point out that five factors ("big five") strongly influence the success of cluster initiative management: (a) idea specifying what needs cluster initiative satisfies, (b) driving forces and commitment: key highly motivated individuals in cluster initiative, (c) activities: structure of activities that make it attractive to be a member of cluster initiative, (d) critical mass; sufficient number of active members enabling meaningful and valuable exchange to occur, (e) organization: presence of a skillful coordinator able to ensure access to resources in everyday running of the cluster initiative. [Klofsten, M., Bienkowska, D., Laur, I., Sölvell, I.,2015]. This list of factors determining success of CI management comes from literature review and has rather "deductive" character. This is because of desire of authors to deliver a holistic perspective on CI development and at the same time perspective possible to use with diverse CIs [Klofsten, M., Bienkowska, D., Laur, I., Sölvell, I.,2015]. Being far from criticizing the presented framework we want to stress the necessity of further efforts going to still better elaboration of not only a lists of success factors but namely constructing such lists on the basis of inductive research, starting from social experts experience, e.g people involved in CI management. This can bring us closer to the reality of cluster initiatives management, and helps create chances to be more objective and less arbitral in defining factors of cluster initiative success. In the subsequent parts of this paper we present our position in more detailed manner.

2. Cluster Initiatives management

2.1 Cluster initiative concept

The cluster initiative concept is closely related to the terms 'cluster organization' and 'cluster policies' and often used interchangeably by different authors. However, it is worth underlining that these terms do not overlap completely.

In this paper the term *cluster initiative* will be also understood as:

- A cluster development project or any other organized effort to enhance the competitiveness of a cluster [Ketels, C., Lindqvist G., Sölvell Ö., 2006]
- Collaborative actions by groups of companies, research and educational institutions, government agencies and others, to improve the competitiveness of a specific cluster [Ketels, C., Memedovic O., 2008]

Cluster initiative refers to the process of cluster-related actions, while the term cluster organisation refers to the organisational entity facilitating these processes. A cluster organisation is the legal entity that may be set up to carry out the activities of a specific cluster initiative, or, more rarely, it may be an existing organisation that has been converted to this purpose. The activities of a cluster organization are often a subset of the activities conducted within a cluster initiative. It means that, a cluster initiative can be conceptualised as a framework within which some actions may be carried out by a dedicated cluster organization and others independently by indicated parties. In a typical case, a cluster initiative may lead to the establishment of one or several cluster organisations [Lindqvist, G., 2009]. Merkl-Rachbauer and Reingruber [2012] define cluster organisation as a specialised institution of various legal forms responsible for cluster initiative management.

Since majority of cluster supporting actions are undertaken by the local regional and national authorities cluster initiative concept may also be associated with the term ‘cluster policies’ understood as ‘programs or other organised efforts undertaken by government to increase the growth and competitiveness of clusters in its constituency’ [PwC, 2011]. In European countries cluster initiatives are often established as a result of public programs support.

Having in mind that all the three concepts are so correlated the success factors identified within this study should also refer to cluster organizations management and provide guidelines for cluster policies development and evaluation.

2.2 Cluster initiatives management

Cluster management refers to ‘the management of activities that involve or may be shared by clustered firms’. It is closely interrelated to cluster facilitation i.e. enabling groups and organizations to work more effectively, collaborate and achieve synergy [Kaner, S., Lind, L., Toldi, C., Fisk, S., Berger, D., 2007]. Cluster manager facilitates ties with cluster’s current and potential members and stakeholders and when a shared vision emerges, encourages its collective realization. According the Report of PricewaterhouseCoopers cluster management can be defined as: ‘the organization and coordination of the activities of a cluster in accordance with certain strategy, in order to achieve clearly defined objectives’ [PwC, 2011]. Cluster management is a complex, interactive and non-linear process.

Following the approach undertaken by Singh [Singh R., 2011] within his research on supply chains we might state that the conflicting objectives and lack of coordination between cluster members may often result in poorer performance of the cluster in the given region. Regular monitoring and implementation of performance measurement model (framework) may help in managing inter-dependencies, increase the efficiency of joint actions and improve the performance of the whole cluster by considering the needs of the individual CI member. Moreover CI is fully coordinated when all decisions are aligned with the agreed objectives of the initiative. Lack of coordination or poor coordination occurs when governing agents of the CI have incomplete information and undertake incentives that are not compatible with those objectives. In view of increasing importance of coordination for success of cluster initiatives, the proper management model and guidelines should be proposed.
Cluster initiative’s success might be understood as fulfillment of CI’s vision, mission, strategy and objectives as well as achievement of the desired outcomes and impacts of the cluster performance. The vision of the cluster represents a framework for the cluster’s strategic planning, specifying what the cluster would like to achieve in the long-term perspective, while the cluster mission refers to cluster organization’s role in achieving it. Cluster strategy determines the actions that have to be undertaken in order to realize the cluster vision. The detailed action plan usually consists of the following six elements [PwC, 2011] (1) Direction, specifying the long term

goals of the CI; (2) Scope, representing the key activities of the cluster initiative; (3) Competitive advantage, specifying the key strengths of the CI and ways of their utilization; (4) Resources, representing key resources (i.e., skills, assets, finance, relationships, technical competence, facilities) that are necessary for the realization of the cluster vision; (5) Climate, referring to external factors that might affect cluster's development (e.g., political, economic, legal factors); (6) Stakeholders; values and expectations of the key stakeholders and their effects on cluster's development.

Achieving cluster initiative success is a complex issue that demand multilateral coordination and requires more than just achieving the goals of individual organizations. It requires collective action and the management of these activities. Although, many cluster initiatives may not have a legal form its proper management is critical for overall effectiveness.

