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Cluster Development Guide – Cyprus

Limassol Chamber of Commerce and Industry – Limassol, Cyprus

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Summary

Clusters have been defined by Porter (1990) as "…geographic concentrations of interconnected companies and institutions in a particular field". In addition, they generally tend to specialize, use similar or same level of technologies and production methods among members, cooperate and compete and have either a formal or nonformal form. As the exact elements of each cluster vary, so does the initial creation stimulus, that can originate from a state initiative (top-down approach) or the potential members themselves (bottom-up). This has direct effects in the development and management process of the cluster on issues relating to the cluster's legal form and status, its organizational structure and operations organization. In the case of Cyprus, this opens up more options given that clustering has been identified as a tool for the eventual innovation of the national and local economy and some of the elements required for a cluster based exosystem are slowly being put in position, in the form of relevant policies and potential fields for clustering activities. However, since there are still important steps to be taken such as the creation of a concise legal framework and funding mechanisms via state and EU funds, as well as the implementation of measures for the creation of a more open and innovative economy that will provide incentives for cluster operation.

These are linked to the main identified factors for cluster success that include business, marketing, managerial and social elements. The guide further elaborates on the steps needed to be accounted for in the creation of various forms of clusters, the most usual and effective components that are required in governance terms (including the flows of operation, evaluation and monitoring aspects) and concludes, summarizing quick guidelines for cluster initiators together with the relevant essential questions that can help identify the suitability of various crucial parameters, such as timing, composition, place and form.

Introduction

Clustering is one of the potential forms of business ecosystem cooperation. As a form of organization, it appears to have many similarities to more traditional forms of cooperation such as business networks, sector associations and others. The main differences are described in the table below. The general idea behind the described differences lies in the understanding that clusters are in effect a potential evolution of the traditional organizational forms, with broader participation and goal setting, often with a scope that goes beyond market-related organizational benefits.

Clusters	**Business Networks**
Equal Standing of Participants	Hierarchical Structure
Locality	No geographical limitation
Larger Participation Improves Performance	Stable Participation
Adaptive Relationships between Partners	Predefined Relationships
New entity	Part of Normal Activities
Includes businesses, stakeholders and service providers	Includes only one type of participants
Businesses have Competitive Products	Cooperative, Complementary Products
Provision of Specialized Services in a specific area	Lowering of specialized production
Can include Business Networks	Cannot include Clusters
Broader Goals, that extend beyond the specific goals of each partner	Focus on the goals of participating partners

The following sections will focus on the Cluster as a potential form of organization describing various elements including the definition, context, typology, general benefits of clustering, as well as the specific aspects of cluster development together with the essential elements of cluster organization and management to create an e-guide on the creation of such structures in the specific economic environment of the Cyprus.

1. Cluster Definition and Content

The core of Cluster Theory has been thoroughly described by Porter in 1990, defining Clusters as"…***geographic concentrations of interconnected companies and institutions in a particular field***. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services, and providers of specialized infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies, or common inputs. Finally, many clusters include governmental and other institutions—such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations—that provide specialized training, education, information, research, and technical support." (Porter 1990). In other words, Clustering, in general, refers to the interaction of businesses of a similar type and serves the healthy competition, networking and collaboration between them.

A number of important points of the abovementioned definition require a more detailed explanation. First of all, it has to be made clear that the firms within a cluster are already interconnected and most of the time competing companies and institutions within a particular general field, meaning a wider range of firms than an industry sector. Firms in a cluster can be involved in similar and related activities without competing in the same industry itself. As a result, cluster theory emphasizes the role of networks and relationships between the various parts of a cluster but not of individual firms, and is closely related to the approach taken in all contemporary models of innovation and competitiveness, especially in the case of the EU and its policies.

Following on the first point, it is clear that the goal of cluster operation is to develop synergies with a multiplier effect on the results of the collaborating companies so that through collective action companies can achieve results that would not be able to achieve autonomously. Clusters, or business clusters,in particular, are interconnected groupings of businesses and related organizations, that are producing similar or related products or services. However, they differ from other business networks by also including within their

structures supported other supporting entities and organizations such as chambers of commerce, technology institutes, research institutes, industry associations, financial institutions, universities, etc.

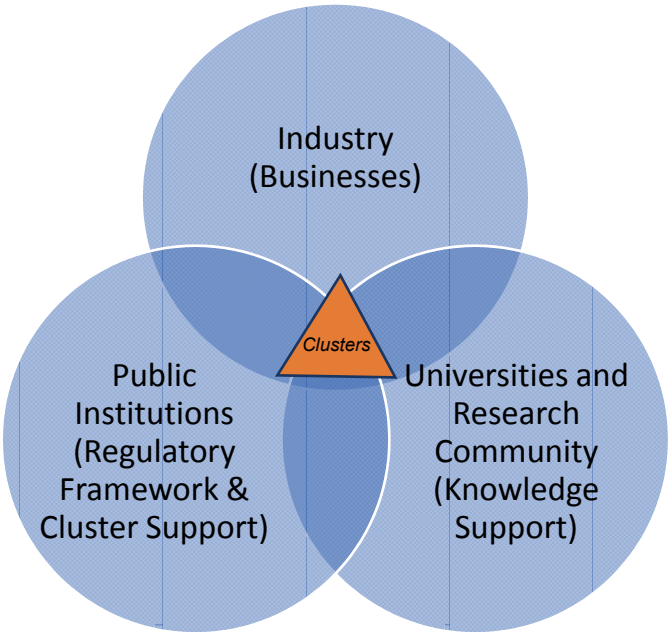

Figure 1 Clustering in the triple helix concept

Another important point refers to the identification of the basic principles behind clustering activities. The most fundamental of these are active integration of activities and collaboration for mutual benefit. Of particular practical interest in the business sector is the identification of the benefits from clustering in the various levels of economy, more specifically onan individual business level, the sector/regional level (depending on the basis for the cluster formation) and the wider economy level. Especially on the individual business level, clusters can help companies to take advantage of market opportunities that they could not achieve alone, reduce the 'barriers' of cost and risk to adapt on international rules and standards, maintain pace with innovation, technological development and evolving consumer expectations, and adjust quickly and develop appropriate responses at a higher speed. This due to the fact that businesses need not rely solely on their internal processes and strengths, but operate using combined effort, using of synergies, and pooling resources to increase their competitive advantage and reduce the risks involved in product, service or market innovation. Resulting from the participation of various actors, and not solely

businesses, clusters enable improvement of firms' capacity building by offering inter-company learning, experience sharing and mutual use of know-how, and business management.

The benefits of clustering for individual business development does not mean that the potential benefits for the two other levels should be under estimated.Business clusters are generally considered powerful engines for economic growth and an important tool for innovation and the internationalization of the activities of SMEs. Meanwhile, as they tend to create the capacity for the formation of a fertile and innovation-friendly business environment for businesses, they create spillovers extending the benefit to collaborating research organizations, suppliers, customers and competitors in the same geographical area or economic sector.

Moving beyond the opening remarks on the now classic Porter definition for clusters, it is essential to provide some further characteristics of cluster operation that originate from these basic points and verified in real life implementation. Despite the observed variables that can be expected when discussing such broad range applicable approaches, the clusters generally tend:

- To specialize in a particular field/industry with businesses connecting to each other to benefit from common technologies and capabilities, (sector connection),
- To face common opportunities and challenges,
- To use similar or same level technologies and production methods,
- To be composed of associate companies of various sizes which are close to each other spatially, (geographic connection) and operation is in the same geographical area (facilitating communication and direct transit),
- To cooperate and compete with each other,
- To have either a formal (institutional formas legal entities) or atypical form (no legal entity),
- To be created and operate ata regional level and below that (e.g. city level) rather than on the national level.

In recent years, the importance of clusters and their role in promoting economic development has been increasingly recognized and actively promoted in the EU level. Business clusters are now considered one of the most effective platforms to increase productivity, promote growth, and consequently enhancing competitiveness with immediate and significant benefits for countries. In addition, given the characteristics described above and particularly the fact that clusters tend to include similar enterprises in terms of size, cluster development programs are regarded as the most effective means for the survival and growth of SMEs. Experience in the EU level has shown that the successful implementation of such programs can help SMEs to:

- improve their performance and consequently their productivity,
- adopt the appropriate technology, and,
- increase their work cycle and their export performance.

Clusters add value to the development of the economy by creating groups of networked businesses in specific sectors and improving business capabilities by offering tailored support. They improve competitiveness, seen in a dynamic and global context, i.e. closely associated with innovation and the adoption of 'best practice'. They enable economic specialization of a particular region, in a range of related activities. Clustering allows for a differentiated approach, targeted at a wide range of economic activities, which takes into account the variation in industrial structures and business needs. Clusters can contribute to an increase in economy-wide competitiveness by facilitating policy reform, fostering private-public dialogue and becoming a catalyst for wider private sector development initiatives.

