# The Roll of Clusters and Networks in development of Industrial SMEs

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*Abstract*— **This paper is based on an ongoing research on the importance of clusters in development of small and medium enterprises, as well as networking issues. The purpose of this study is to review the effect of clustering and networking on SMEs' competitiveness, especially in developing countries. As it emerges from the literature reviewed, cluster policy brings many positive effects in industrialized countries, especially with contribution of ICT through online networking and knowledge sharing, but such effects have not been researched in transition countries, yet. It could be suggested that a comprehensive benchmarking model focusing on the critical success factors (CSF) of an industrial cluster can help to increase improvement, so as to strengthen the competitive position of a cluster as a whole. The paper finalizes with a discussion on the benefits and advantages of applying cluster policy, as well as some recommendations for further researches.**

*Keywords-Industry; Clustering; Small and Medium Enterprises (SMEs); Networking; Competitiveness*

## I. INTRODUCTION

Nowadays, trade liberalization and globalization processes have significantly increased customer expectations and competition between companies. In order to respond to the increased pressures by the globalization process and benefit from global market opportunities, SMEs have begun facing two main challenges: first, to transform themselves and increase their individual competitiveness, and second, due to their limited size to take advantage of synergy effects created by entering into cooperative relations with other SMEs and related partner institutions [1]. In line with that, many countries have promoted the development of industrial clusters where firms can develop competences and competitive advantage against the world's best competitors by sharing resources, innovative capabilities, and knowledge [2]. Cluster theory focuses on removing obstacles, relaxing constraints, and eliminating inefficiencies to productivity growth [3], as the emphasis is not on market share but rather than on dynamic improvements. If cluster-based economic development models properly applied, it can provide a foundation for sustainable economic growth and pave the way to greater prosperity [4]. According to Mason et al. [5], the attractiveness of clusters derives from their ability to concentrate economic activity in a particular location, as one of the most striking features of economic activity over the last 20 years or so has been the tendency towards the intense geographic concentration of firms [2].

In its broad sense, term of clustering refers to geographical concentration of certain economic activities. As stated by Tambunan et al. [6], a cluster may incorporate suppliers of inputs, or extend to regular buyer or exporter. It also includes the government institutions, business associations, and providers of business services and agencies that support clustered enterprises in particular fields as product development, technology, marketing information and production process improvement.

The new reality of the internationalization of developed-country clusters poses an opportunity for clusters in developing countries to link with them, and through them with international supply chains [7]. Moreover, it has been received growing attention as a means to boost growth and competitiveness of enterprises [8], as well as improving their productivity and innovation. On the other hand, cluster promotion is one of the key ingredients of a national competitiveness policy as practiced in most industrialized countries. Also, it is an important goal of a developing country's SME policies, especially among those aimed at technological improvement [7].

This study aims at helping the reflection on the importance of cluster development policies among SMEs and on how those could be implemented. The following sections first present a brief review of characteristics and needs of SMEs, next infrastructures which are essential for cluster development will be discussed. After definition of clusters, networking approach will be defined and horizontal and vertical networks will be introduced. The rest of this paper is devoted to presenting the advantages and benefits of clustering and networking and their importance in the process of SME development. Finally, the authors outline some conclusion and research directions in which the clustering can be applied.

## II. DEFINITION OF SMEs, THEIR CHARACTERISTICS AND CHALLENGES

The term of SME refers to a small and medium size enterprise. There are a number of definitions of what constitutes an SME, as many countries have their own definition of what constitutes as SME. For instance, Australian Bureau of Statistics [9] defined small businesses include sole proprietorships and partnerships without employees, businesses employing fewer than five people as

micro-businesses and other businesses employing five or more people but less than 20 people as small ones, while medium-sized businesses were those employing fewer than 200 people. Although numbers are broadly used to identify whether a company is a SME or not, this should be complemented by a set of characteristics which enable a better definition of "SME" [10].

