MANAGEMENT OF ENTERPRISES IN THE DEFENSE INDUSTRY OF TURKEY – CLUSTER APPROACH

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Abstract

The market conditions require a new approach in solving the problem of corporate competitiveness - developing its own strategy for boosting the competitiveness and sustainable economic growth. The well-founded competitive strategy of the company determines the promising directions of its activity, determines the type of competitive advantages and ensures resource availability for its implementation. The advantages held by the defence industry companies are one of the determining factors essential to achieve higher and long-term competitiveness of the Turkey industry and economy as a whole. The purpose of the study is to show how cluster works. We can say as a conclusion from the study that the use of cluster approach optimizes the management of companies. For the success in the competitive struggle, it is particularly important to have a good knowledge of the theoretical and methodological aspects of competition that reveal its economic nature as a basis for the market economy and a driving force for the development of business entities.

Keywords: Competition; Competitiveness; Defence industry; Cluster

INTRODUCTION

Cluster management is a management model that fosters decentralization of management, develops leadership potential of staff, and creates ownership of unit-based goals. Unlike shared governance models, there is no formal structure created by committees and it is less threatening for managers. There are two parts to the cluster management model. One is the formation of cluster groups, consisting of all staff and facilitated by a cluster leader. The cluster

groups function for communication and problem-solving. The second part of the cluster management model is the creation of task forces. These task forces are designed to work on short-term goals, usually in response to solving one of the unit's goals. Sometimes the task forces are used for quality improvement or system problems. Clusters are groups of not more than five or six staff members, facilitated by a cluster leader. A cluster is made up of individuals who work the same shift. For example, people with job titles who work days would be in a cluster. The cluster leader is chosen by the manager based on certain criteria and is trained for this specialized role. The concept of cluster management, criteria for choosing leaders, training for leaders, using cluster groups to solve quality improvement issues, and the learning process necessary for manager support are described.

Knowledge-intensive clusters play a key role in driving innovation, regional development and competitiveness. There is no doubt that cluster excellence matters, and the main questions of scholars and practitioners refer to the ways of achieving it. One of the factors that is seen as essential for achieving cluster excellence refers to the excellence in cluster management.

The current discussions on cluster management excellence primarily focus on the outputs related to clusters and cluster organisations. In this report, we examine the notion of clustermanagement excellence as a process rather than an output. We suggest that excellence in outputs derives from excellence in the process, and therefore specific attention needs to be paid to how the cluster management process should be organised. Consequently, we aim to shift the discussion from what the clusters should try to achieve towards how the clusters can best achieve their objectives.

Cluster management can be defined as the organisation and coordination of the activities of a cluster in accordance with certain strategy, in order to achieve clearly defined objectives. Cluster management represents a continuous activity of a cyclical nature. It is a complex, interactive and non-linear process. The main stages of the cluster management cycle can be split into

(1) Define;

(2) Design;

(3) Implement,

(4) Monitor, (5)

Evaluate, and

(6) Revise.

Cluster management goes beyond management of an individual organisation. It implies mediating and facilitating the relationships of multiple cluster members. Each of the cluster members has own agenda, and a key challenge for cluster managers is to make sure those

agendas are united into common objectives and collective actions, that conflicting interests are resolved, and the relevant organisations see enough added value from their participation in cluster activities.

We also suggest that focusing on cluster management alone is not enough for cluster excellence, and that the notion of cluster governance has to be brought onto the stage. Cluster governance refers to the intended collective actions of cluster stakeholders to advance the cluster and develop a sustainable competitive advantage. Cluster governance thus represents the interests of cluster stakeholders (e.g., universities and research institutes, large and small companies, government, supporting structures etc.), while cluster managers strive to serve the needs of cluster stakeholders.We were able to observe that clusters driven exclusively by the efforts of cluster managers and without joint commitment of the stakeholders are doomed to fail. (Anderson, T., Bjerre, M.,Wise Hansson, E. (2006) "The Cluster Benchmarking Project", Nordic Innovation Centre; Cortright, J. (2006) "Making Sense of Clusters: Regional Competitiveness and Economic Development", Impresa, The Brookings Institution Metropolitan policy Program; OECD (2001) "Innovative Clusters – Drivers of National Innovation Systems"; Porter, M. (1990) "The Competitive Advantage of Nations", Harvard Business School; Porter , M. (2003) "The Economic Performance of Regions", Harvard Business School Promoting Cluster Excellence, Measuring and Benchmarking the Quality of Cluster Organisations and Performance of Clusters GerdMeier zu Köcker, Jørgen Rosted (Eds.) 2010)