All the above mentioned make clear that the uptake of Cluster Creation initiatives can contribute effectively in tackling challenges relating to market turbulence, external competition and overcome size-related limitations, especially in economies with high and very high SMEs ratio. Especially in the case of Cyprus, according to EUROSTAT and CYSTAT statistics, the economy is dominated by small, family-run enterprises with limited export orientation. The country's economy is dominated by the service sector, mainly tourism, transport, and finance. As SMEs mainly provide low-added value support services are

unlikely to invest in R&I, and tend to concentrate on low-value-added products and services rather than taking risks on new products or export markets.

The percentage share of large enterprises with over 250 employees in the Cyprus market is extremely low (below 1%) and are usually highly specialized, such as pharmaceuticals, hospitality or service activities incidental to air transportation.

2. Cluster Typology

2.1 Types and Elements of Clusters

The first clusters were discovered, rather than made. Observers have noted that the economy flourishes in regions where there are many outstanding businesses in strategic alliances in an industry or along a value chain and where there are also the corresponding service providers close by, such as engineers, technical agencies, lawyers, professional accountants and tax advisers, management consultants and R&D institutes, universities and advanced training institutions. Clusters can arise on their own because more suppliers and supplementary service providers relocate or establish businesses in places where there are already enough partners. These location decisions upgrade the region in question, giving it appeal for new complementary relocations – thus the growing cluster popularity.

Cluster related literature has examined in depth the theoretical and practical aspects relating to this particular form of organization, in order to identify their typical formation characteristics (briefly presented in the previous section) and to provide a general classification regarding their membership and operational parts.

Being complex frameworks, Clusterstypically do not have a specific “creation” time, but are results of procedure and evolution over long periods of time and market operation, often following and building upon pre-existing organized co-operation, forms. However, they do tend to require a certain stimulus to take a more formal form, as discussed in the previous sections. This is rather normal when considering their holistic nature, that requires the alignment of common interest by often numerous and diversified stakeholders.

Given that, it is also normal that the exact origins of each cluster can differ. For example, the initial stimulus may have been:

- the availability of raw material, either unique or providing a considerable local comparative advantage,
- Particular soil / climatic conditions for specific products,
- Proximity to a nearby market, allowing for easy national or international distribution,
- Chance events, such as the emergence of local entrepreneurs with specific skills and ambitions,
- The local establishment of a government-funded R&D facility or the emerging of a public initiative,
- Tradition/ history and culture in a location which has generated a reservoir of know-how and experience in a particular area/ specialism.

At this point it is important to note, that clustering and the presence of other networking and cooperative schemes, such as associations, unions or development of supply chains, are not mutually exclusive[1]. It is rather the opposite that due to their trans-sectoral nature and benefits; clusters co-exist and can incorporate other networking forms giving them the potential to further expand and flourish in a more open and innovative business ecosystem. However, the exact nature and scale of these interactions are determined by the type of cluster discussed in each case.

In recent years, the general consensus shows that the main approaches on clusters are three. In many cases, especially in the EU area, regardless of the exact type formed, clustering tends to be initiated or at least supported by economic or development agencies in a national or regional scale. The three main types identified are the following:

a. National Clusters, groups of companies and organisations to collaboratively address development issues for the cluster. This type usually has the broader capacity to address policy, infrastructure and scale related issues.

[1]Networks should not be confused with the more process-oriented term, networking. The former is a formalised alliance of firms; the latter is a social phenomenon of personal interactions that moves and spreads ideas, information and best practices throughout a cluster and imports them from other locations. The ability to both network extensively and to form networks selectively is vitally important to competitive clusters.

b. Regional Clusters, as the archetypical types described in the theory developed by Porter, that are based on the assumption that industry will increasingly prosper in a specialized, networked environment. These do not have the intervention capacity of the first category, but focus on building supportive environments for the cluster members, in order to extend and take advantage of the linkages between participating firms, suppliers and other related and supporting organisations (as for example educational organisations, professional support organisations and companies and others).

c. Commercial Clusters, market-driven consortiums of companies who have chosen to collaborate in a number of areas (resources, technology, know-how). These can be membership-based, and appear to have more similarities with other business networking schemes, being more purpose or opportunity driven. Their creation can be linked to the need for a response to national or international calls for funding schemes and their field of operation tends to be narrower in scope. A sub-variety of the "business cluster", resulting by the EU approach in the promotion of research or regional cohesion policy, another type of cluster-like activity is also common, that can be described as "project clusters". These forms of cooperation are created as a result of the needs of specific projects, with a lifetime linked to the project's duration that in case of successful implementation can lead to the transformation to a 'business cluster".

Regarding the subject of cluster participation, some variation can be observed depending on the cluster's scope. A common and easily identified distinction lies with the horizontal or vertical cluster character. In the case of same sector businesses (and supporting stakeholders) with similar products, the resulting clusters can be described as horizontal, while in the case of clusters that involve more than one levels of their sector's supply chain, clusters tend to operate vertically.

Another criterion can be the focus scale of the cluster. The geographical concentration is a defining element of the clusters in general, as proximity can be an important asset in the cost-effective interactions between businesses. However, this refers mostly to product

production activities that may include the actual physical transport of material or resources, and should not be considered as an absolute criterion. This is especially true in the case of service-oriented clusters and in sectors that make good use of non-physical interaction. As a result, the regionality of clustering can extend beyond cities or regions to a statewide networking, producing local, regional or national clusters and depending on the sector to more specialized approaches such as urban or rural ones.

Following the discussion on the various cluster types, literature work and empirical studies have also produced classifications on the types of cluster elements. Although the huge spectrum of cluster operations does not allow hard-line distinctions, a generally applicable typology on membership would divide cluster membership as one of the following four categories: core businesses, support businesses, soft support infrastructure, hard support infrastructure.

The leading businesses in the cluster can be described as Core Businesses, with the capacity to earn income from customers beyond the cluster's boundary. These usually operate as cluster initiators and are the main implementors and beneficiaries of its activities. On the second level of cluster structure lay the Support Businesses, whose contribution is the directand indirect support of core businesses. These may include suppliers of specialized machinery, components, raw materials; and service firms including finance/venture capital, lawyers, design, marketing and PR, and are highly specialized and physically located close to the core businesses.

Beyond the businesses (core and supporting) that constitute a cluster lay the supporting infrastructure elements. These come in two forms, soft and hard. As in other cases, soft support infrastructure refers to the linkage and successful involvement of stakeholders (of an appropriate scale to the cluster's type). Empirical results show that high-performance Successful clusters have community-wide involvement. Local schools, Universities, polytechnics, local trade and professional associations, economic development agencies and any other relevant can support activities. In addition to soft infrastructure, many clusters require the support of physical (hard) infrastructure: roads, ports, waste treatment, communication links, and other amenities. The quality of hard infrastructure should in

principle be at least similar to that of competitors. These four separate elements in a cluster can be portrayed as concentric circles as shown in the image below.

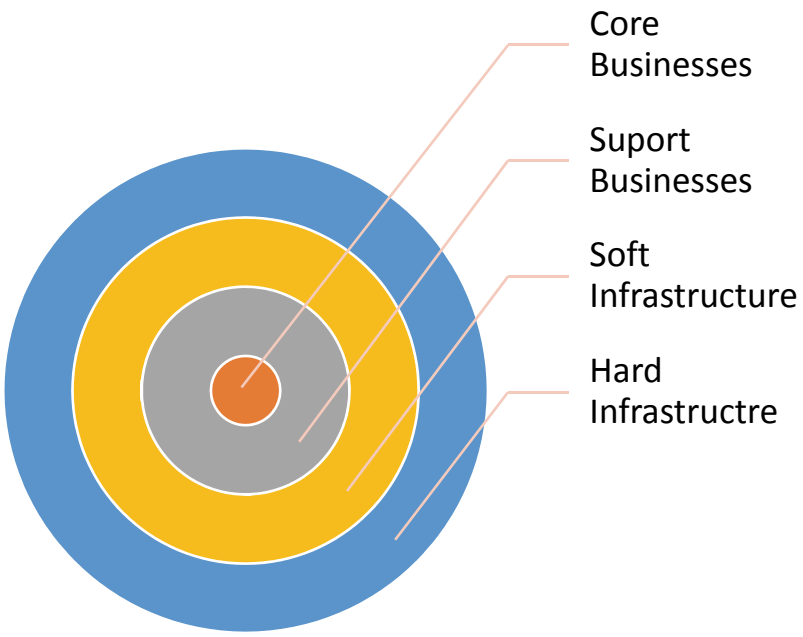

Figure 2 Cluster Elements

2.2 Innovation Ecosystems Elements and Clusters

Given the central role of clustering in contemporary innovation and R&D policies, a few notable mentions have to made to the role of selected innovation ecosystem components. Business incubators and science parks have become popular and often an important institution that can be found in cluster areas and close to universities. It has also been used in business politics to increase the number of firms in regions with low levels of entrepreneurship. These are usually the focus of serious investment activity by government agencies, universities and municipalities. The aim of the incubators is to assist upcoming ventures in the early stages. Other innovation ecosystem elements appear to be important organizational products of clustering environment. These include entrepreneurs, spin-off firms and new firms founded by of the system actors. All these benefit from the improved business environment of clusters such as resources necessary to start a new company, social ties and confidence building,

2.3 Government Support Roles in clustering

Public authorities and government institutions have an undeniably important role to play in clustering activities. The exact role of these institutions varies depending on the scope and aim of each cluster, but the following list includes the ones most commonly required.