3. Methodology

3.1. Analytic Hierarchy Process method overview

The AHP (Analytic Hierarchy Process) method was selected for determining the relative importance of different success factors of cluster initiatives management. The AHP method is characterized by simplicity, applicability to various areas of science and high effectiveness in problem solving. Therefore, it can be successfully applied to estimate priorities (weights) in the area of cluster initiatives management. The AHP involves three major stages [Chen, C., Huang, C., 2004] [Wind Y., Saaty, T., 1980]: (1) 1st stage is a decomposition of a complex problem into a hierarchy; each level consists of a few manageable elements, which are in turn, decomposed into the given elements of the problem, typically the specific courses of action, which construct the lowest level of the hierarchy. A decision problem hierarchy is an efficient way of identifying the major components of the problem. The number of elements in each branch of the hierarchic decision tree should be more or less comparable. Moreover the elements should be of the same order of magnitude with respect to the basis of comparison. With regard to the principle of hierarchical decomposition, (a) the lower level elements must be outer-dependent on the associated level above, (b) the lower level elements must not be inner-dependent with respect to the elements at the level above, and (c) the higher level elements must not be outerdependent on the level below. A typical AHP model consists of an overall goal, a set of criteria to specify the goal decomposed to subcriteria, and the decision alternatives to be evaluated – constructing the lowest level of the hierarchy [Wolfslehner, B., Vacik, H., Lexer, M., 2005].

3.2. Research questions, aim and hypothesis

Since cluster initiatives are an important 'strategic tool' for regional development, the following questions have been taken under consideration and formed the basic research/study framework for the subsequent interviews and questionnaires. Based on the literature review, the following research questions were formulated:
1) What is meant by cluster initiatives management success?
2) How can cluster initiatives management success be achieved?
3) What are the Critical Success Factors of cluster initiatives management?

Main aim: to identify Critical Success Factors of cluster initiatives management effectiveness and to define the optimal cluster initiatives management model.
Main hypothesis: Estimation of Critical Success Factors of cluster initiatives management allows to determine the optimal model of cluster initiatives management.

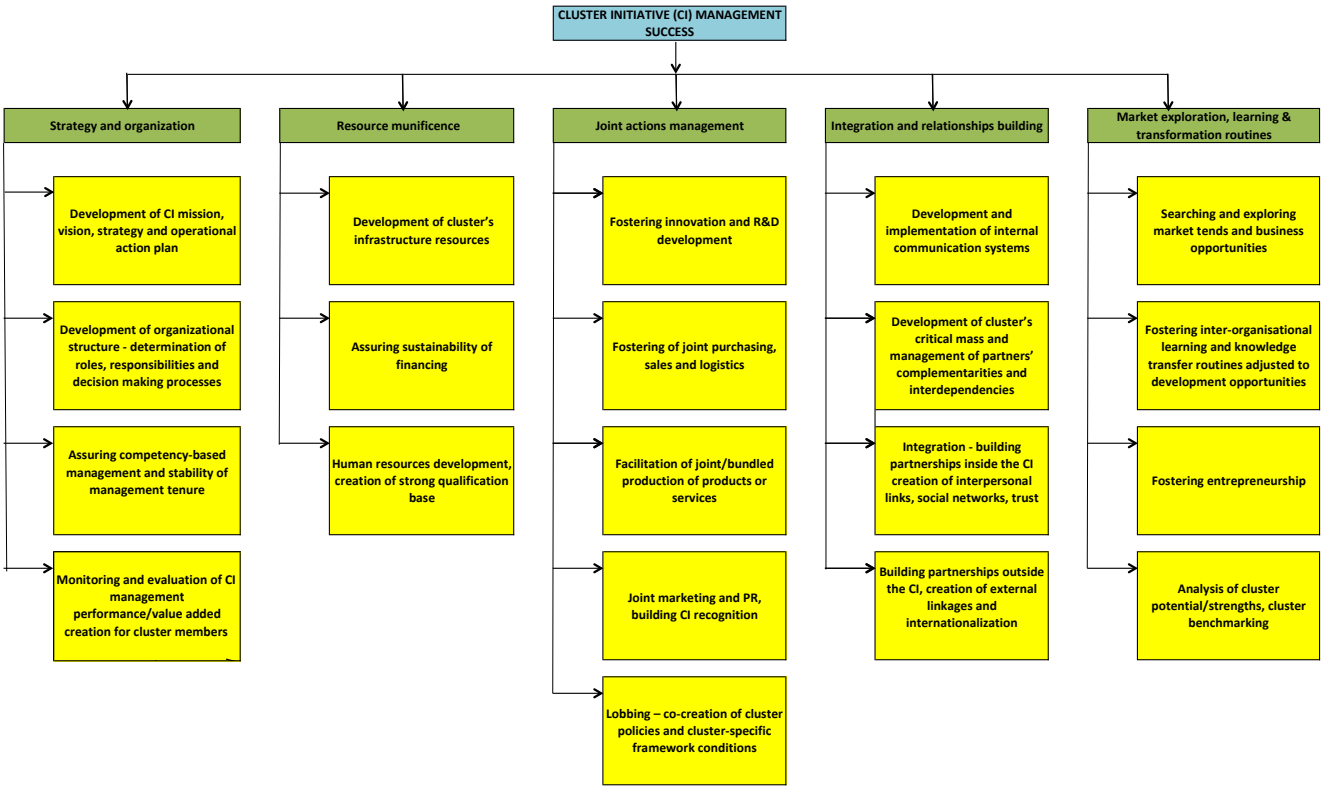
3.3. Application of AHP method for identification of Critical Success Factors of cluster initiative management

In order to determine the Critical Success Factors of cluster initiatives management the following steps of Analytical Hierarchy Process approach were adopted:

1) Extensive literature review and formulation of major criteria and subfactors/subcriteria affecting effectiveness of cluster initiatives management; Based on extensive review of existing literature on the cluster performance the list of success factors that ought to drive cluster initiatives performance was prepared. The extensive review was performed in related databases such as: Scopus, Science Direct, Emerald Intelligence, Google scholar. Initial research into the literature review was conducted in order to select keywords, which were utilised for further research.
2) Preparation of questionnaire used in AHP approach; AHP method was used for eliciting and refining judgments from a panel of experts. It allowed the experts to identify and elaborate on these factors, they consider important. Questionnaires were filled in during face to face or skype meetings.
3) Selection of the expert group taking part in AHP evaluation of CSFs; The success of an AHP study is largely dependent on the quality of the participants/experts therefore, the nomination of people who would be taking part in a study should be very precise and carefully thought out. This study was conducted among Polish and European cluster coordinators and managers representing cluster initiatives from 10 different countries of various development stages and specializations. Moreover, majority of experts were top quality managers holding European awards or representing formally recognized and labeled cluster initiatives.
4) Prioritization of CSFs with AHP method - collection of experts opinions/ideas/judgments about CSFs of cluster initiatives (filled in questionnaires) and formulation of hierarchical structure of the identified critical factors. At this phase of the study a pair wise comparison questionnaire of the success factors identified in previous phases was developed and used to collect pair wise comparison data. Evaluators of the criteria (experts) were expected to answer a series of questions such as: which of the criteria rank is more important in relation to cluster initiatives management success and which of the subcriteria are more important in relation to the given criterion as well as to what degree they are more important in the scale from equally important to absolute dominance. The evaluator's task was to mark in the pairwise comparison table the dominance of one criterion above another on the verbal scale from weak to absolute (extreme) dominance, called the fundamental preference scale of T. Saaty. If one criterion did not outweigh another in relation to the respective goal of comparison, i.e. in the case of equivalence of both criteria in the expert's opinion, the evaluators (experts) marked equal dominance of the criteria (the lack preference for one above the other). By the pair wise comparison data, the priority and ranking of each criteria and subcriteria in terms of effective and successful CIs management was obtained.

Figure 3.1 shows the hierarchy tree for making the decision about the priority of factors affecting cluster initiatives management success. The success factors identified in the literature review have been classified in 5 success criteria: ‘Strategy and organization’, ‘Resource munificence’, ‘Joint actions management’, ‘Integration and relationships building’ and ‘Market exploration, learning & transformation routines.

Figure 3.1. The hierarchy tree of cluster initiatives management success



Source: Own work

The table below presents definitions of all the main criteria and subcriteria distinguished.

Table 3.1. Definitions of criteria and subcriteria

Criteria	Subcriteria	Definitions
Strategy and organization		Set of management activities related to development of a cluster vision, mission, strategy, organizational structures, assuring stable competency-based management team and performance monitoring and evaluation practices
	Development of CI mission, vision, strategy and operational action plan	Set of management activities related to development and implementation of a cluster initiative's vision, mission, strategy and an action plan in close cooperation with the cluster participants. Internal process in which the needs and expectations of cluster stakeholders are discussed and translated into objectives and actions.
	Development of organizational structure - determination of roles, responsibilities and decision making processes	Set of management activities and supporting tools dedicated to determination of governance structures, controlling and decision-making processes within a cluster initiative. Operational rules and bylaws, for supporting the operation, regulation, and control of the CI structure: actors, positions, authorities, roles, rights, responsibilities and relationships between them developed and accepted by the full breadth of cluster participants.
	Assuring competency-based management and stability of management tenure	Set of management activities related to assuring competency-based management of cluster initiative and stability of management team, employment of highly qualified cluster manager and cluster management team and constant development of their qualifications and skills.
	Monitoring and evaluation of CI management performance/value added creation for cluster members	Set of management activities dedicated to planning, monitoring, evaluating and rewarding CI management performance based-on the definition of key performance indicators. Development of quality assurance system dedicated to performance monitoring and evaluation of cluster strategy execution and value added creation for cluster members ('client' satisfaction assessment). Implementation of consistent and effective ways to document and track activities/processes and integrate quality-oriented improvement approaches.

Resource munificence		Set of management activities dedicated to acquisition and sustainability of financial, human and infrastructure resources.
	Assuring sustainability of financing	Set of management activities and supporting tools associated with assuring the financial health and long-term sustainability and the efficiency of a cluster initiative. Development of a financing model based on regular and variable income sources such as: membership fees, sponsoring and donations, fees for services offered by the cluster management, incomes generated from patents and licenses owned by the cluster organization etc. as well as acquisition of external private and public funds.
	Development of cluster's infrastructure resources	Set of management activities and supporting tools for developing and managing CI infrastructure resources such as cluster offices, laboratories, communication and ICT systems, etc.
	Human resources development, creation of strong qualification base	Set of management activities dedicated to acquisition and development of highly talented and skilled human resources. Set of routines such as: provision of specialized trainings, support of regional educational institutions and infrastructure, talent acquisition from outside of the region, attraction of external companies with highly skilled labour force.
Joint actions management		Set of management activities and extent of routines dedicated to identification of partnering opportunities, development and supervision of cooperation projects between cluster actors (project portfolio management).
	Fostering innovation and R&D development	Set of management activities and extent of routines dedicated to stimulating development of joint R&D and innovation projects, technology transfer and scientific cooperation. Actions associated with improving innovative capabilities of cluster members.
	Fostering of joint purchasing, sales and logistics	Set of management activities and extent of routines dedicated to stimulating joint purchasing, sales and logistics among cluster actors.
	Facilitation of joint/bundled production of products or services	Set of management activities and extent of routines dedicated to stimulating joint/bundled production of products or services among cluster actors (development of cluster products or services – cluster external offer).
	Joint marketing and PR, building CI recognition	Set of management activities and extent of routines dedicated to development of cluster's marketing and PR system that facilitates communication with potential new members, external stakeholders and the general public. Actions associated with creating awareness of cluster vision and strategy, promoting the cluster brand, building international and national visibility and recognition of cluster and its actors. Development of marketing materials and tools for reinforcing the image of a cluster (publications, press releases, fairs etc.).
	Lobbing – co-creation of cluster policies and cluster-specific framework conditions	Set of management activities and extent of routines associated with improving cluster-specific framework conditions, extending location attractiveness and advantages, improving business climate and living conditions.
Integration and relationships building		Set of management activities and supporting tools associated with development of cluster internal communication, critical mass, internal and external relationships and partnerships.
	Development and implementation of internal information and communication systems	Set of management activities and supporting tools associated with creation of cluster internal communication system including websites, intranets, newsletters, bulletins, cluster resources and competence databases, suppliers and services catalogs etc.
	Development of cluster's critical mass and management of partners' complementarities and interdependencies	Set of management activities and supporting tools dedicated to the recognition of cluster members capacities and needs, gaining long-term commitment of CI stakeholders, mobilisation of the relevant regional players ensuring proper composition of cluster participants and representation of the whole value chain (involvement of all triple helix actors, assuring high quality of business and R&D sector and presence of competitors).