The key pillars of excellence in cluster management include a regular review of both cluster objectives and the objectives of the cluster organisation, 'trying out' various types of actions and learning from the results of those actions, as well as constant monitoring and regular evaluation, adaptive performance measurement systems and active engagement of cluster stakeholders at all stages of the management cycle.

In the report, we present various examples of good practices related to both cluster management and cluster governance. However, we conclude that there is no golden recipe for excellence in cluster management. Not only do different clusters require different approaches, but even the same cluster is likely to require new approaches as it passes through various stages of its development, or in response to various external drivers.

Cluster managers operate in a turbulent and highly complex environment. To survive in such unpredictable environment, adaptive management structures are needed.

The information presented in this report is based on our experience in working with knowledge-intensive clusters from all over the world. By this report I only aim at sketching the contours of how to achieve excellence in cluster management. I am convinced that each cluster is unique, and so is the best approach towards clustermanagement in a particular cluster.

Current evidence suggests that in the presence of universities, research centres and supporting structures, a geographical concentration of high tech companies has a positive effect on the economic performance of those companies in a cluster. As a result, knowledge-intensive clusters play a key role in driving innovation, regional development and competitiveness.

The ability of clusters to deliver high economic performance is often *labelled as cluster excellence.* Cluster excellence can, for example, be expressed in terms of cluster growth, added value, productivity and innovativeness. Therefore, there is no doubt that cluster excellence matters, and the main questions of scholars and practitioners refer to the ways of achieving it. One of the factors that is seen as essential for achieving cluster excellence refers to high quality cluster managementor cluster management excellence.

Cluster management excellence is often linked to the strength and professionalism of the cluster organisation.

By a cluster organisation one should understand organised efforts to facilitate cluster development, which can take various forms, ranging from non-profit associations, through public agencies to companies. A cluster organisation typically functions as a mediator between various cluster members and adds value by stimulating collaboration both within the cluster and between the cluster and the outside world. Cluster management excellence thus refers to the organised efforts allowing to achieve and maintain cluster excellence.

The term and the notion of "cluster management excellence" are increasingly gaining popularity. Labelling excellent cluster managers becomes common practice at both the European and national levels. Cluster organisations seek for ways to demonstrate excellence towards their members, policy makers and the community. Policy makers, in turn, launch a number of projects and initiatives aiming to improve the efficiency of existing efforts in cluster management. (For example, see Europa InterClusterWhite paper on "The emerging of European world-class clusters" www.intercluster.eu/images/stories/white_paper/white_paper_the_emerging_of_european_worl d_class_clusters.pdf Promoting Cluster Excellence, Measuring and Benchmarking the Quality of Cluster Organisations and Performance of Clusters Gerd Meier zu Köcker, Jørgen Rosted (Eds.) 2010).

The current discussions on cluster management excellence primarily focus on the outputs related to clusters and cluster management. The typical questions these discussions aim to answer are: Which performance indicators could be used to define cluster excellence? Based on what results can we conclude that cluster managers demonstrate excellence? How can we best compare clusters and cluster organisations?

At the same time, the materials on the actual process of cluster management, let alone excellence in this process, hardly exist. How should the cluster be managed? What are the key pillars of cluster management excellence? How can cluster management excellence be achieved and maintained? The materials on those issues would be of great help to all cluster managers, and to the managers of emerging clusters, in particular.

The objective of this report is to support cluster managers, policy makers and other relevant stakeholders in crystallising the notion of cluster management excellence as a process rather than an output.

In this report, we present our vision on the essence of cluster management, and identify the key pillars of excellence.