- Providing for hard infrastructure required by all economic activity, including clusters and similar networking activities.
- Forming effective and supporting policy frameworks for innovation systems, by aligning the private and public sectors in a systematic and coordinated approach to SME development.
- Commit, collaborate and cooperate in networks and in networking activities, providing support as required.
- Creating and supporting clustering communication channels and disseminate relative information.
- Defragmentation of cluster-related public and governmental services structures and creation or designation of new targeted agencies to accommodate cluster needs.
- Re-organizing of government information delivery services to provide accurate cluster related information.
- Creation of entrepreneurial support and learning networks.
- Development and training of a specialized work-force responding to new needs.
- Using cluster as a context for the above-mentioned training.
- Promotion of the development of cluster skill-centres.
- Stimulation of innovation and entrepreneurship.
- Provide national and seek EU funding.
- Creation of enabling financing vehicles.
- Allocation of resources and investments to maximize impact and send signals.
- Promotion of competitive funding programmes.
- Investment in cluster-based R&D.
- Promotion of the use of incubators.
- Creation of technology centres.

- Use of clusters as a promotional tool.
- Support of the development for export networks and know how to exchange.

Further classifying the potential governmental influence or role in clustering, the following table should also be taken into account.

Government should	Government may	Government should not
• Support *all* existing and emerging clusters • Participate • Enable data collection and dissemination at the cluster level • Be ready to implement recommendations	• Initiate/ Convene • Co-Finance	• Pick favored clusters • Pick favored companies • Subsidize or distort competition • Define cluster action priorities

Figure 3 Government Role in Clustering

Taking into account the two lists, it becomes clear the eventual role of government agencies (or other agencies, depending on the level of cluster implementation) would be the role of initiator (via legislative actions, policy drafting or incentive provision), facilitator/cooperator (via participation) or coordinator (in a national scale of policy issues). It is still important to contemplate that clusters refer to institutional structures operating within markets and following market rules. In that sensegovernmental and other public agencies' role would not be suited to being cluster leaders, as this can create serious market distortions by benefiting specific sectors or companies.

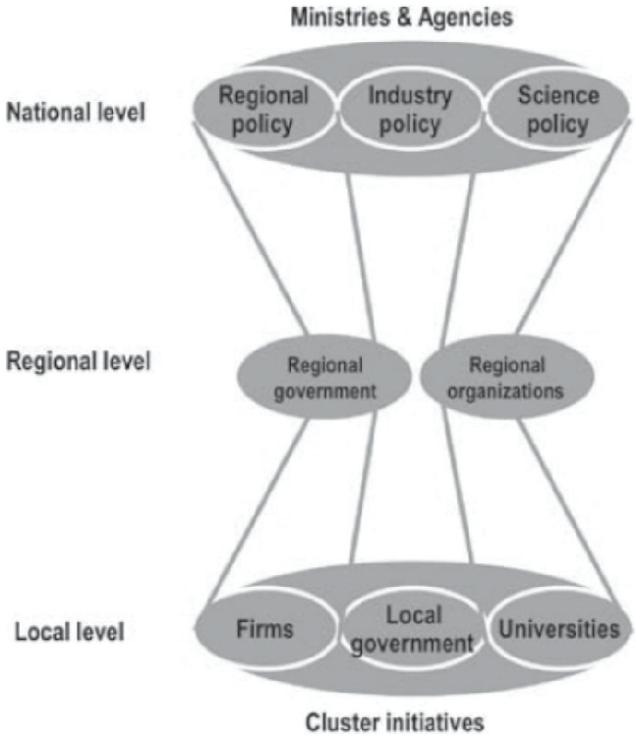

Figure 4 Potential Cluster Initiators

3. Legal Requirements for Cluster creation in Cyprus

Cyprus does not have a specialized legal framework for the creation and operation of clusters. As a result, there are no specific legal requirements that refer to the type, size, purpose or any other elements described in the previous sections and no special registry exists that would record such activities in due time.In any case, up to date clustering activity in Cyprus has been sporadic and of limited value for the formation of a clear picture of potential requirements based on practice.

Taking this into account, it becomes evident that any requirements would need to be tracked down in respective policy documents of the Cypriot government regarding business innovation and the new needs of the entrepreneurial ecosystem. While these documents do not create legal obligations to respected in the formation of a cluster, it is clear that they provide the State's approach on the subject, and, as public authorities tend to be major stakeholders in clustering, will have to be taken into serious account.

That said, it is clear that the two most important documents presenting the official view on clustering in Cyprus are the "National Policy Statement for the Entrepreneurial Ecosystem", adopted by the Cypriot Government in December 2015 and the "Smart Specialization Strategy for Cyprus" (S3CY) adopted in March 2015.

Based on the principles of said documents, the focus of entrepreneurship and innovation policy is placed on five priority themes:

- Cultivation of an Entrepreneurial Culture
- Improvement of the Business Environment
- Entrepreneurial Innovation
- Access to Finance
- Access to markets.

These will have to be applied to the priority areas identified through S3Cy and reflected in NPSEE:

1. Tourism,
2. Energy
3. Structured Environment/Construction Industry,
4. Transport/Marine,
5. Agriculture/Food Industry and
6. Health.

In addition, *Information and Communication Technologies, Environment and Key Enabling Technologies have been identified as key cross-cutting priorities.*

Adding to the above, a Cyprus' "National Integrated Industrial Strategy" is currently under development with its main objective "to increase the industry's productivity, innovation, and exports and its contribution to the country's Gross Domestic Product."(Service of Ministry and Technology, Government of Cyprus). The Strategic Pillars include Digitization of Industry, the developing new skills and enhancing existing skills, improvement of the industrial / business environment, enhancing access to finance and to markets. These two strategies need to be paired with appropriate legislation reforms for their success, a work already in progress in several sectors. Obviously, clustering will have to be an integral part of any relating legislation to effectively complement any efforts and to remain relevant as a strategic approach of the Cypriot economy.

After policy and legislation, funding and investment motivation on innovation for enterprises, whether these are SMEs or Start-ups, are the second important element for the development of a healthy Innovation Ecosystem. In this direction, Cypriot Government has, as part of NPSEEC, produced a package on Tax Incentives, with benefits of up to 50% tax exemption and up to a cap of 150.000 €, for investments in innovative enterprises whether these include their financing, shares acquisition or guarantees (Cypriot Presidency Reform Unit, http://www.reform.gov.cy/en/growth-reform/entrepreneurship-and-investments/tax-incentives-for-investing-in-startups-and-innovative-companies). These incentives have been complemented with an updated definition of innovation in enterprises, by which a company must have spent 10% of its operating expenses on research and development in at least one

of the last three years (verified by an external auditor) whereas Start-ups are assessed based on their business plan. In addition, innovation is now interpreted on a much broader basis than “traditional” R & D to include any innovative ideas that can be turned into entrepreneurship and commercial products, regardless of origin or themes.

Furthermore, international capital movement is encouraged and facilitated with the "Cyprus Startup Visa" scheme focusing on individuals or groups originating outside EU and the European Economic Area (EEA), to attract young talents for the benefit of Cypriot Innovation Ecosystem (Cypriot Presidency Reform Unit, http://www.reform.gov.cy /en/ growth-reform/entrepreneurship-and-investments/startup-visa). The final incentives refer to IP regime and bring Cyprus up to date with OECD approaches on the subject, linking R&D expenses incurred using public funds with the necessity of the regime, by allowing tax reductions from R&D profits.

4. Existing Means and Challenges for Cluster Development in Cyprus

4.1 Cluster Ecosystem Essential Elements

The previous sections of this study have presented the theoretical framework on cluster operation and the legal / policy requirement of clustering in Cyprus. Based on these, this section will examine the existing means for cluster development and whether these are adequate for the formation of a cluster ecosystem in the country. Thus, the essential requirements of a cluster system can be summarized as follows.

A cluster ecosystem requires the presence of leading core companies that can have a (comparatively) significant share in the domestic and foreign markets, supplemented by specialized supporting organizations. This concentration of cluster members needs to take place in a relatively limited area, to express and represent a local unique advantage. In the case of Cyprus, due to the relatively small size of the country and the overall coherence between its different parts, this means that the geographic element can also be met by nation scale clusters. In addition, the availability of infrastructure is of paramount

importance, to ensure a transfer of knowledge and technology, especially in service-oriented clusters, as well as the interaction between the cluster members.