	Integration- building partnerships inside the CI creation of interpersonal links, social networks, trust	Set of management activities and supporting tools dedicated to building personal relationships and mutual trust among cluster members through organization of networking and matchmaking events, facilitation of internal partnerships.
	Building partnerships outside of CI, creation of external linkages and internationalization	Set of management activities and supporting tools dedicated to building partnerships outside of CI (cooperation with other clusters, scientific institutions, public authorities, supporting organisations) creating external linkages and facilitating internationalization and mobility of personnel.
Market exploration, learning & transformation routines		Set of management activities and routines dedicated to exploration of market trends, facilitation of knowledge transfer, fostering of entrepreneurship and analyzing of cluster potential and strengths.
	Searching and exploring market trends and business opportunities – building business intelligence	Set of management activities and routines dedicated to market trends exploration and identification of potentially valuable partnering opportunities related to cluster's specialization. A collaboration opportunity might be internal or external.
	Fostering inter-organizational learning and knowledge transfer routines adjusted to development opportunities	Set of management activities and extent of routines designed to facilitate collective learning process and flow of information, ideas, and resources within a cluster, as well as transregional knowledge exchange.
	Fostering entrepreneurship	Set of management activities and extent of routines designed to foster entrepreneurship and assure high dynamics of markets, products, services, new niche and market fields exploration, innovative start-ups creation, etc.
	Analysis of cluster potential/strengths, cluster benchmarking	Set of management activities and extent of routines designed to analyzing of cluster potential and strengths, including systematic SWOT analysis (macro, meso and micro levels) and international benchmarking.

Source: Own work

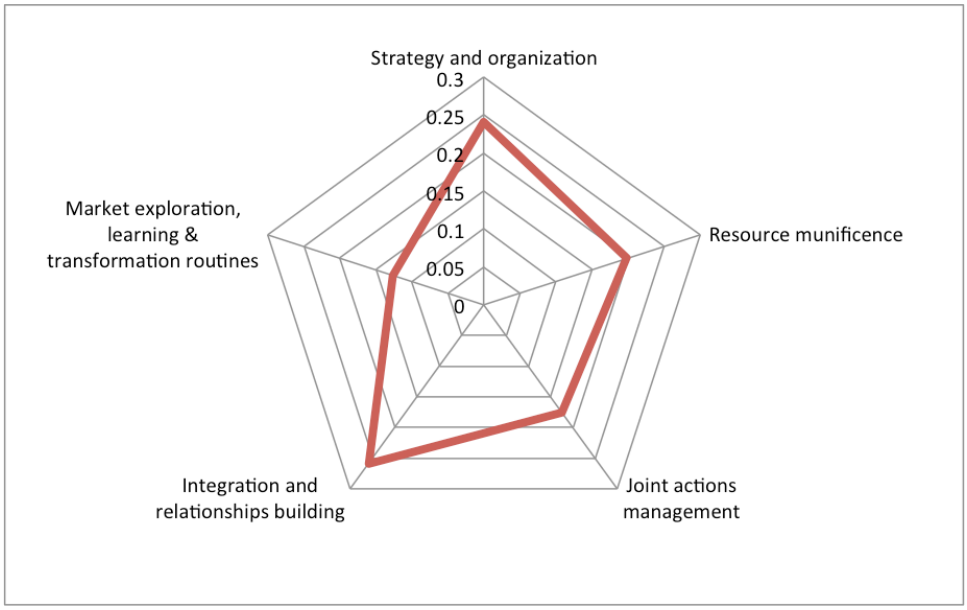
3.4. Characteristics and selection of research sample, interview structure

The cluster initiatives managers invited to be a part of the study were identified through sources such as Europa InterCluster (intercluster.eu), TCI Network databases (tci-network.org) and direct meetings during conferences, workshops, training sessions, and research projects dedicated to cluster related topics. These contacts were also used to get direct referrals to other experts identified through online search or experts databases such as LinkedIn. Out of nearly 90 experts - managers of cluster initiatives in Europe invited to participate in the study only 25 agreed to conduct the interviews. The study was conducted based on face to face and skype interviews. Each interview lasted approximately one hour. Out of 25 interviews only 19 responses qualified to be taken into consideration, the remaining 6 were either not fully completed (because of expert's lack of time) or their Consistency Ratio (CR) indicator exceeded 10%. Each expert within the interview made pairwise comparisons among the Success Factors grouped into main criteria and subcriteria. The experts represented 19 different cluster initiatives located in 10 European countries i.e. Clean Cluster (Denmark), Sustainable Infrastructure Cluster (Poland), Automotive Cluster of Slovenia (Slovenia), Cluster of Industries of Culture and Free Time INRE (Poland), South Poland Cleantech Cluster Sp. z o.o. (Poland), Gdańsk Construction Cluster (Poland), BIM Cluster - Cluster of Information Technologies in Building Industry (Poland), Luxembourg Maritime Cluster, ICT Cluster Bern (Switzerland), Clusterland Sweden/Cluster 55 (Sweden), Health Capital Berlin-Brandenburg (Germany), Cap Digital (France), ArchEnerg Cluster International Renewable Energy and Building Trade Cluster (Hungary), INNOSKART ICT Cluster (Hungary), Wielkopolska ICT Cluster (Poland), LifeScience Cluster Krakow (Poland), Business Upper Austria - OÖ Wirtschaftsagentur GmbH (Austria), ClusterAgentur Baden-Wuerttemberg (Germany), bioPmed Healthcare Innovation Cluster (Germany)

