THE CAPABILITY CONTRIBUTION OF MAIN DEFENSE INDUSTRY FIRMS TO THEIR SUPPLIERS: A DYNAMIC CAPABILITIES VIEW

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

MURAT ASLAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
THE PROGRAM OF SCEINCE AND TECHNOLOGY POLICY STUDIES

FEBRUARY 2018

Approval of the Graduate School of Social Sciences

_____

Prof. Dr. Tülin Gençöz
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Doctor of Philosophy.

_____

Prof. Dr. Teoman Pamukçu
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Doctor of Philosophy.

_____

Assoc. Prof. Dr. Serhat Çakır
Supervisor

Examining Committee Members

Prof. Dr. Erol Taymaz	(METU, ECON)	_____
Assoc. Prof. Dr. Serhat Çakır	(METU, PHYS)	_____
Prof. Dr. Erkan Erdil	(METU, ECON)	_____
Assoc. Prof. Dr. Erdal Akdeve	(ASBÜ, BA)	_____
Asst. Prof. Dr. Altan Özkil	(Atılım U, SAVTAM)	_____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name : Murat ASLAN

Signature :

ABSTRACT

THE CAPABILTY CONTRIBUTION OF MAIN DEFENSE INDUSTRY FIRMS TO THEIR SUPPLIERS: A DYNAMIC CAPABILITIES VIEW

Aslan, Murat

Ph.D., Program of Science and Technology Policy Studies

Supervisor: Assoc. Prof. Dr. Serhat Çakır

February 2018, 207 pages

Firm capability assessment has been given importance and already studied in some industries and it seems it will be increasing in the future. This thesis investigates the capability assessment issue for Turkish Defense Industry. Defense industry is both a vertically integrated and high technology based industry, so firms are highly dependent on each other for their individual performance. However, the extent of this dependence and the specific effects of main defense industry firms on the remaining firms in supply chain are not yet fully examined. To fill the gap, this study aims to examine the relationships between main defense industry firms and their suppliers by using the dynamic capabilities view of firm. This is because dynamic capabilities help to shed light on intangible capabilities that form the base for the competitive advantage of firms as widely discussed in literature. The novelty of this thesis is being the first known study that examines contribution of main defense industry firms on their suppliers based on capability contribution perspective.

First of all, our thesis just confronts with the developments of the Turkish Defense Industry with its supplier capability focus. As the information collection methodology, we have utilized interview method with selected 45 firms. Besides supplier firms, we conduct semi-structured interviews with other actors of the sector such as; SSM, SASAD, Defense Industry Clusters, KOSGEB and main defense industry firms.

Our findings from supplier interviews indicate that working in defense industry brings apparent dynamic capability contribution for subcontractor firms. According to results, working with defense industry causes increase in all; absorptive capability, innovative capability and adaptive capability parameters and it is concluded that working with defense industry contribute to dynamic capability and competitiveness of the defense supplier firms.

Apart from this based on interview and semi-structured interview findings we have come up with three policy recommendations; Regulating SME Supporting Structure, Promoting the Cluster Structure for Defense Industry and Promoting R&D Focus for Defense Industry. We expect applying these policies would increase this capability contribution.

Keywords: Turkish Defense Industry, Capability Assessment, Dynamic Capabilities

ÖZ

ANA SAVUNMA SANAYİ FİRMALARIN ALTYÜKLENİCİLERİNDE YETENEK KATKISI: DİNAMİK YETENEKLER BAKIŞI İLE

Aslan, Murat
Doktora, Bilim ve Teknoloji Politika Çalışmaları
Tez Yöneticisi: Doç. Dr. Serhat Çakır

Şubat 2018, 207 sayfa

Son yıllarda firma yetenek ölçüm çalışmalarına önem verilmiş, bu ölçümler birçok sektörde çalışılmış ve gelecekte de bu çalışmaların artacağı beklenmektedir. Bu çalışmalarda firmaların yetenek ölçümleri için farklı indikatörler kullanılmaktadır. Bu tezde, Türkiye için ekonomik ve teknolojik anlamda yüksek potansiyel taşıyan sektörlerinden biri olan ve dikey entegre bir yapıya sahip olan savunma sanayi için yetenek ölçümü konusuna odaklanılmıştır. Bu tez çalışması ana savunma sanayi firmaları ile yan sanayi firmalar arasındaki ilişki üzerine yoğunlaşmaktadır. Savunma sanayi dikey entegre ve yüksek teknoloji bir sektör olduğundan firmaların performansı birbirleri ile çok ilintilidir. Bu çalışmada bu ilişkiden doğan yetenek artışı analiz edilecektir. Çalışmanın özgünlüğü savunma sanayinde ana yüklenici firmaların altyüklenici firmalara yetenek katkısı perspektifi ile araştırıldığı bilinen ilk çalışma olmasından kaynaklanmaktadır. Bu çalışmayı yürütürken temel amacımız Türk Savunma Sanayinde anayüklenici ve altyüklenici yetenek aktarımı konusuna katkı sağlamaktır.