The presence of internal competition between the parties to the cluster is another distinctive element that differentiates clustering from other forms of networking, as the cluster aims not in promoting a sectoral interest, but rather promote common interests of participating members individually. Structurally, any operating clustershould be able to provide advantages to its members, including the accelerated spread of the innovations, the stability of economic ties of firms participating in the cluster system, reduction of transaction costs and finally. easier and better access to technology and suppliers of skilled labour. This will have to be supplemented by a flexible composition and structure, lack of strictformal constraints and barriers to expansion and contractionof the cluster and by an openness of the cluster as a system. These final elements will be discussed in the relevant later sections of the study.

4.2 Cyprus State of the Art – Existing Means and Challenges

As mentioned in previous sections, clustering has been introduced relatively recently (2015) in Cyprus' policies as part of the innovation activities for Smart Growth. According to the National Policy Statement for the Entrepreneurial Ecosystem Action Plan of 2015, a Plan was to be created to promote the creation of Business Clusters, in order to develop strategic co-operation and to achieve economies of scale for businesses in Cyprus. The Ministry of Energy, Commerce and Industry was set as the competent authority while the Directorate General for European Programmes, Coordination and Development was identified as an institutional stakeholder. According to the initial projections, the Cluster Plan was scheduled to be launched in 2017. According to the latest progress report (2017), the estimated period of implementation was 2018-2019, with a total budget of 30.000.000 euros. However, there have been no developments regarding the issue as late as March 2019. It is expected that when implemented the programme will contribute in promoting cluster forces to address common challenges and opportunities, in networking, exchange of expertise and exploitation of a common infrastructure and in achieving critical mass and activating the entire value chain of implementing sectors.

According to the latest *Global Entrepreneurship Monitor* analysis regarding the period 2017-18 (using 2018 data)in the nine measured Entrepreneurial Framework Conditions (EFCs) (financing, government policies, taxes and bureaucracy, government programs, school-level entrepreneurship education and training, post-school entrepreneurship education and training, R&D transfer, access to commercial and professional infrastructure internal market dynamics and market openness, and social and cultural norms), Cyprus presents a mixed picture regarding Innovation and Entrepreneurship as shown in the figure below, with the best rating referring to physical infrastructure, followed by the categories relating to market and regulations. In overall, the lower ratings are predictably the ones relating to entrepreneurial education especially in early stages and the ones relating to supporting innovation such as Government Entrepreneurship programmes, R&D Transfer and financing. As these categories have long been described as the Cyprus economy's major drawbacks regarding innovation, prompting the recent changes described above, improvement need time and a steady organized approach so it is only reasonable that any progress has yet to be represented in indexes.

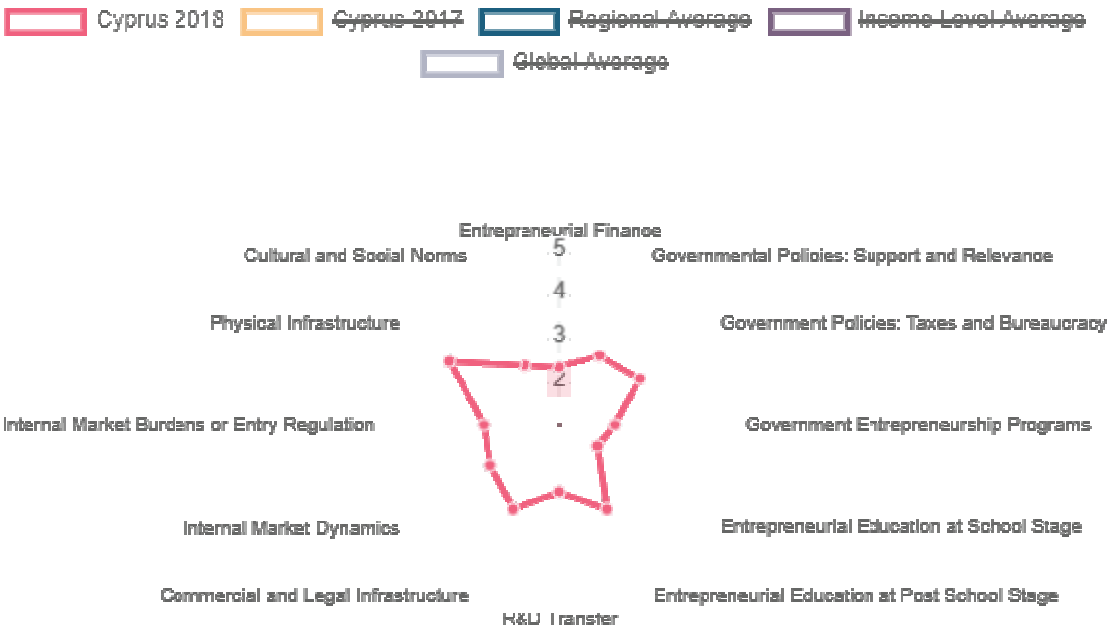

Figure 5 Cyprus Entrepreneurial Framework Conditions 2018 (GEM 2018)

In the period between the publication and endorsement of the new generation of innovation relating policy texts of 2015 and to date, a series of actions have taken place to modernize the legal system that surrounds the establishment and operation of businesses in Cyprus. One of the main activities was to simplify the legal procedures required to register a company, simplify and facilitate the procedure to submit VAT and income tax documents. Linked to this, a more attractive tax income framework was introduced to provide tax incentives to individuals to invest in innovative and start-up companies. Another activity was the development of the SME Test to assess the impact of legislative measures taken per type of business in order to avoid imposing additional burdens especially to micro businesses and SMEs. The new revised framework for Impact Assessments was approved by the Council of Ministers to be implemented as of January 1st 2017.

Since, two of the major lagging aspects of the Cypriot Business Environment are e-government and e-commerce, relevant Cypriot ministries initiated an effort to create a digital platform in order to provide information for funding Schemes related to companies (e.g., available funding, procedures to submit applications, related legal issues), so that they can easily spot available funding opportunities. At the same time, measures were taken to harmonize the Cypriot legal framework with the EU legislation on e-commerce, aiming to create a reliable system for businesses to carry out e-commerce activities and to protect consumers' rights.

Another important amendment of the Cypriot Law was the one of the income tax law of the intellectual property regime (the IP box regime) (exploitation and/or sale of intangible assets) by the Cypriot Parliament, an improvement that is recorded in numerous international reports since. The amendment targeted the alignment of the Cypriot IP regime according to the relevant recommendations of the Organization for Economic Co-operation and Development (OECD) and applicable EU rules. Finally, a notable initiative was the "Startup Visa program/scheme" aimed to attract entrepreneurs from third countries to create and register a startup in Cyprus.

A major recorded obstacle for innovation in the Cypriot legal framework has been the exclusion of public universities from creating spin-off companies, constraining the commercial uptake of university research, despite the relatively positive R&D profile of Cyprus universities research. To address this legal obstacle and align the law of public universities with best practices applied in advanced economies of Europe, North America and Asia, the three public universities of Cyprus worked in collaboration with government stakeholders and came up with a "framework" of proposed amendments to the law governing the public universities in order to allow them to establish private legal entities with private inventors, investors and entrepreneurs. In parallel, the Research Promotion Foundation of Cyprus as the main instrument of the innovation application in the Cypriot entrepreneurial ecosystem, developed an initial business plan to establish and operate a Technology Transfer Office to develop know-how and support services for the academic and research institutions, in order to support them in exploiting their research results and in securing their intellectual property rights.

In addition to the systemic shortcomings of the business ecosystem in Cyprus, there is a further element that needs to be referred into as a potential challenge for clustering, and this is the apparent lack of entrepreneurship education. This is particularly reflected in the GEM and EFC indicators relating to the social parameters of entrepreneurship. This is both the cause and result of a traditionally structured and fragmented economy based on very small sized businesses, which in many cases are family run in isolation to other economic players other than those absolutely required (suppliers, customers, sources of finance). As it is easily understood, a business environment of this type tends to focus on reduced risk taking and risk intolerance, which when combined with an apparent lack of collaborative culture, lead to a relative stagnation in innovative schemes. Finally, a significant challenge for the development of cluster-based economic activities is the often-lacking available information for businesses regarding novel approaches in services and products, leading to a low degree of implemented innovation for many businesses.

5. Cluster Structure Recommendations

The complexity of cluster interactions and the complexity of relationships they require for their unobstructed operation, place them at the climax of ecosystems of innovative and high-tech business sectors and of any other sectors they are met.

As a result, the clustering approach appears to have certain requirements and components that are needed for its appearance, as well as a distinct number of developing stages after that stage. Thus, in principle these requirements include:

- People-to-people contact
- Consensus on key issues
- Collaboration at multiple levels
- Community-wide involvement in the process of building new linkages between communities, businesses and government.

The cooperation towards common goals, both by firms and other stakeholders, within a concentrated geographical area and working towards establishing linkages and alliances to improve the collective competitiveness, lies behind cluster reasoning. Clustering can help a clump of co-located firms and organizations turn into a high-performance system. This works at the system, rather than an individual organization, level. Thus, an active local cluster includes firms and support organizations working together to achieve results that would not be possible individually.