Small and medium enterprises are regarded as one of the main driving forces of economic development, stimulating private ownership and entrepreneurial skills [11], as well, they are crucial for sustained, long-term growth, dynamism and employment [12]. SMEs generally employ the largest percentage of the workforce and are responsible for income generation opportunities [13]. According to UNIDO [14] in many countries, the SME sector can be a strong pillar of support for regional and economic development, since it provides a means for the mobilization of a country's resources, resulting in the generation of employment and income for the general benefit of regional and national economies. Secondly, it plays an important role in poverty alleviation and assists those who are disadvantaged, such as youth or women, who often subsist on the periphery of societies and are not otherwise able to contribute meaningfully to the economic development of the country. Thirdly, the SME sector can play an important role in absorbing redundant manpower as a consequence of privatization activities carried out by governments. Fourthly, SME development promotes democracy and a civil society; it stimulates entrepreneurs to participate in the economic, political and social system of the country. Finally, the SME sector has proven to be flexible and innovative; in a number of sectors SMEs have considerable comparative advantages over large enterprises, which enable them to respond more quickly and effectively to changing, and increasingly global, trends [14].

Majority of SMEs have simple systems and procedures, which allows flexibility, immediate feedback, short decision-making chain, better understanding and quicker response to customer needs than larger organizations [15]. However, all the authors highlight scarcity of resources as one of the main problems and typical characteristic of SMEs [15]. As highlighted by UNIDO [14], individual SMEs are often unable to capture market opportunities that require large production quantities, homogeneous standards, and regular supply. Also they have difficulties in achieving economies of scale in the purchase of inputs, such as equipment, raw materials, finance, consulting services, etc. Moreover, Small size also constitutes a significant hindrance to the internalization of functions such as training, market intelligence logistics and technology innovation. Furthermore, small scale can also prevent the achievement of specialized and effective internal division of labor, which fosters cumulative improvements in productive capabilities and innovation. Finally, because of their low profit margins, small-scale entrepreneurs in developing economies are often locked in their routine and unable to introduce innovative improvements to their products and processes, or to look beyond the boundaries of their firms to capture new market opportunities.

However, SMEs can benefit greatly from being linked into national, regional and global networks of firms and value chains as this can help them to overcome the inherent limitations with regard to economies of scale and scope imposed by their size and frequent isolation [14]. For an in-depth understanding of these issues the reader is referred to [16].

III. DEFINITION OF CLUSTERS AND REQUIRED INFRASTRACTURES

Nowadays there has been a growing attention on clustering and networking as a useful strategy for SME development. The term of clusters was brought into the regional development lexicon by Porter in 1990 [5] who has defined it as geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions in a particular field that compete but also cooperate. From the literature review it has emerged that there are a number of definition for clusters, however, most of them have the same meaning with using different terminologies. Some recent definitions of clusters have been quoted as below:

- A cluster can be defined as a geographical grouping of firms that belong predominantly to one activity sector [7].
- UNIDO (cited in [7]), United Nations Industrial Development Organization, defined clusters as a sectoral and geographical concentration of enterprises that produce and sell a range of related or complementary products and thus face common challenges and opportunities.
- An industry cluster is a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats (Resenfeld cited in [17]).
- A cluster can be defined as a geographical, shared-focused, and sectoral concentration and combination of firms [2].
- An industrial district of mostly small and specialized firms that perform different, but complementary activities and that are linked horizontally and vertically through a mix of cooperative and competitive relations [18].
- Clusters consist of private enterprises of various sizes, including producers, suppliers, and customers, plus labor, government, professional associations, and academic, research or training institutes [1].

It is clear that geographically concentration, related and complementary activities, competition and cooperation are the common characteristics of the clusters. The interaction of firms in cooperative actions for strategic purposes, such as collective actions, resource sharing, joint development or experimentation, co-production, economies of scale and scope, is an important characteristic of the more developed

clusters [19]. Clusters could emerge in the locations where there is specific infrastructure, enabling the participants to benefit from it. These can be specialized training institutions, communal infrastructure, telecommunications, etc. [1]. Furthermore, he stated that an appropriate business environment is a base for the appearance of critical mass of SMEs as a precondition for cluster formation, and Sureephong et al. claimed that the most difficult processes in creating a cluster is the development and sustain the collaboration to connect these SMEs together.

