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Analysis Of Cooperative Relationship In Industrial Cluster

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Abstract

According to scientific works of such authors as Porte,(1990) and Ketels, Solvell(2009), Lindqvist the cluster approach plays a vital role in the economy and in human life generally. It leads to solution to a range of problems in the case of rational implementation. A highly competitive global economy allocates too little resources to certain industries. That development of sustainable, innovative responses from industry is then vital. Nowadays the sustainable development clusters also can help to improve international competitiveness. This paper aims at understanding the cooperative relationship between different members of a cluster. A framework for cooperative relationship development in innovation and knowledge contexts is based on interdependency of cluster members' strategies with each other, especially education and production components.

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Keywords: industrial cluster, cooperative relationship, knowledge exchange, innovations.

1. Introduction

Nowadays the globalization process requires new approaches, innovations and changes from the education system. One such approach is the collaboration between education and business systems in clusters. Today cluster development problems are becoming ever more urgent because cluster development remains one of the most effective ways to increase competitiveness. Currently there is a lot of scientific research related to cluster theory (Weber, 1929; Schumpeter,1934 ; Rosenfeld, 1997; Porter, 1990). Cooperative relationships in clusters offer an opportunity for optimization of engineering and manufacturing processes and minimization of nonmanufacturing costs for cluster participants. As a result all cluster members get supplementary competitive advantages. An additional point is that cooperative relationship in clusters stimulates innovation activity, foster progressive technologies and knowledge exchange. There is a free information exchange and fast novelty distribution by

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channels of suppliers and consumers. Many participants in clusters overcome differences and latitude during development process in relationship. The last years have witnessed improvements in the understanding of cooperative relationships in industrial clusters (Solvell, Lindqvist, & Ketels, 2003; Amisse & Muller, 2009; Han, 2009; Safiullin, Ankudinov,& Lebedev, 2013). Therefore there are some unsolved problems in the analysis of cooperative relationships. One of the under-studied problems is an analysis of cooperative relationships in industrial clusters based on the dynamic approach. Therefore it was considered important to introduce for your consideration the author's analysis of methodology of cooperative relationships and to demonstrate the usage of it's evidence from the automotive cluster participants of the Republic of Tatarstan such as Kazan (Volga Region) Federal University and OJSC "KAMAZ".

2. Methodology specification

This methodology pays attention to not only static but also dynamic analysis of cooperative relationships in industrial clusters. The main idea of this methodology is based on the proactive management theory (Ansoff, 2007). According to the proactive management theory a cooperative relationship in industrial clusters is studied by using graph and game theories.

The author's methodology of analysis involves the procedure with three main steps of study:

- Structure of industrial cluster;
- Proactive innovation and knowledge management in cluster;
- Payment matrix of cluster member strategies.

Further let us consider each of these steps.

2.1. The first step: Structure of industrial cluster

The structure of industrial cluster can be presented as following:

$$K=\{E, L\}, \quad (1)$$

where E- set of cluster elements;

L- set of links between cluster elements.

In this context, set of cluster elements K can be described as:

$$E=\{e_i\},\ i=1,\ldots,n, \quad (2)$$

where e_i- element of cluster

n- number of cluster elements.

Set of links L between elements of cluster l_i и l_j can be described as:

$$L=\{l_{ij}\},\ i,j=1,\ldots,n. \quad (3)$$

It is worthwhile to say that the value of a cluster member can be estimated by parameter ($a_{i)}$, and potential- ($b_{i)}$. Successful industrial cluster development is dependent on critical mass (R). When cluster development reaches a critical mass the process of transformation and self-development begins. In this case following system (4) is correct:

$$\begin{cases} \sum_{i=1}^{n} a_i e_i \rightarrow \max \\ \sum_{i=1}^{n} b_i e_i \geq R \end{cases} \quad (4)$$