Afurther key component of any high-performance cluster is extensive informal and formal networking between firms – even competitors – right across the cluster, and between firms and their supporting infrastructure. ‘Soft’ networks (such as local professional and trade associations) and ‘hard’ networks (strategic alliances between firms) are both important and can have their place within clusters. The development of such networks is supported by a local culture that enables both competition and cooperation to thrive. It extends beyond successful lobbying under a new name. A clustering approach certainly does provide an effective means of gaining access to government agencies and making local priorities clear,

but the creation of a mechanism for wide improvements in areas of common concern is more important.

This mechanism for institutionalizing teamwork is a key component of a local innovation system. Sinceinnovation increasingly relies on close interaction between the science base and the business sector, the most effective communication of tacit information is happening when the separate components of the cluster are near to each other. New products increasingly use different technologies, and technologies are increasingly based on different scientific disciplines. The degree of connectivity amongst knowledge agents, and between them and firms, is a key aspect of a high-performance innovation system. Companies, in particular,specialized SMEs, rarely have the resources to innovate alone. However, unless an effective incentive system is in place to encourage linkages, firms are likely to remain isolated from knowledge agents.

As a result, the cluster structure will brave to be designed with the focus on linking and aligning all the elements. An effective clustering approach links the separate elements of an innovation system, aligns the private and public sectors, and facilitates a 'whole-of-government' approach at a local level in support of local clusters.

That said, a number of factors can already be identified as important for the success of a cluster:

- The presence of businesses with adequate potential output in terms of economic performance, market access and ability to innovate;
- The existence of clear expectations and orientation towards benefits as a basis for the active involvement of the partners in the cluster and the cluster activities;
- The need for pre-trial cooperation or consultation of the potential partners of the cluster, through business networking;
- The readiness to engage in active pooling of knowledge, and specifically of so-called "tacit knowledge";
- The establishing and maintaining reciprocal trust as a basis;
- A willingness for joint network management by all partners to coordinate cluster activities and handle internal and external networking (cluster management);

- The existence of an adequate though a relatively low level of internal competition between businesses of the cluster;
- The development of a common image to the public and the markets (cluster PR and marketing systems).

The sheer number of important factors shows the level of complexity that clusters present. At the same time, they have to ensure: the coherency of strategic objectives and the strength of coordinated actions. It is therefore very important to ensure a further element that has not yet been mentioned, and that refers to their efficient governance.

As clusters are mostly heterogeneous systems, consisting of a number of member businesses and partners whose information, communication and cooperation have to be structured and organized. Seen in this way, the organizational structure of a cluster is of central importance, as formal organization and rules for cooperation are giving the cluster its binding nature and ensure transparency and accountability for its members. This, in turn, is the basis for mutual trust, which again is the foundation for successful cooperation. Organizational structures also define the cluster's functions and benefits for its members. They help members to identify themselves with their cluster more strongly. This promotes the emergence of a type of "corporate identity". The organizational structure is also a key influence on a cluster 's competitiveness and vigour, as hierarchically flat and efficient structures are essential for operating successfully in international markets.

The central elements of a cluster's organizational structure are:

• Legal form (legal status)

• Structure (competences and communication pathways)

• Systems (organization of operations)

Cluster's structure needs to be light, simple, without unnecessary bureaucracy; flexible, in order to be able to adjust the strategy according to with technical, scientific, political and social changes; and finally, open, so that Cluster can benefit from interaction and know-how from similar experiences of operation in other territories.

The choice of legal and organizational form depends on the goals of the cluster (cf. section on strategy) and here specifically on the answers to the following three questions:

1. How closely do the partners in the cluster wish to cooperate?
2. What is the role of commercial activities in the cluster?
3. How quickly should new members be integrated – exclusivity versus inclusivity?

Generally speaking, clusters whose primary goal is the joint implementation of commercial activities need a different legal and organizational form, compared to clusters focusing on e.g. research and development. The general rule is that "structure follows strategy". Given that in the case of Cyprus no specific legal obligations exist regarding the exact nature of clusters, some possible legal forms for clusters are:

- association (non-profit or for-profit)
- private limited company (Ltd)
- joint stock company
- hybrid forms (mix of association and private limited company)
- foundation

Irrespective of what legal form is selected for the cluster, it is important to determine and decide on a formal cluster management structure. This involves determination and agreement on the following issues:

- Structure and composition of the cluster governance structures
- Cluster management roles and responsibilities – who does what and who is responsible for what
- Cluster management modus operandi – how the cluster management structure will interact with cluster members on a day to day basis.

Furthermore, an important element on the cluster's structure is to determine the competence and communication paths and flows. A Classic structure that has up to date proven successful commonly includes the following elements:

- Advisory board (executive board)
- Steering committee (membership committee)
- Management office (cluster manager and administration)

- Topic/theme specific working groups

It is advisable to formulate and formalize the structure of the cluster in a set of articles which are signed by all members and provide a binding basis for cooperation in the cluster. The articles should specify the legal form, goals, membership, rights and duties, and cluster organs and their functions. Job description for the Cluster Manager should be drafted which specifies the role, specific responsibilities of the job holder. Further, an operation manual should be written which sets out the operational policies, procedures systems and day-to-day working methodologies in order to guide the work of the cluster management organization.

Figure 6 Typical Cluster Structure

6. Cluster Management

6.1 Cluster Development Procedures

Given their cooperative nature and the occurring similarities to other organizational models (networking, associations, collectives etc.) cluster development stages can present a great variety, depending on the clustering initiative origins.Some common development phases are evident though, as described below:

- Information and Dissemination leading to Development of common perception & goals
- Partnership leading to Developing strategic links

- Programming Phase leading to Development of Strategy & Vision
- Maturity Phase leading to Implementation of Cluster

Of course, the cluster development stages can take other forms too. In the example set by Fowcs-Williams and displayed below, the identified phases were five, further broken down into twelve steps. However, regardless of the exact break down described by each author., the core of cluster development remains the same.

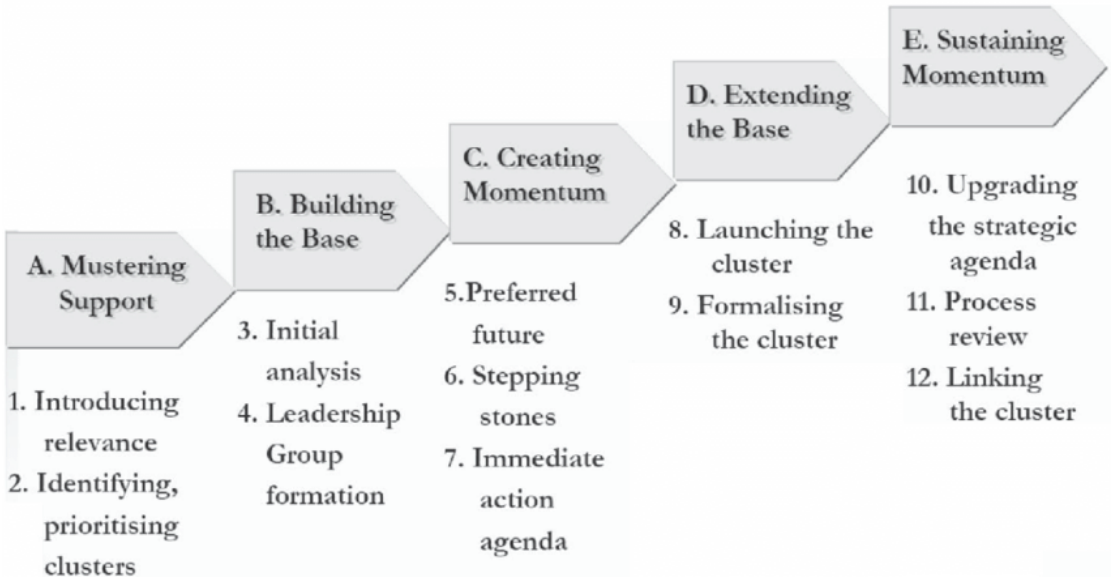

Figure 7 Five Phases, Twelve Steps Source: I. Fowcs-Williams, Cluster Development: The How, Five Phases, Twelve Steps, TCI Annual Conference, Hong Kong 2005

As clusters typically originate in either the top-down route, in which a cluster priority list is drawn on the basis of a cluster analysis or bottom-up, in which the initiative to develop a cluster strategy comes from actors within sectors themselves, specific stages and steps are taken for a successful approach have to be planed differently.

According to the top-down approach of cluster formation, usual as a result of an initiative by public authorities, a typical step by step presentation would appear to be the one presented in the figure below.