On the other hand, an entrepreneurial environment needs to encourage an entrepreneurial spirit in ways that generate opportunities and create conditions for establishing new SMEs, and critical mass of SMEs is a crucial factor for cluster development. However, Ceglie (cited in [1]) argued that the geographical concentrations of SMEs that operate in the same sector are not sufficient for producing "external economies". According to him other factors, such as trust building and constructive dialogue among cluster actors, exchanging of information, identifying common strategic objectives, agreeing on a joint development strategy and its systematic and coherent implementation are of paramount importance for building an efficient cluster. With facilitation of an enterprise culture by establishing forums, where coalitions can form and re-form on a needs basis, larger firms in regions involved in such coalitions provide the infrastructure and finance for their smaller counterparts. Enterprise culture involves providing a knowledge sharing environment that facilitates the formation of coalitions of SMEs so that they can exploit emerging business opportunities for their value creating potential [5].

## IV. NETWORKS OF SMES

Term of "Networks" often confused with "Cluster". Networks are "groups of firms that cooperate on a joint development project complementing each other and specializing in order to overcome common problems, achieve collective efficiency and penetrate markets beyond their individual reach" [14]. Networks are termed horizontal when formed by SMEs only, and vertical when large scale enterprises are involved. UNIDO describes also the relationship between the two terms: networks can develop within or out of clusters. Clusters lead sometimes to the development of networks within them. Moreover, a network can eventually evolve into a cluster, as it develops business development services providers, enterprise associations and the involvement of public institutions.

On the other side, Tambunan [20] focused on concept of networks in his recent study of Indonesian export-oriented SMEs. He defined internal networks as business co-operations or links among enterprises inside the cluster, which can be in various forms, for example marketing, distribution, production, procurement of materials, training for workers, etc. And external networks has been defined as business and other forms of relation between enterprises inside the cluster and actors outside the cluster such as large enterprises, including foreign direct investment-based companies, suppliers of inputs, providers of business services, and so on.

According to him, internal networks or inter-firm co-operations can be divided into horizontal and vertical co-operations. The first type is a co-operation among SMEs occupying the same position in the value chain. Through such co-operation, enterprises can collectively achieve scale economies beyond the reach of individual enterprises and can obtain bulk-purchased inputs, achieve optimal scale in the use of machinery, and pool together their production capacities to satisfy large-scale orders. The second type is co-operation among SMEs along the value chain. With this, an enterprise can specialize in its core business and subcontracts other related works to other enterprises in the cluster. In many cases, the vertical co-operation consists of both internal and external networks [20].

As cited in [20], collaboration of internal and external networks give rise to a collective learning space, where ideas are exchanged and developed and knowledge shared in a collective attempt to improve product quality, upgrade technology and move to more profitable market segments.

## V. ADVANTAGES OF AGGLOMERATION

A number of researchers have acknowledged the value of clusters in enhancing the firm's competitive advantage as well as regional competitiveness and have pointed to the advantages that result in the development, transfer, and application of knowledge necessary for staying competitive in today's fast changing environment [2]. Regional specialization on interlinked activities of complementary firms in production and service sectors and their cooperation with public, semi-public, and private research and development institutions creates synergies, increases productivity, and leads to economic advantages [3]. Schmitz (cited in [21]) pointed that agglomeration of enterprises engaged in similar or related activities brings advantages, called external economies, such as a pool of specialized workers, easy access to suppliers of specialized inputs and services and the quick dissemination of new knowledge. He then proposes that what makes clusters potentially beneficial to competitiveness of SMEs are the opportunities for collective efficiency, derived from external economies and joint actions. According to Porter (cited in [1]), clusters influence competition first, by increasing the productivity of companies based in the cluster; second, by promoting the innovation, and third by stimulating the formation of new businesses, which expands and strengthens the cluster itself. Its positive impact is on learning and innovation and, consequently, in the upgrading of capabilities leading to the development of sustainable competitive advantages and to the stimulation of regional economic development [19]. As cited in [7] why the cluster concept could be used by less developed economies and those in transition:

*1) It promotes self employment,*

*2) It does not need huge amounts of capital. The banks come after the clusters have started their development since the first stages of growth are primarily financed from the entrepreneurs re-investing his profits.*

*3) It allows the country to produce in sectors of high rapidity of change in terms of products, processes or*

*markets, as SME clusters can quickly adapt to changes in fashion, etc.*

Moreover, clusters have been widely recognized as one of the ways of overcoming the size limitations of SMEs and as an important instrument for improving their productivity, innovativeness and overall competitiveness [1].