The objectives of clusters and the corresponding indicators of cluster management excellence may vary per cluster; nevertheless, we suggest that some key principles can be distilled which are applicable to various clusters independently of their objectives.We thereby aim to shift the discussion from what the clusters should try to achieve towards how the clusters can achieve their objectives.

We also suggest that focusing on cluster management alone is not enough for cluster excellence, and that the notion of cluster governance has to be brought onto the stage. Cluster governance represents the interests of cluster stakeholders (e.g., universities and research institutes, large and small companies, supporting structures etc.), while cluster managers strive to serve the needs of cluster stakeholders. Cluster managers are thus given power by cluster stakeholders to administer the cluster. Consequently, omitting the stakeholder part when discussing cluster management excellence would be a one-sided approach.

The information presented in this report is based on our experience in working with knowledge-intensive clusters from all over the world. The report exclusively contains the general principles of excellence in cluster management and does not take into account contextual or sectoral issues. We are convinced that each cluster is unique, and so is the best approach towards cluster management in a particular cluster. By this report we only aim at sketching the contours of how to achieve excellence in clustermanagement. The reader should not act upon the information contained in this report without obtaining a specific professional advice.

The remainder of this report is organised as follows- (A Practical Guide to Cluster Development. A Report to the Department of Trade and Industry and the English RDAs by Ecotec Research &Consulting. ECOTEC, (2004) Gerd Meier zu Köcker, New Approaches towards Cluster Management Excellence. Presented in Delhi, December 2010 See, for example, European Cluster Excellence Initiative www.cluster-excellence.eu/; European Cluster Managers' Club).

Cluster management cycle

Cluster management can be defined as the organisation and coordination of the activities of a cluster in accordance with certain strategy, in order to achieve clearly defined objectives. Cluster management represents a continuous activity of a cyclical nature. It is a complex, interactive, non-linear process. Different activities are thus likely to take place simultaneously.

(1) Define;

(2) Design;

(3) Implement,

(4) Monitor,

(5) Evaluate, and

(6) Revise.

Define

The first stage of the cluster management cycle refers to defining what the desired outcomes for the cluster should be. At this stage, the vision, mission, strategy and objectives of the cluster are formulated. The outputs of this stage form the basis for the whole cluster management process.

Defining cluster vision

Cluster vision refers to the inspirational description of what the cluster would like to achieve in the long-term future (typically five-ten years). The vision thus represents a framework for the cluster's strategic planning. For example, a biotech cluster might have a vision statement that reads: "The cluster as a global hotspot of biotechnology and biomedical research, with a solid and competitive industrial base".

Defining mission of the cluster organisation

While the vision refers to the cluster as a whole, the mission defines the fundamental purpose of the cluster organisation itself, i.e., why it exists and what its role is in achieving the cluster vision. For example, a cluster organisation may aim to help create a vibrant collaborative environment in the cluster by bringing cluster participants together, facilitating strategic training and promoting entrepreneurship.

Developing cluster strategy

Cluster strategy, in turn, refers to the long-term action plan in order to realise the cluster vision. Cluster

strategy typically covers the following six elements:

(1) *Direction*: where the cluster is trying to get in the long term;

(2) *Scope*: what the key activities are that the cluster should focus on;

(3) *Competitive advantage*: what the key strengths of the cluster are and how those can be best utilised;

(4) *Resources*: what resources (i.e., skills, assets, finance, relationships, technical competence, facilities) are required to realise the cluster vision;

(5) *Climate*: what external factors are likely to affect cluster's development (e.g., political, economic, legal factors);

(6) *Stakeholders*: what the values and expectations of the key cluster stakeholders are and how those can affect cluster's development

Excellence in cluster management

Based on the results of monitoring and evaluation, cluster objectives and the objectives of the cluster organisation are regularly reviewed, and the course of action is adjusted, if needed.

The cluster organisation prepares annual cluster reports with a brief overview of the progress made during the last year and shares those reports with a wider community.

Cluster managers maintain regular contacts with cluster organisations from other clusters to exchange experiences and best practices with regard to cluster performance measurement. The evaluation results are communicated to the key stakeholders and the wider community.