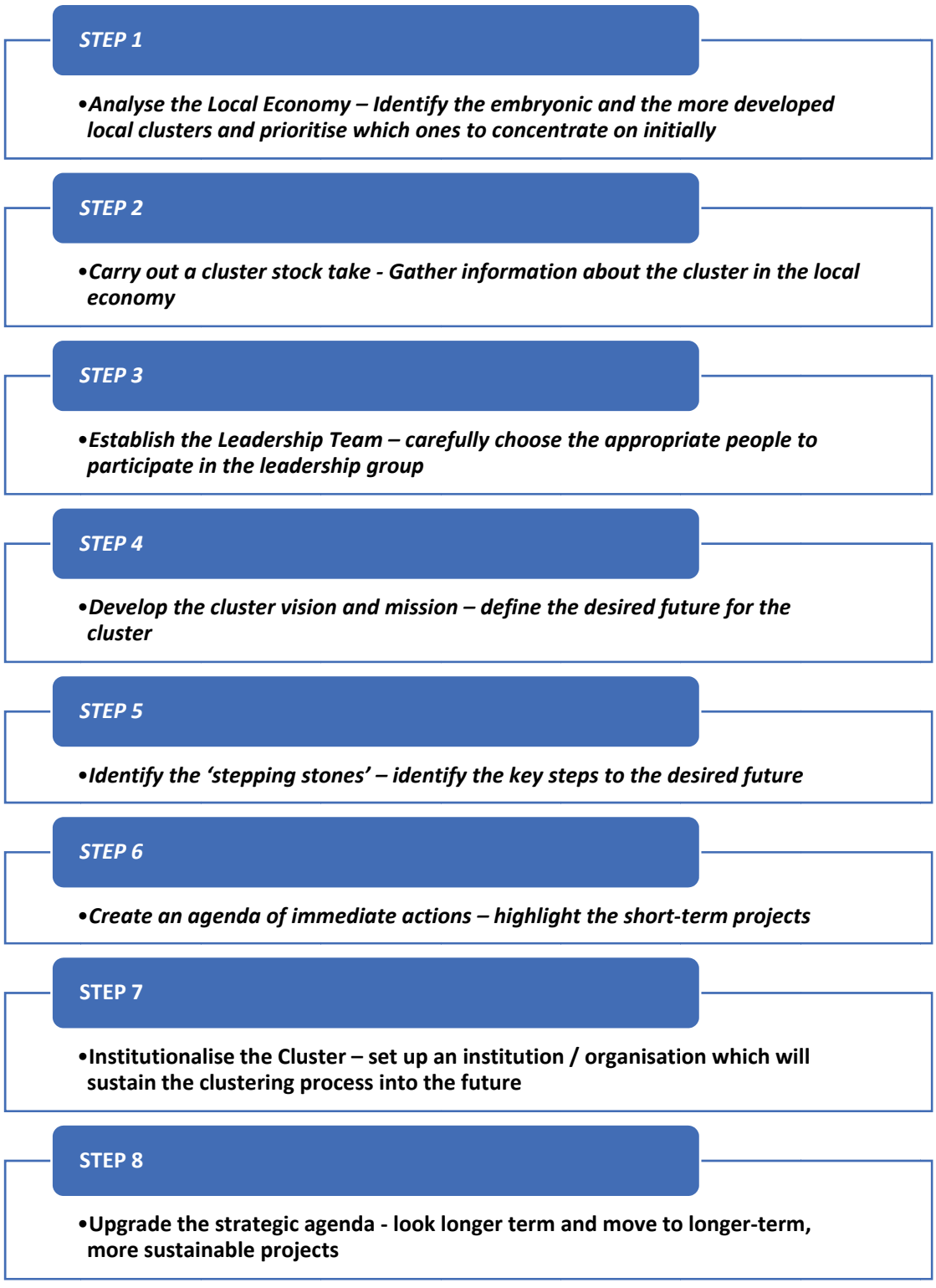

Figure 8Top-down approach of cluster formation

In the case of bottom approaches, the steps appear to slightly differ, mostly due to the fact that the cluster is set up to adapt to an existing central policy strategy rather than be initiated as a result of it. Therefore, the role of analysis for its stakeholders, goals and potential impact has to be more extensive.

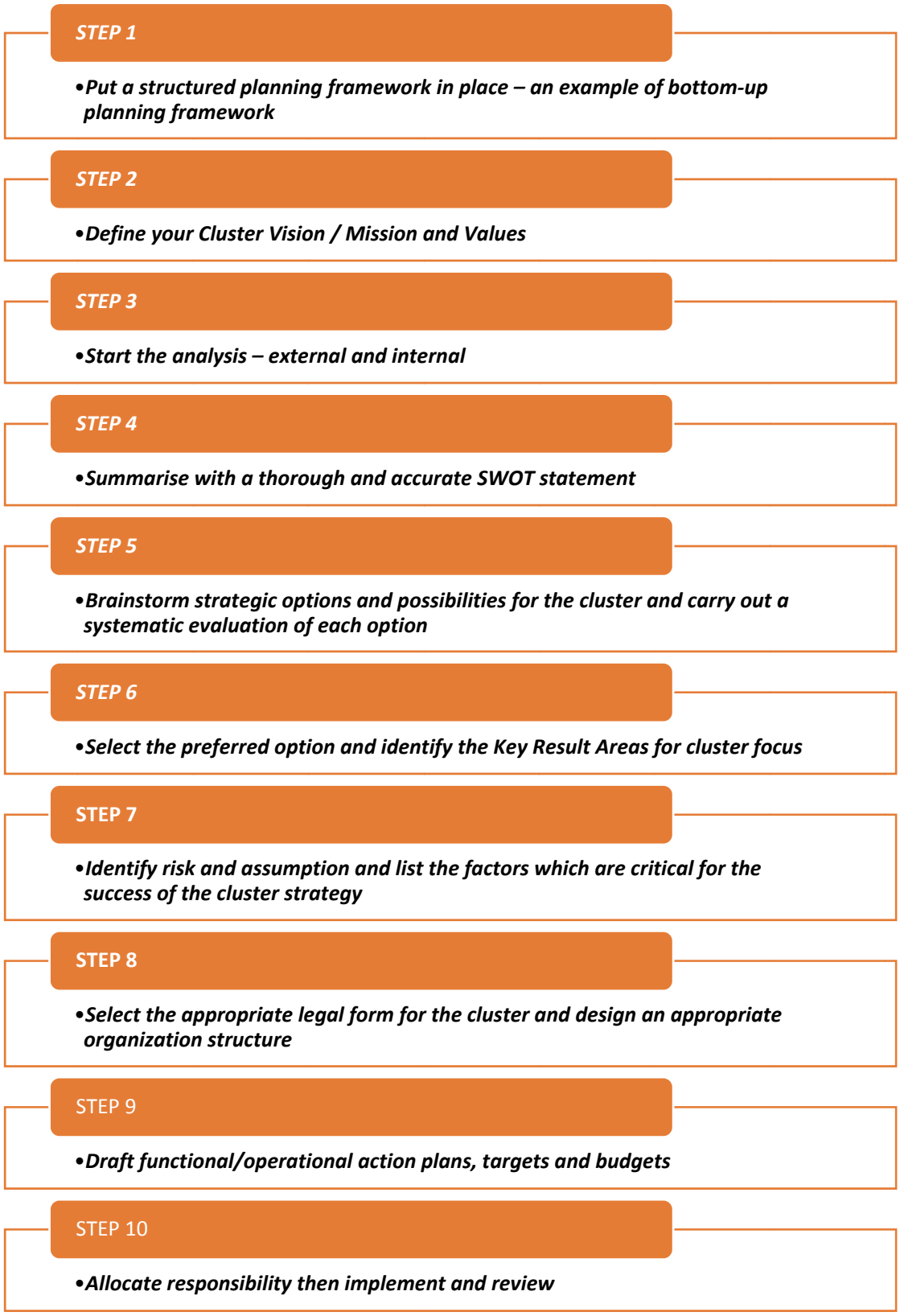

Figure 9 Bottom-Up approach of cluster formation

Cluster management organization has been underestimated over the years as Porter's cluster approach did not regard this success factor for different reasons. Many of the cluster programs in Europe now focus heavily on the establishment and development of cluster management organizations. Clear evidence has evolved in the past couple of years that cluster management excellence plays a decisive role in the successful development of clusters. Cluster excellence is determined by three key dimensions: framework conditions, cluster actors and cluster management organization (Christensen T, Kôcker G, Lämmer-Gamp T, 2011). Its key role is in creating and driving a strong and purposeful dynamic among cluster members and stakeholders.

KEY FINDINGS – drivers of cluster effectiveness[7]	
1	Research-driven clusters are much more similar to industry-driven clusters than expected
2	Clusters with a low or high share of public funding are similar in terms of structure and governance, but different in terms of impact
3	The visibility and attractiveness of a cluster and the impact of the cluster management organization on SME development depends on its size, age, institutionalization and degree of industrial orientation
4	The characteristics of a cluster depend on the technology field it is operating in
5	*Clusters with a high impact on business activities of SME feature an active cluster management*

Figure 10 Drivers of Cluster Effective

6.2 Cluster Process Management

Business process, in the cluster context, can be defined as is a chain of functionallylinked activities with the aim of meeting requirements of internal and external customers.

The processes met within clusters can be distinguishedas belonging in one of the three following types:

• Management processes: processes in the area of strategy, planning and management,i.e. processes in the field of strategic cluster management. These are linked mainly to the cluster's structure and institutional elements.