4. Research results

Results of comparisons of all 5 main criteria to the main goal cluster initiatives management success are presented in the Figure 4.1. The comparison was made based on the geometrical means of all experts' responses. 'Super Decisions' software was used for the computation of all priorities. The priorities were calculated for all cluster initiatives represented in this study regardless of their development stage, type of industry or location. The highest rank was given to 'Integration and relationship building', including the following subcriteria: 'Development and implementation of internal communication systems'; 'Development of cluster's critical mass and management of partners' complementarities and interdependencies'; 'Integration - building partnerships inside the CI creation of interpersonal links, social networks, trust' and 'Building partnerships outside the CI, creation of external linkages and internationalization'.

Figure 4.1. Priorities of the main criteria in all studied cluster initiatives

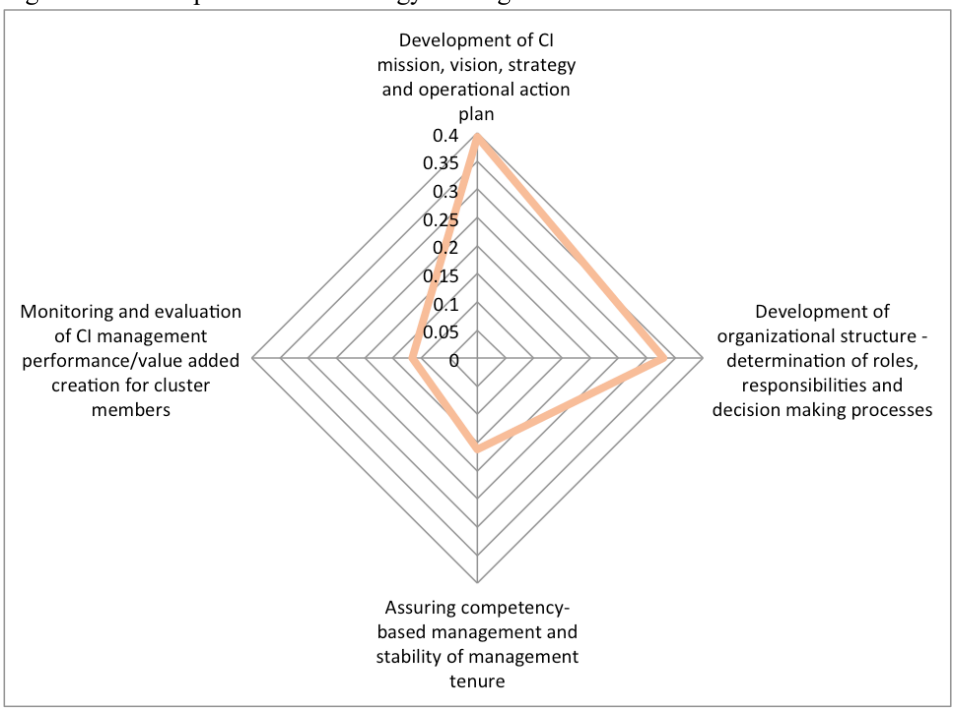


Source: Own work

'Integration and relationship building' was the most important critical success criterion of cluster initiatives management success, with 0.259 priority. The next, nearly equally high in relation to the main goal, was the 'Strategy and organization' criterion with 0.240 priority. The third most important criterion was 'Resource munificence' (P = 0.198), followed by only slightly less important criterion 'Joint actions management' (P = 0.175). The least important criterion of all five analyzed turned out to be 'Market exploration, learning & transformation routines' with priority P = 0.127.

In the next stage the subcriteria (success factors) within a given criteria (group of factors) were compared against each other in pairs. Figure 4.2 presents local priorities, the results of the comparison of all subcriteria against each other in pairs, in relation to 'Strategy and organization' criterion.