The essence of cluster governance

So far in this report, we have been examining the notion of cluster management. However, we suggest that focusing on cluster management alone is not enough for cluster excellence, and that the notion of cluster governance has to be brought onto the stage. Cluster governance refers to the intended *collective* actions of cluster *stakeholders* to advance the cluster and develop a sustainable competitive advantage. We were able to observe that clusters driven exclusively by the efforts of cluster managers and without joint commitment of the stakeholders are doomed to fail.

Distinguishing between cluster management and cluster governance

Cluster governance should not be equalled to cluster management. While cluster management is about the actual management of the cluster, cluster governance is about ensuring that the cluster is well managed. Cluster governance represents the interests of cluster stakeholders (e.g., universities and research institutes, large and small companies, government, supporting structures etc.), while cluster managers strive to serve the needs of cluster stakeholders. Cluster management addresses day-to-day cluster activities such as planning, allocation of

human and financial resources, monitoring cluster progress etc. Governance, in turn, among others refers to appointing cluster managers and evaluating their performance, setting the vision and strategy of the cluster and approving action plans.

Project management

T e structure and management of a cluster demand high quality teamwork in which numerous tasks and functions are handled by diff erent cluster actors. Clusters are strongly project oriented organisations where concrete activities are mostly implemented in projects. This requires professionalproject management. Project management relieves cluster management and enables the cluster to achieve operational goals quickly and in accordance with its resources. It sets clearly defined, limited and manageable tasks and enables cluster members to handle important project work for the cluster in addition to their current daily business, jointly and in a goal-oriented way.

A project is a major, unique and complex undertaking, with several actors involved in its planning, management and implementation. Specifi cally, a project involves a large number of individual processes which together lead to the project result. For example, a number of diff erent specialists have to work together as a team in building a house, with each of them handling specific partial tasks and processes so that a viable building emerges at the end.

Cluster projects can be defined as:
• **internal projects:** the project is carried out by participants for cluster members (internal customers)
• **external projects:** the project is carried out by cluster members for customers outside the cluster (external customers)
 We can also distinguish between process oriented and goal oriented projects.
I
n the cluster context, **project management** can be defi ned as the planning, management and implementation of a unique and complex undertaking involving several cluster actors, with temporallyand materially defi ned starting and fi nishing points. The goal of project management is to implement individual projects as punctually and in line with performance and resources as possible. With most projects there is a project executing entity which issues the project commission and takes the overall decisions, while the project management (project manager and team) are responsible for concrete project implementation.
So how do you organise and manage projects as effi ciently as possible in a cluster?

Organising cluster projects requires in depth consideration of the following aspects:

• **Technical management aspect:** setting goals, planning, managing and monitoring project phases

• **Methodological aspect:** applying project-specifi c methods and techniques

• **Behavioural aspect:** project rules and behavioural rules for project participants

• **Organisational aspect:** rules on the project structure and procedures.

It is advisable when implementing a cluster project to split the project into several **phases** and deal with these in steps together with the project participants.

Phase 1: project start & defi nition

In the initial step, all the data relevant for the project is collected and analysed, and **project goals** are defi ned. Setting clear and realistic goals is very important for project management, as it sets the general approach. Project goals should be realistic, unambiguously defi ned and recorded in writing. When setting project goals we can distinguish between material, deadline and cost goals. All three aspects must be precisely formulated as early as possible. Th is is also the phase when the project participants or project staff s is identifi ed. Th e data analysis is then used to generate an initial joint **project concept**, which acts as a basis for discussion and the project plan.

Phase 2: planning

The planning phase should start with a meeting of all those involved in the project and should result in a project structure in terms of content and timetable. It is important to identify the individual tasks and divide these up. In addition, an estimate must be made of the work involved, the costs set and key interim goals (milestones) identified. To be able to measure subsequently whether the interim goals and project goals have been reached, indicators should be defi ned. A major point in planning cluster projects is agreement between all those involved that they will carry out the tasks they take on in a binding and punctual manner.

Th e following tools can be used for project organisation:

• Structure, procedure and timetable planning

• Capacity, resource and cost planning

• Project matrix.

The simplest approach is a presentation using a project matrix where the tasks of those responsible are assigned, inputs and outputs defi ned and deadlines set. The project manager is responsible for following up deadline overruns, as otherwise the cooperation will lose discipline.