• Core processes: these are processes associated with production within the cluster, i.e. specifically cluster services and are essentially concentrated in the clusters core businesses

• Support processes: this kind of process involves providing supporting services and the infrastructure needed within the clusterorganization. These are linked to the three outer layers of cluster memberships (Supporting Institutions, Soft and Hard Infrastructure) and can be considered to also include horizontal processes such as learning and informationprocesses (knowledge management).

The importance of process management has increased significantly in recent years. Blockchains, Smart Growth and innovation and the transition to a knowledge-based economy haveall resulted in growing complexity in market conditions and the individual customer wants. These business ecosystem parameters place a high strain on institutions organized in terms of purely functional departments, that quickly reach their limits, with growing interface problems and friction. The answer to this challenge is the shift form in the management of clusters from a functional orientation to process orientation. The two different approaches are presented below in figures 11 and 12 respectively. It has to be noted that the choice of management approach will have to be reflected in all of the abovementioned processes. What is shown here effectively, is the that the Functional Orientation of Cluster operation tends to create vertical flows within the cluster, whereas the Process Orientation horizontal ones leading to greater involvement of all cluster participants.

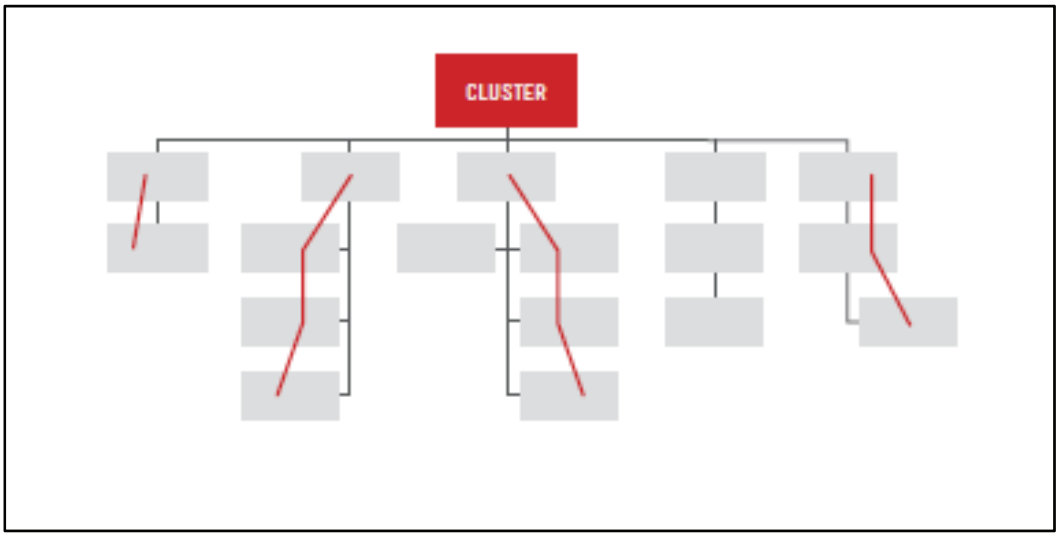

Figure 11 Cluster Functional Orientation

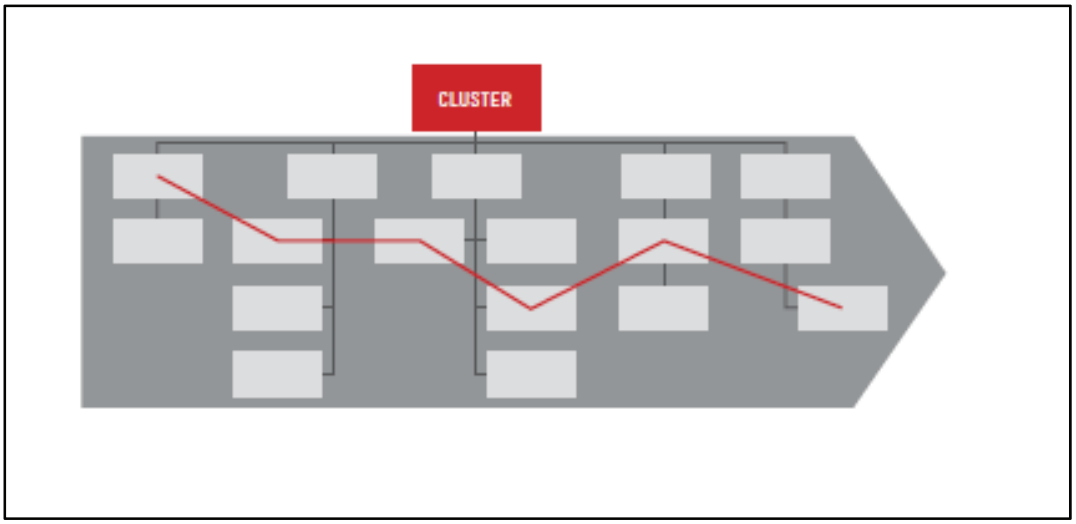

Figure 12 Cluster Process Orientation

6.3 Other Cluster Management Key Operations

6.3.1. Evaluation

Evaluation is a regular check (documentation and reflection), mostly at the end of a projectphase. Leading questions are whether the goals of the strategic alliance or cluster are still realistic,whether the chosen approach is the right one to achieve the goals, and what can be learned fromexperience to date.

Evaluation can also be a response to an acute problem situation (crisis), for example, if deadlines aremassively overshot, if the actual costs differ sharply from the budget, or if there is dissatisfaction.In many areas, including clusters and strategic alliances, a “culture of evaluation” has grown upin recent years as people have recognised that an independent review of events provides valuableinformation for improving the activities.

A distinction has to be made here between external and internal evaluation.For an external evaluation, an evaluator or evaluation team is commissioned from outside thebusiness or cluster to carry out the evaluation. The content and methodology of evaluation aredefined in the commission. Mostly, cluster evaluation uses a mix of quantitative and qualitativeinterviews with representatives of the various stakeholders and an analysis of written planningand reporting documentation. The results are sent to a cluster management team which drawsconclusions for the next phase of the project. In many evaluations, workshops are held with alarge number of cluster actors to enhance acceptance of the results and motivation for implementingthe conclusions.

A frequent criticism of conventional evaluations is that they are too control oriented andconcerned with the past. However, evaluation as control is not generally very oriented towardsaction and change. The evaluated cluster system then tries to emerge from the evaluation with aslittle damage as possible and fails to use the evaluation as a learning opportunity.As a result, the idea has gained ground in recent years that evaluations are a learning tool forcluster managers. Internal evaluation is better suited for this purpose:

- Internal evaluation is a solution-oriented methodology which aims to enhance the competenceof those being evaluated to learn from the experience.
- The point is to provide an accurate diagnosis of the strengths and weaknesses from the point of viewof the relevant stakeholders, and specific identification of starting points (“levers”) for effectivechange.
- The evaluation aims at supporting learning and the strategic response capability of actors in theevaluated system.
- Evaluation should accordingly be structured as an interactive and implementation-orientedlearning process.

6.3.2 Monitoring

An important basis for evaluation is information on the course and results of strategic alliancesand clusters which has been systematically collected and stored. The choice of the informationto be recorded depends on which indicators are defined as critical for the course and success of astrategic alliance. This information system is also described as monitoring:

Clusters and strategic alliances are highly complex so that conventional analysis of results oftenfails to supply useful information. Monitoring using previously set parameters is often left behindsomewhere along the way, so that little useful data is available when the evaluation comesup. This is due to several reasons:

- Monitoring still gives priority to quantitative, independent indicators, although the necessaryqualitative information for understanding the effects is lacking.
- Monitoring and reporting are focused on activities and direct results (outputs), which overlyemphasizes short term aspects and neglects long term processes, although the latter is usuallymuch more important for achieving goals and effects.
- There are currently hardly any indicators which are suitable and generally recognized for evaluating the effects of clusters, with a lack of both solidly established methodological foundationsand practical tools for monitoring effects.
- Evaluation is usually taken up too late so that it is impossible to use information directly toimprove the situation.
- Evaluation is generally done on commission for the promotional entities, without dialoguewith the project executing agencies, so that the conditions for a top-down control are met, butnot for joint learning from experience.
- Effects of regional alliance projects and clusters are the result of highly diverse internal andexternal influences, and it is very difficult to identify clear and unambiguous relationships.

The temptation is particularly great here to credit the cluster with resulting effects, whether ornot the cluster can demonstrably be shown to have contributed to them.As a result, an instrument has been developed in an effort to overcome these deficiencies, in the form of Impact oriented monitoring.