The literature has shown the benefits of establishing clusters as an efficient tool for improvement, as there is strong evidence that joining forces into clusters brings additional benefits for SMEs. Table 1 shows some of the most important advantages of clustering approach emerged from literature reviewed. As cited in [20], UNIDO's experiences in many developing countries showed that collaborate actions through well developed business networks involving SMEs and large enterprises, suppliers of inputs, providers of business services, financial institutions, other supporting private and public agencies, and local and regional governments offer new opportunities for developing specific location advantages and the competitive strengths of clustered SMEs.

TABLE I.       THE MOST IMPORTANT BENEFETS OF CLUSTERING

| No. | Advantage | Explanations | Cited in (Refer.) |
|---|---|---|---|
| 1 | access knowledge and information resource and creation of knowledge | As a result of geographical proximity, communication between cluster members is strengthened and the exchange of knowledge and quick dissemination of new knowledge is intensified. | [8], [1], [21] |
| 2 | enhance competences and create competitive advantages | Encouraging learning and innovation consequently leads to the development of sustainable competitive advantages. | [19], [1], [20] |
| 3 | create synergies | As the sum of the components is of greater value than each individual company or institution, clusters create synergies. | [2], [3] |
| 4 | lower production cost | Cluster members are able to reduce costs and to improve the level of service to their customers, even though transportation and communication costs decline. | [1], [8], [20], [19] |
| 5 | enhancing organizational performance and innovation | The differentiation that evolves within firms in the cluster is likely to increase variety, which has been shown to enhance profitability, learning, and innovation. | [1], [2] |
| 6 | regional and national economic development | Cluster approach upgrades capabilities leading to the development of sustainable competitive advantages and to the stimulation of regional economic development. | [19], [3] |
| 7 | A pool of suppliers of raw material, equipment and specialized services | With clustering, firms achieve the economies of scale in the purchase of inputs, such as equipment, raw materials, finance, consulting services and etc. | [8], [19] |
| 8 | A pool of specialized labor | Agglomeration of enterprises engaged in similar or related activities brings advantages such as a pool of specialized workers and easy access to suppliers of specialized inputs and services. | [21], [1], [8] |
| 9 | low-transaction costs | Inter-organizational trust is likely to enhance collective learning when it encourages the sharing and disclosure of organizational information and knowledge, and reduces transaction costs. | [2], [20] |
| 10 | formation of local supporting institutions | The existence of a cluster also stimulates formation of local supporting institutions oriented towards satisfying specific needs of the cluster participants. | [1] |
| 11 | establish co-operative linkages between companies | Proximity helps to establish co-operative linkages between companies through enhancing mutual learning and knowledge creation. | [1], [18] |
| 12 | higher specialization | High concentrations of SMEs, both from the supply and demand sides as well as cluster support institutions, can contribute to high levels of specialization. | [1] |

## VI.    CONCLUSION AND RECOMMENDATION

Based on analysis of the literature this paper builds on theoretical understandings of clusters and networks approach in development of small and medium enterprises. Industrial clusters are often regarded as innovation systems due to the potential for collective learning local knowledge. The global knowledge economy has shifted development perspectives from output to input factors as production has become more knowledge-based. If so, a large question appears: why, in

developing countries, where SME development policies are considered as one of the main driving forces of economic development, the issues of cluster formation and technological improvement are not been given the same priority. SME cluster development is processes that involve many business and institutional actors and call for a general "cultural" attitude towards improvement and cooperation. Knowing and understanding clusters are the value to region only if that knowledge leads to actions that grow economies and raise standards of living. Unfortunately, there is no single recipe for less favored regions to follow that will meet the needs of all clusters. Applying knowledge base benchmarking methodology to cluster development should assist industry cluster to be able to achieve collaboration efficiently and dynamic improvement. From the review it emerged that ICT has been frequently seen as a powerful tool to stimulate knowledge sharing and innovation among SMEs, which will lead to regional development. The impact of clusters on economic development in transition countries has not been extensively researched as well as networking of SMEs.

In a geographical region suffering from the harmful economic effects of peripherality, real progress to convergence can be achieved through benchmarking, more specifically, it may be used to close the information gap that small firms often have, and through this process boost individual firm, and hence overall regional performance. There is a need to development of a benchmarking framework focusing on the critical success factors (CSF) of an industrial cluster, which helps to increase improvement, so as to strengthen the competitive position of a cluster as a whole. This paper provides a conceptual foundation for empirical research into these issues.

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