Figure 4.2. Local priorities of 'Strategy and organization' subcriteria

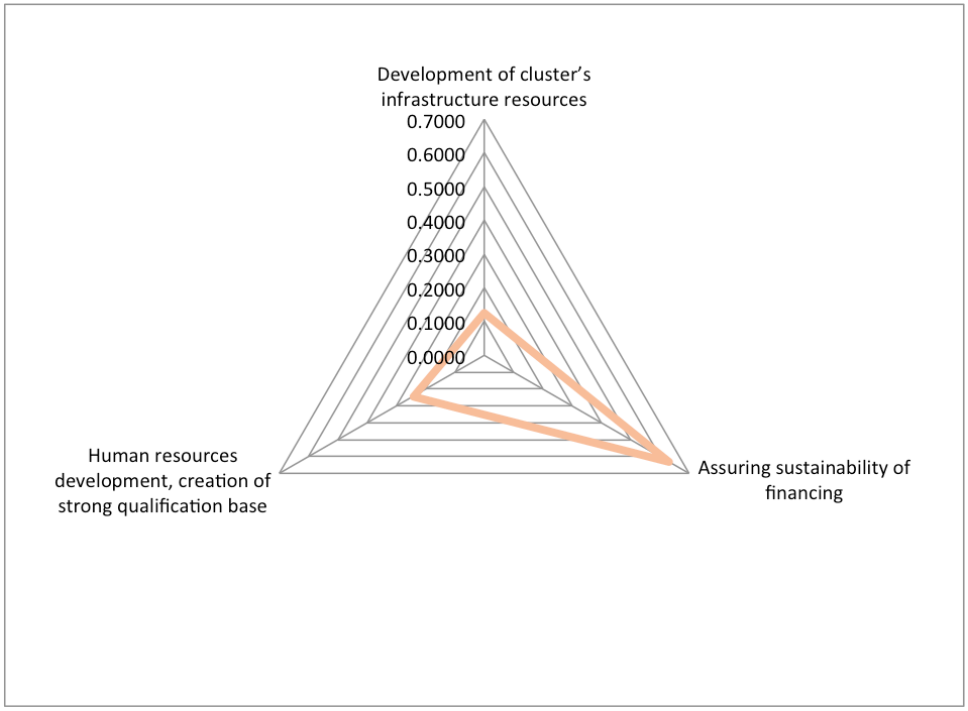


Source: own work

In this criterion the experts paid the greatest attention to 'Development of CI mission, vision, strategy and operational action plan' (P = 0.393) followed by 'Development of organizational structure - determination of roles, responsibilities and decision making processes' (P = 0.330). Third ranked 'Assuring competency-based management and stability of management tenure' received priority P = 0.163. Relatively least significant for 'Strategy and organization' success was 'Monitoring and evaluation of CI management performance/value added creation for cluster members' with priority P = 0.115.

The figure below presents the comparison of subcriteria against each other in pairs, in relation to 'Resource munificence'.

Figure 4.3. Local priorities of 'Resource munificence' subcriteria

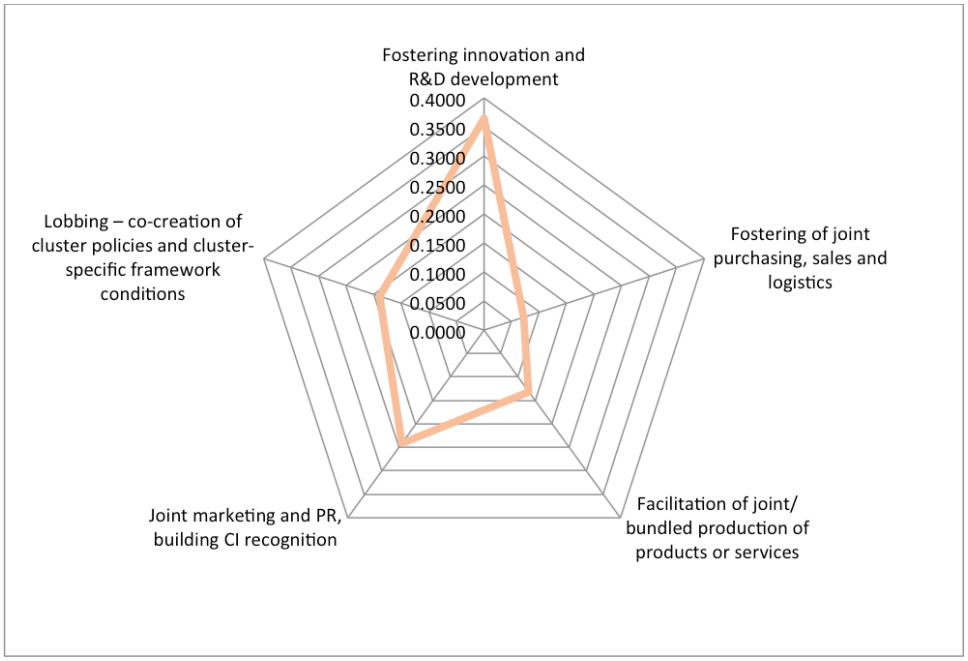


Source: own work

In the 'Resource munificence' criterion the experts paid the greatest attention to 'Assuring sustainability of financing' (P = 0.632). The next ranked subcriterion was 'Human resources development, creation of strong qualification base' with priority P = 0.243. The third criterion - 'Development of cluster's infrastructure resources' received the lowest priority P = 0.125.

The following figure presents the comparison of subcriteria against each other in pairs, in relation to 'Joint actions management'.

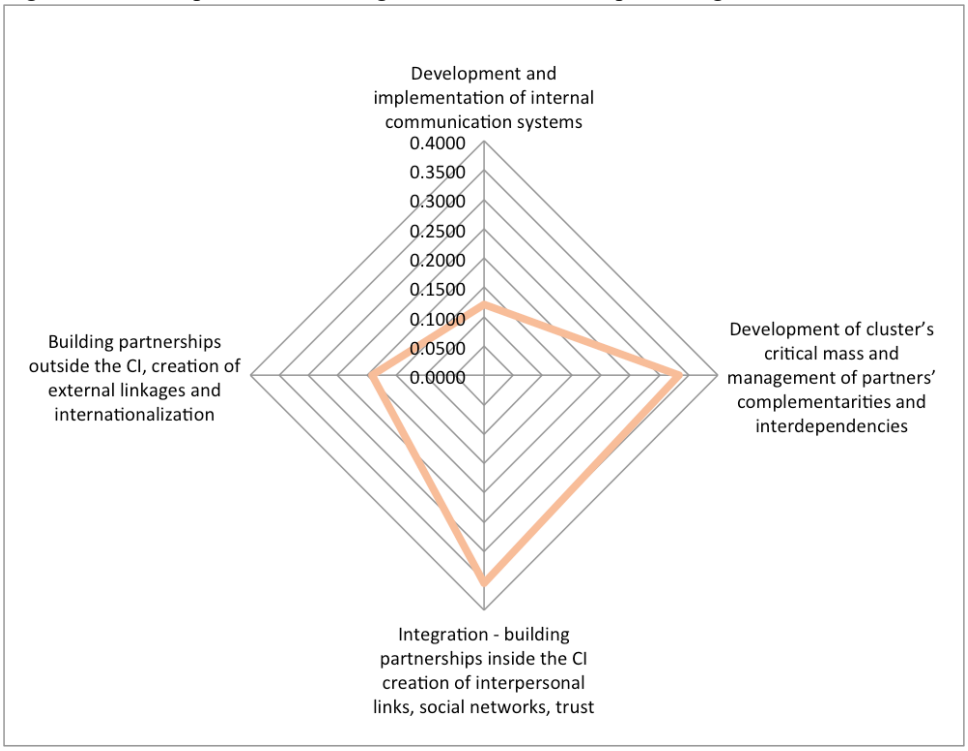
Figure 4.4. Local priorities of 'Joint actions management' subcriteria