The following tools can be used to structure projects:

• Milestone plans / lists

• Networking schedules

• Activities plans

Th ere is a range of useful software for facilitating planning and visualising the various tasks, activities, sequences, interim goals and timetables. For example, MS Excel can be used for project planning, or specifi c project management software such as MS Project.

Th e results of the planning phase can then be summarised in an overall document, the project plan. This plan includes the following elements:

• Project description

• Brief description of the project executing agency

• Project manager, organisation

• Description of the project partners

• Th e initial situation and motivation

• Subject of the project, project goals

• Project structure, procedure and timetable planning

• Personnel and resources plan

• Cost and fi nancing plan

• Timetable and work plan, project matrix

It is important in the project or project structure plan to break down the overall project into subprojects and break these down in turn into sub-tasks. Th e sub-tasks or "work packages" then have to be broken down further into individual activities. It is useful here to draw up work package descriptions. Each work package should be clearly assigned to one individual, and the time and resources (costs) for them should be defi ned.

Phase 3: project implementation

During project implementation, two central management functions have to be performed – concrete project organisation, and management of the execution of the work. The main tasks in project organisation are creating a goal-oriented framework for action, i.e. ensuring clearly defined obligations in implementation and creating a structure for communication. This is particularly important because every project is subject to a specific dynamic, and there may be changes over the course of the project. These need to be communicated to project participants quickly and transparently, in order to be able to respond appropriately. As far as project management is concerned, the primary tasks are coordinating the individual work packages,

coordinating the participants, structuring concrete project communication, and motivating project participants.

During this phase there must naturally be ongoing project controlling, in the form of a comparison between actual and budget figures, carried out by the project manager. With very extensive projects, controlling can be done by separate controlling teams. Project controlling covers monitoring project progress, costs, and time and quality tracking. However, controlling should also enhance the ability of project participants to refl ect and provide feedback to enhance project management skills (keyword: self-organisation capability). Particularly important for project management are **regular project team meetings** for face-to-face sharing of information, communication and progress control. Th ese meetings are also important for team building, as they promote group coherence.

An important instrument for project implementation is the project plan or project matrix mentioned earlier, as this serves as a guideline and gives all participants an exact overview of the status of the project.

Another important point is to ensure up-to-date project documentation, which makes it possible

for individual team members to coordinate their work and ensures a uniform level of knowledge within the group. Th e principle is that the status of documentation should always match the status of the project. Project documentation covers documentation of both the progress and the results of the project. Th e reporting system required for documentation should largely follow the structure of the project plan.

Phase 4: project completion

Project completion should be defi ned in qualitative and quantitative terms in the project plan (goal attainment). Th e project can only be regarded as complete if 100 per cent of the defi ned project goals have been reached. In any case, after completion of a cluster project the individual project phases should be jointly analysed and evaluated. What worked well, what less well, what were the reasons, and what can be done better in the next project (lessons learned)? Project documentation (project progress reports, fi nal report) play an important role in this. An internal cost analysis should also be included in the fi nal phase. Th e last step is to wind up the project and project group. Th e project manager has a central role in project management. **The most important tasks for the project manager are:**

• Overall coordination and management of the project team

• Project planning and controlling (performance, deadlines, costs)

• Leading the team, i.e. goal-oriented assignment of project participants

• Motivating project participants

• Allocating and distributing resources

• Moderation

• Representing the project, internally and externally

• Project communication (internal, external)

• Project administration and documentation

The project manager should be chosen on the basis of project experience, technical knowledge (project content), communication and management skills, ability to work under pressure and flexibility. With major projects, a separate project steering committee can be formed. Generally, however, this function is performed by the cluster steering committee, which supervises the project manager and project team.

Project management is an interdisciplinary activity which can only be effi ciently handled by a team. The exact membership of the team depends on the content of the project. It is a matter of finding the right mix of people with the necessary technical, methodological and social competence.

All team members should see themselves as full and equal members of the project, to ensure identifi cation with the project and the emergence of an "internal identity" (cooperation and cohesion) in the group. Th e size of the project team depends on the scale of the project. Normally, a project team should have at least three members.