Impact-oriented monitoring is a process for project management and focuses on those factors which the project can directly influence. The emphasishere is on those areas which are decisive for achieving results: the quality of implementationof activities, organizational procedures and processes, changes in the behaviour of partners andtarget groups. The application of the said instrument will be very

7. Conclusions – Identifying Clustering Suitability

Clusters are a tool for the further development of existing regional or entrepreneurial strengths. They are not suitable as a short-term solution for structural weaknesses. When starting from scratch, it's best to understand the critical success factors and to make formation decisions only in locations where these criteria have been met. Initiators, should as part of the cluster creating procedure, be able to identify the elements below:

- External dimension– macro considerations: i.e. economic/ market regional conditions and economic criteria. An adequate number of supplementary and active businesses with at least a European level of competitiveness is a prerequisite for successful cluster development.
- Internal dimension – micro considerations: organizational and operational aspects.
- There should be a clear focus on core competencies which are identifiable in practice. Clusters must have a common identity.
- Clusters need appropriate, lean and professional control and management structures.
- Existence of appropriate stimulating support programmes, partnerships and innovative service models (such as the "one stop shop" model) are useful but they cannot "build" clusters on their own.

Furthermore, the ability to adequately provide responses to each one of the following questions is another important factor to be taken in serious consideration during the initial cluster creation activities.

1. What is the minimum number of businesses to be associated/cooperating to join the Plan?

2. Which business clusters or cluster models should be given priority? Which will be further promoted through the Plan (through criteria)?
3. Who will join as eligible sectors and activities?
4. What are the eligible costs that will be covered by the Scheme?
5. The cluster should be required to register after submitting the proposal to Ministry or before?
6. What will be the timing of the implementation of the investment?
7. How many should the payment phases of the project be? Advance payment or not necessarily;
8. What indicators will be monitored through the Plan eg? In collaboration with Research Institutions, Number of Innovative Products and Services, Number of Foreigners Collaborations?

All these are elements discussed in the preceding sections and form the clustering core, that paired with the appropriate choices regarding structure and management will assist in the formation of successful and most importantly impactful cluster organizations.

References

- Andrenelli, A., J. Gourdon and E. Moïsé (2019-01-24), "International Technology Transfer Policies", OECD Trade Policy Papers, No. 222, OECD Publishing, Paris
- Brown, R (2000), Cluster Dynamics in Theory and Practice with Application to Scotland, Regional and Industrial Policy Research Paper, No.38,
- Case studies of clustering efforts in Europe: Analysis of their potential for promoting innovation and competitiveness, preliminary draft version for distribution in the European Presidential Conference on Innovation and Clusters, Stockholm 22-23/1/2008, prepared under the Europe Innova Cluster Mapping Project for DG Enterprise and Industry of the European Commission.
- CLUNET (2008) Cluster Policy Guideline Report», PRO INNO EUROPE – INNONETS
- Cluster Policy in Europe. A brief summary of cluster policies in 31 European countries (2008), prepared under the Europe Innova Cluster Mapping Project, Oxford Research AS, 2008
- COECON (2013), The Role of Innovation Brokers in a Knowledge Economy The Fourth Strand To Triple Helix, Triple Helix XI International Conference London, July 2013
- COMMUNICATION FROM THE COMMISSION (2010), EUROPE 2020 A strategy for smart, sustainable and inclusive growth, COM(2010)2020, Brussels, 3.3.2010
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, Strengthening Innovation in Europe's Regions: Strategies for resilient, inclusive and sustainable growth, COM(2017) 376 final, 18.7.2017
- Cypriot Presidency Reform Unit. (2015). National Policy Statement for the Enhancement of the Entrepreneurial Ecosystem in Cyprus. Retrieved fromhttps://issuu.com/presidency-reform-cyprus/docs/fc7917ffc2122a/1?e=23693381/36744221

- Cyprus Ministry of Education and Culture. (2016). Annual Report 2016. Retrieved fromhttp://www.moec.gov.cy/en/annual_reports/annual_report_2016_en.pdf
- Demetriades, M and Robledo-Bottcher, N, (2018), RIO Country Report 2017: Cyprus EUR 29151 EN, Publications Office of the European Union, Luxembourg
- DG EPCD (2015), National Strategy for Research and Innovation, available at http://www.dgepcd.gov.cy/dgepcd/dgepcd.nsf/page34_en/page34_en?OpenDocument
- DG EPCD (2017), National 'European Research Area' (ERA) Roadmap for Cyprus 2016 – 2020, available at http://www.dgepcd.gov.cy/dgepcd/ dgepcd.nsf/page34_en/ page34_en?OpenDocument
- Directorate General for European Programmes, Coordination and Development. (2015). National Strategic Plan of the Republic of Cyprus for Lifelong Learning 2014-2020. Retrieved from http://www.dgepcd.gov.cy/dgepcd/dgepcd.nsf/ 499A1C B95 981643FC2257C7D00486172/$file/National%20Lifelong%20Learning%20Strategy%20in%20Greek.pdf.
- European Commission - European Cluster Observatory (2016), Clusters and Workforce Development, Discussion Paper, available at https://www.clustercollaboration.eu/sites/default/files/eu_initiatives/discussion_paper_skills_development.pdf
- EUROPEAN COMMISSION, Directorate-General for Research and Innovation. (2014). Cyprus - Research and Innovation performance. Luxemburg: Publications Office of the European Union.
- European IPR Helpdesk (2017), The European IPR Helpdesk - Your Guide to IP in Europe, available at https://www.iprhelpdesk.eu/sites/default/files/2018-12/european-ipr-helpdesk-your-guide-to-ip-in-europe.pdf
- European Union. (2017). European Innovation Scoreboard 2017 - Methodology report. Retrieved from http://ec.europa.eu/DocsRoom/documents/25101

- European Union. (2017). European Innovation Scoreboard 2017. Retrieved from https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en
- European Union. (2017). Innovation Union. Retrieved from http://ec.europa.eu/research/innovation-union/index_en
- Global Entrepreneurship Monitor (2017), Cyprus National Report 2016–2017
- Global Entrepreneurship Monitor (2018), Entrepreneurship in Cyprus National Report 2017–2018
- Guidelines for Cluster Development A Handbook for Practitioners (2013), available at https://www.enterprise-development.org/wp-content/uploads/GuidelinesforClusterDevelopment.pdf
- http://www.clusterobservatory.eu/index.
- Innovative Clusters: Drivers of National Innovative Systems», OECD Proceedings, Organisation for Economic Co-operation and Development, 2001
- Lagendijk, A (1999), Good practices in SME Cluster initiatives. Lessons from the 'Core' regions and beyond. AL ADAPT report. Centre for Urban and Regional Development Studies University of Newcastle Upon Tyne.
- Lämmer-Gamp, Thomas/Meier zu Köcker, Gerd/Christensen, Thomas Alslev, (2011), Clusters Are Individuals. Creating Economic Growth through Cluster Policies for Cluster Management Excellence, Danish Ministry of Science, Technology and Innovation/Competence Networks Germany, Copenhagen/Berlin
- Maskel P and Kebir L (2005), What qualifies as a cluster theory?, DRUID Working Paper No. 05-09, Danish Research Unit of Industrial Dynamics
- Mindlin Y B, Zhukov B M, Prokhorova V V, Shutilov F V and Belova E O (2016), Main Stages of the Formation of an Economic Cluster, International Journal of Economics and Financial Issues, 6(S1) 261-265
- NCRITD (2014), Innovate Cyprus - Proposal for the creation of a new Integrated National Framework for Research, Technology Development and Innovation in Cyprus, available at https://rio.jrc.ec.europa.eu/en/library/innovate-cyprus-proposal-creation-new-integrated-national-framework-research-technology

- OECD (2007), Competitive Regional Clusters: National Policy Approaches, Regional Innovation
- OECD Innovation Policy Platform (2010), OECD Innovation Policy Handbook
- Porter, M. E. (1998), Clusters and the New Economics of Competition. Harvard Business Review, Nov/Dec98, Vol. 76 Issue 6, p77-90.
- Porter, M.E. (1990), The Competitive Advantage of Nations. London, Macmillan.
- Porter, M.E. (1998), On Competition. Boston: Harvard Business School Press
- Porter, M.E.; Stern, S. (2001), Innovation: Location Matters. MIT Sloan Management Review. Vol. 42 No4.
- RPF, DG EPCD (2015), Smart Specialisation Strategy for Cyprus, http://www.dgepcd.gov.cy/dgepcd/dgepcd.nsf/page44_en/page44_en?OpenDocument
- Statistical Service of Cyprus (CYSTAT), http://www.mof.gov.cy/mof/cystat/statistics.nsf/index_en/index_en.
- Unit of Administrative Reform, Ministry of Energy, Commerce, Industry and Tourism. (2015). National Policy Statement for the Enhancement of the Entrepreneurial Ecosystem in Cyprus. Retrieved from http://www.reform.gov.cy/en/growth-reform/entrepreneurship-and-investments/setting-up-a-policy-framework-for-the-enhancement-of-the-entrepreneurial-ecosystem
- WEF (2017) The Global Competitiveness Report 2017–2018. Retrieved from http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf
- WIPO (2017) Global Innovation Index 2017. Retrieved fromhttp://www.wipo.int/publications/en/details.jsp?id=4193
- World Bank (2009) Cluster for Competitiveness A Practical Guide & Policy Implications for Developing Cluster Initiatives, World Bank, February 2009.