Source: Own work

Within this group, the experts gave the highest priority to the 'Fostering innovation and R&D development' subcriterion (P = 0.364). The second most important subcriterion 'Joint marketing and PR building CI recognition' with priority (P = 0.241) was followed by 'Lobbing – co-creation of cluster policies and cluster-specific framework conditions' (P = 0.190). The two least important subcriteria: 'Facilitation of joint/bundled production of products or services' and 'Fostering of joint purchasing, sales and logistics' received accordingly P = 0.132 and P = 0.073.
The Figure 4.5 presents the comparison of subcriteria against each other in pairs, in relation to 'Integration and relationship building'.

Figure 4.5. Local priorities of 'Integration and relationship building' subcriteria

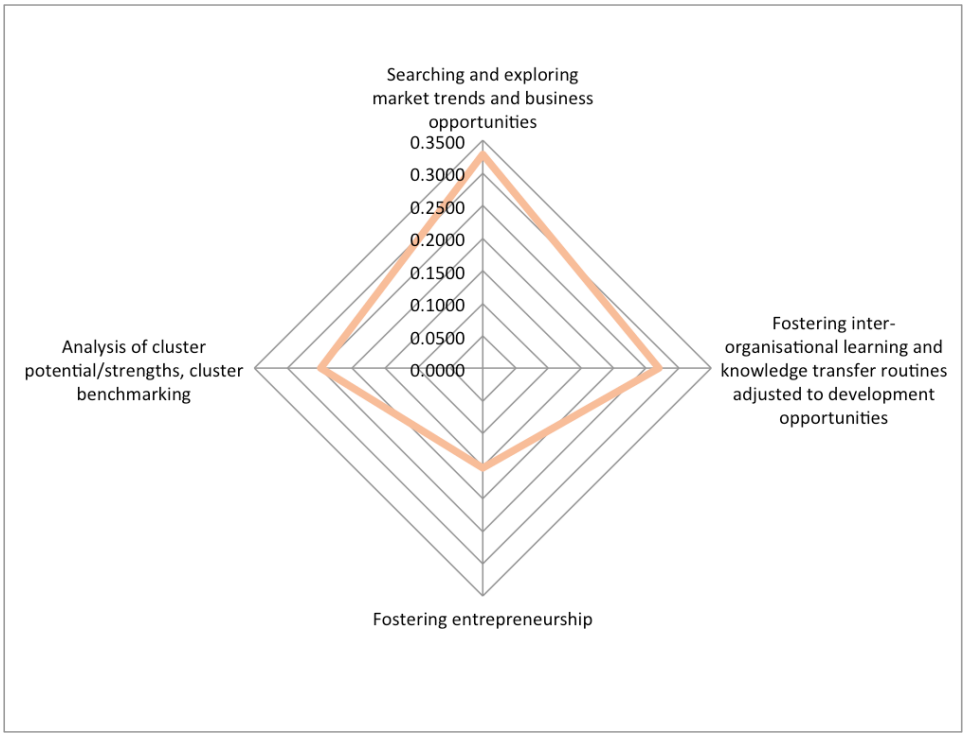


Source: Own work

Within this criterion experts assigned the highest priority to the subcriterion of 'Integration - building partnerships inside the CI creation of interpersonal links, social networks, trust' (P = 0.354). The second almost equally important subcriterion was 'Development of cluster's critical mass and management of partners' complementarities and interdependencies' with priority P = 0.334. The two least important subcriteria in this group: 'Building partnerships outside the CI, creation of external linkages and internationalization' and 'Development and implementation of internal communication systems' received accordingly P = 0.191 and P = 0.122.

The next figure presents the comparison of all subcriteria against each other in pairs, in relation to 'Market exploration, learning & transformation routines' criterion.

Figure 4.6. Local priorities of 'Market exploration, learning & transformation routines' subcriteria



Source: Own work

In this criterion the experts paid the greatest attention to 'Searching and exploring market trends and business opportunities' (P = 0.328) followed by 'Fostering inter-organisational learning and knowledge transfer routines adjusted to development opportunities' (P = 0.269). Third rank was given to 'Analysis of cluster potential/strengths, cluster benchmarking' with priority P = 0.249. Relatively least significant for market exploration's success was 'Fostering entrepreneurship' subcriterion with priority P = 0.153.

The magnitude of the global priority determines the percent of 'contribution' of the given subcriterion for overall cluster initiatives management success. In order to compute the exact influence of each subcriterion on the whole process of cluster initiatives management success for each subcriterion its global priority was estimated. The global priority means the individual influence of each subcriterion on the process of cluster initiatives management. To obtain it, the local priority of the main criterion was multiplied by the local priority of the given subcriterion according to the following formula:

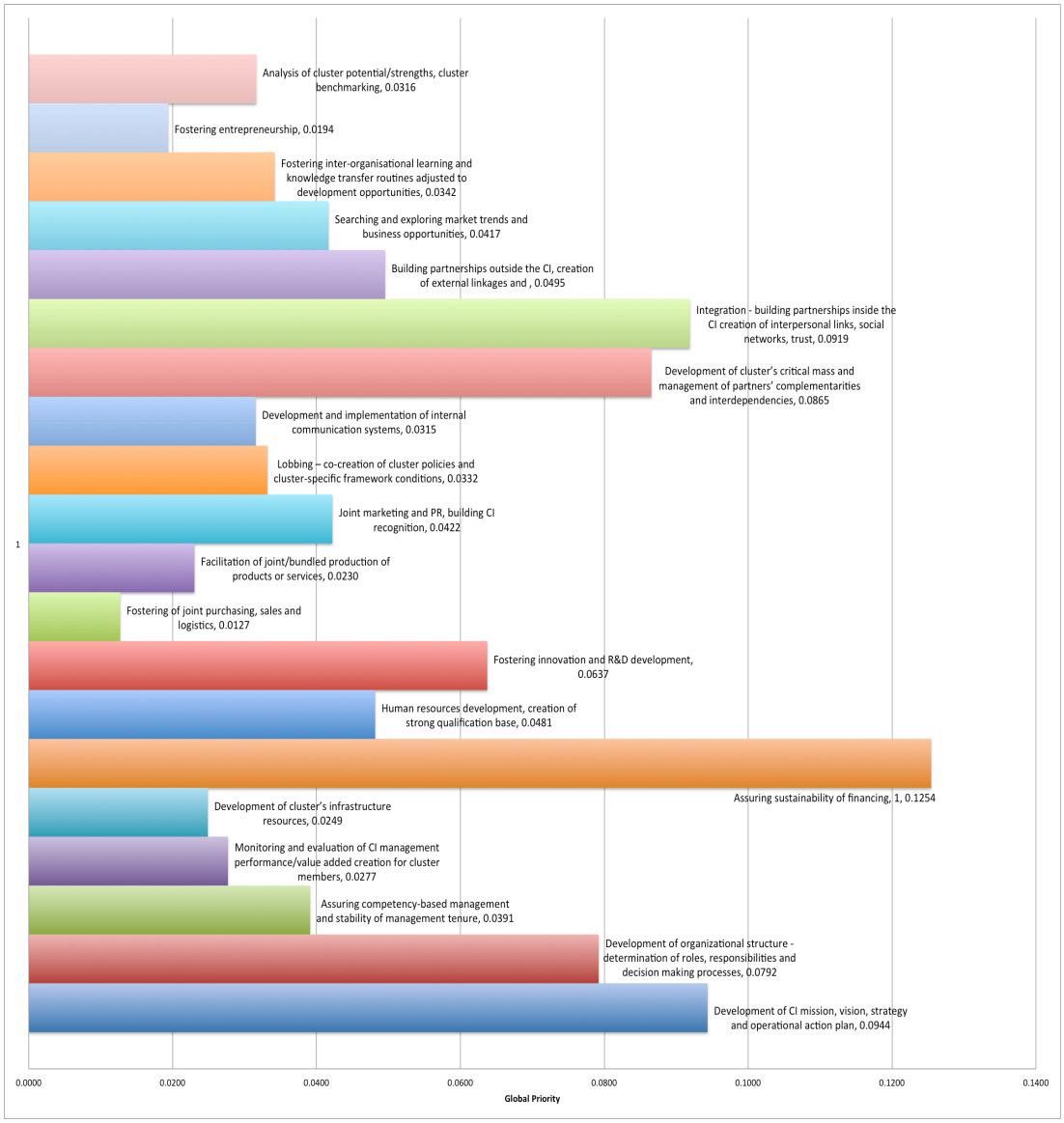
global weight (priority) of the j-thsubcriterion with regard to the i-th main criterion = [weight (priority) of the i-th criterion] x [local weight (priority) of the j-thsubcriterion with regard to the i-th criterion] *(1)*

Thus, for example, the global priority for 'Assuring sustainability of financing' was a result of the multiplication of the normalized local priority for 'Resource munificence' (P = 0.198) by the normalized local priority of 'Assuring sustainability of financing' (P = 0.632). The calculated global priority is thus equal to:

$P_g = 0.1985 \times 0.632 = 0.1254$ *(2)*

The Figure 4.7 presents the graphic visualization of all subcriteria global priorities indicated by interviewed cluster initiatives coordinators.

Figure 4.7. Global Priorities of all subcriteria in relation to the main goal



Source: Own work

According to Pareto's principle for many phenomena, 20% of invested input is responsible for 80% of the results obtained, in other words 80% of consequences are results of 20% of the causes. Taking this approach into consideration 20% of the highest ranked factors are responsible for 80% of overall cluster initiatives management success.

The top 20% ranked subcriteria were:

- Assuring sustainability of financing (P = 0.125);
- Development of CI' mission, vision, strategy and operational action plan (P = 0.094);
- Integration building partnerships inside the CI creation of interpersonal links, social networks, trust (P = 0.092);
- Development of cluster's critical mass and management of partners' complementarities and interdependencies (P = 0.086).

Joint importance of these 4 factors reached 40%, while the remaining 60% was distributed among 16 other factors. Identified Critical Success Factors of cluster initiatives management should be a basis for creation of the optimal model of cluster initiatives management and underline the areas of activity that require the most attention of governing bodies.

5. Conclusions

Cluster initiative success is a multidimensional process related to many factors. AHP analysis of collected data showed that there are chosen criteria and subcriteria that have more significant influence on cluster initiative management success than the others. The AHP based interviews conducted among European cluster managers representing 19 cluster initiatives located in 10 countries allowed to identify Critical Success Factors, which determine the key areas of activity and management focus. The research findings assigned 40% importance to the following 4 factors: 'Assuring sustainability of financing', 'Development of CI mission, vision, strategy and operational action plan', 'Integration building partnerships inside the CI, creation of interpersonal links, social networks, trust' and 'Development of cluster's critical mass and management of partners' complementarities and interdependencies', while the remaining 60% was distributed among 16 other factors. These priorities correspond with the V. Pareto's principle in which 20% of invested input is responsible for 80% of the results obtained.

The results of this study support more effective management and better organisation of cluster development processes. They are specifically tailored for entrepreneurs, willing to initiate or establishing cluster initiatives, as well as managers, responsible for CIs day-to-day operations and other CI stakeholders. They can also be utilized in the political area, as guidance for policy makers in redesigning policies of cluster initiatives support as well as monitoring and evaluation processes, so that they are based on identified CSFs.

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