The central functions of the project team include:

• Autonomous completion of work packages

• Attendance at project team meetings

• Structuring the relationship with other project members and project manager (information and communication)

 • Project documentation for assigned work packages.

Process management

The question first arises what we actually mean by the term process or **business process**. Applied to the cluster context, we can **define** the term as follows: A business process is a chain of functionally linked activities with the aim of meeting requirements of internal and external customers. (Cluster Management – A Practical Guide - Clusterportal BW https://www.clusterportalbw.de/downloads/publikation/Publikationen/download/dokument/cluster -mana)

DEFENSE INDUSTRY CLUSTERS IN TURKEY

The firms serving the defense industry have certain roles depending on their size, products, and services. There are three main roles: Main contractor, subcontractor, and suppliers of various devices and components. There are also some firms that conduct analysis, design, testing specialized in certain areas (*Assessment of Defense Industry Clusters... (PDF Download Available).* Available from: ttps://www.researchgate.net/publication/284698919_Assessment_of_Defense_Industry_Clusters_in_Turkey [accessed May 14 2018].)

Due to security and confidentiality of the defense technology in defense systems, the need to develop these systems, at least the critical portions of them within the country is obvious. Many countries place limitations on the use of exported defense systems. For example, in the USA, the export of defense systems is subject to the approval of the congress. Furthermore, the maintenance costs of exported defense systems are considerably high. Therefore, independence in defense systems has many advantages for the countries.

Defense systems are generally complex, large-scale, and software-intensive systems. Generally, the defense contract is won by a main contractor. This main contractor has many subcontractors to develop various parts of the system. The main contractor may also get services for design, testing, and certification of specialized components. In some cases experts from consultancy firms or scientists from universities may be hired for consultancy. As a result, defense system projects have many stakeholders. Defense systems are generally developed for governments and stakeholder involvement is especially challenging in government-contract software projects. Therefore, clustering has many benefits in developing defense systems by bringing these stakeholders together.

In order to achieve competitiveness, the firms in the cluster are required to form effective collaboration circles both within the cluster and outside the cluster. The success of firms in the cluster is higher than the firms outside the cluster due to fact that no firm can overcome the challenges related to development of defense systems. Since defense systems are largescale and complex, it is quite unlikely that the expertise and resources needed to successfully develop a defense system will be possessed by only one firm. Thus, clustering is one of the best solutions for this problem. Porter emphasizes that clusters are formed by industrial firms that share common benefits and firms from different industries supporting the industrial focus of the cluster. The common benefits are shared pool of resources, institutions, a shared culture, common opportunities, and similar threats. The strategic alliances between defense industry firms are affected by the conditions due to political, social, economic, and security climate in the country.

The defense firms are not the only players in creating a competitive defense industry. Therefore, there are other actors playing significant roles in achieving a strong defense industry. Ministry of Defenses, government acquisition agencies, public and private research and development institutions, universities, non-profit organizations are among these other actors. According to Ziylan, a large defense project cannot be achieved by a single main contractor without having government support . Having adequate qualified human resources in the Turkish defense industry is also important. Therefore, assessment of defense industry clusters in Turkey universities and research institutions should be in close contact with the defense industry and be able to offer programs and courses needed by the defense industry. Creating a synergy between all these actors will help to achieve a strong defense industry. Consequently, the defense clusters would create communication channels between all these actors.

The fast growing defense industry started to realize the importance of clusters in terms of achieving a competitive industry. The national policies and reports (for instance) also state that creating effective defense clusters is a necessity. Furthermore, having a strong technological base and a sustainable growth in variety and depth of defense industry is crucial for competitiveness.

Murad Bayar, the Head of Turkish Undersecretariat of Defense Industries (SSM) between 2004 and 2014, drew attention to the importance of defense industry clustering during his appointment. According to Bayar, currently, the defense industry in Turkey has yet to reach the capability to create innovative and critical defense technologies. He states that the development of capable main and subcontractors and the creation of necessary culture in defense industry would take time. Therefore, SSM is trying to lead the SMEs and other firms in defense industry to establish defense project management practices and increasing the technology development capability. He also highlights that clustering is an important tool in guiding these firms and achieving these goals. Bayar, signifies the example of OSSA as a successful implementation of defense clustering .

The first defense industry cluster in Turkey is OSTIM Defense and Aviation Cluster (OSSA) established in 2008 . Two more clusters followed OSSA. Teknokent (Technology Park) Defence Industry Cluster (TSSK) located in Middle East Technical University in Ankara is established at the end of 2010. Aerospace Clustering Association (ACA) located in Izmir started in 2010 as the first cluster specializing in Aviation and Space technologies. Eskişehir Aviation Cluster (ESAC) [25] followed ACA in aviation and established in 2011 in Eskişehir, one of the cities hosting a large Air Force base in Turkey. Another cluster focusing on Space, Aviation, and Defense is established in 2014 in Bursa. Currently, this cluster is in early stages. 55 firms applied for memberships

CONCLUSION

The clusters consisting of defense firms have similar characteristics. We believe this is due to the inherent characteristics of defense industry. The main characteristic of the first   three defense industry clusters in Turkey is that they mostly consist of SMEs and they are located in the same geographic area. However, Aviation and Space Valley of France, consists of not just SMEs but also main defense contractors. The Teknokent Defense Industry cluster located in Middle East Technical University in Ankara and Aviation and Space cluster located in İzmir, have strategic alliances with the universities located nearby.

The universities offer related graduate programs and courses to educate the practitioners of the firms in the clusters. The OSTIM Defense and Aviation Industry cluster is different in the sense that the main focus is on manufacturing rather than research and development.   Therefore, the cluster consists of SME manufacturing firms and the cluster facilitates the coordination.

The lack of guidance and determination of roles in defense clustering presents a challenge in Turkey. Without an in-depth analysis and planning, there are various attempts from different government agencies for clustering initiatives. As a result, the optimal use of resources may not be achieved. One of the first steps in finding a solution to the current set of problems is to fill the gaps in the industry regulations related to clustering and cluster development.

The defense industry clusters in Turkey are in their early phases and they are not developed to the point of fully functioning clusters. The slow pace in the development may be attributed to the deficiencies in the cluster formation during early phases. Currently, the defense clusters in Turkey are only able to bring the SMEs together to increase coordination and the governing body of these clusters solely function as an association   providing a list of subcontractors to the main contractors. The main reason is the limited perspective of the SMEs forming the clusters. Rather than cooperation and forming strategic alliances with other SMEs to increase their capabilities, they only try get a piece from business and benefit from government subsidiaries such as tax relieves. One of solution to this problem may be establishing processes to benefit from experts and academicians as consultants along the way. However, these strategies and solutions should not be perceived as items in some strategy papers but they should be considered as actually functioning and effective processes. (Ziylan, A. (2004) National Technological Capability and Defense Industry (Ulusal Teknoloji Yeteneği ve Savunma Sanayii - In Turkish). Savunma Sanayicileri Derneği Yayını, 2004 (1), p. 91. Timurçin, D. (2001) The Notion of Clustering and Its Effect on Competitiveness of   SMEs (Kümelenme Kavramı ve KOBİ'lerde Rekabet Gücüne Etkisi – In Turkish).

The defense industry clusters in Turkey have not specialized in a particular defense area or a technology. Specialization in certain defense areas may produce better results. For example, the French aviation and space industry clustering established in Midi-Pyrenees and Aquitaine region of south-eastern France is specialized in structural aviation engineering. The French aviation and space industry clustering established in Ile De France region of northern France is specialized in aviation electronics and aircraft engines.

Another cluster located in Cote D'azue region of south-eastern France develops projects related to helicopters. While the firms in the defense clusters has achieved a certain level of synergy, information sharing, and collective R&D, the outside links of clusters is currently weak. Especially the links between the defense firms in clusters and the universities need to be improved. The universities should be more engaged to defense industry clusters and they should actively participate in defense project development. Even though, there are still many problems, the defense industry clustering in Turkey has been successful in achieving the intended goals in the last 5 years. The current trend shows signs of improvement and will likely to increase the national defense industry capability.

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