Öncelikle tez çalışmamızın konusu Türk savunma sanayinin gelişimi ve son yıllarda ulaştığı yetenek yaklaşımı ile birebir örtüşmektedir. Firmalardan bilgi toplamak için birebir mülakat yöntemi kullanılmış ve 45 firma bu şekilde çalışmaya dahil edilmiştir. Alt yüklenici firmalar haricinde sektörün SSM, SASAD, Savunma Sanayi Kümelenmeleri, KOSGEB ve ana savunma sanayi firmaları ile de yarı-yapılandırılmış mülakatlar gerçekleştirilmiştir.

Savunma sanayi firmalar ile ilgili elde ettiğimiz bulgular savunma sanayi ile çalışmanın bu firmalara dinamik yetenekler sağladığını ortaya koymuştur. Sonuçlara göre savunma sanayi firmaları ile çalışmak dinamik yeteneklerin tüm parametrelerine; özümseme yeteneği, adaptasyon yeteneği ve yenilik yeteneğine katkı sağlamaktadır.

Bunun yanında ikili görüşmelerde elde edilen bulgular ile 3 farklı politika amacı önerilmiştir; KOBİ Destek Mekanizmasının Düzenlenmesi, Küme Yapısının Teşvik Edilmesi ve Savunma Sanayi için Ar-Ge odağının desteklenmesi. Bu politikaların etkin uygulanması ile bu katkının arttırılabilmesi mümkün görünmektedir.

Anahtar Kelimeler: Türk Savunma Sanayi, Yetenek Ölçümü, Dinamik Yetenekler

To my family

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my supervisor Assoc. Prof. Dr. Serhat Çakır for his efforts, guidance, patience and support through the research. He not only guided me perfectly, but also encouraged me to perform better in the study.

I would like to thank to, Prof. Dr. Erkan Erdil, for his insights, suggestions and feedbacks throughout the research.

I would like to thank to jury members; Prof. Dr. Erol Taymaz, Assoc. Prof. Dr. Erdal Akdeve, Asst. Prof. Dr. Altan Özkil and Prof. Dr. Teoman Pamukçu for their valuable contributions on the thesis.

I would like to thank to Prof. Dr. Dilek Çetindamar for the feedbacks, criticisms and insights throughout the study.

I would like to thank to SSM and especially to the Head of Industrialization Department Bilal Aktaş for supporting my study. Besides, I am grateful to Özden Özben and Mehmet Kaptanlar for their insights, supports and feedbacks.

I would like to thank my company, ASELSAN, for the support about thesis study permissions. I would like to thank especially my manager Central Procurement Director Ali Rıza Kılıç for allowing me to conduct this study and for supporting me throughout the study.

I would like to thank my friends; Cansu Durukan, Gülsevim Evsel, Maryat Demircan, Muhsin Doğan, Şafak Baykal, İrfan Ceylan and Funda Mendeş for their supports that enable me cope with this tedious process.

I would like to thank to my friend Abdurrahman Türk, for the feedbacks, insights and supports during the whole study.

I would like to thank to my parents, Hasan Aslan and Nuray Aslan for their endless moral support. I would like to thank to my brother Çaglayan ASLAN for his invaluable supports through the research.

I am also grateful to my beloved daughter Zeynep and my wife Yasemin for their unconditional support, patience and love. Without their help, I could not have been able to complete my PhD.

And finally, thanks to TÜBİTAK for the scholarship, which is provided throughout my PhD study.

TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

In recent years, firm capability assessment has been given importance and has already been studied in some industries, and it seems that number of these studies will be increasing in the future. There exists capability assessment studies in; pharmaceutical, chemical and semi-conductor industries. In these studies, various indicators are considered in order to define the capabilities of companies. Sometimes these indicators are patent based (Narin et al., 1987; Chang et al., 2012), in some studies indicators are R&D spending based (Cohen and Levinthal, 1990), and some studies focus on the new product development (Wang and Ahmed, 2004; Griliches, 1990; Vega-Jurado et al., 2008; Potters, 2009) or some authors use a mix of these indicators (Schoenecker and Swanson, 2002; Chen, 2004). As far investigated there is no such a capability analysis in the defense industry. Our main aim is filling this gap of capability research in the defense industry. In this thesis, we focus on the capability performance of the defense industry since the defense industry is one of the few industries that offers a high potential for economic and technological growth in Turkey.

This thesis explores the relationships between main defense industry firms and their suppliers. Defense industry is both a vertically integrated and high technology based industry, so firms are highly dependent on each other for their individual performance. However, the extent of this dependence and the specific effects of main defense industry firms on the remaining firms in supply chain is not yet fully examined. To fill the gap, this study aims to examine the relationships between main defense industry firms and their suppliers by using the dynamic capabilities view of these supplier firms. This is because as widely discussed in literature dynamic

capabilities help to shed light on intangible capabilities that form the bases for the competitive advantage of firms.

According to SIPRI Yearbook 2016[1] report, the ratio of defense expenditure in total GDP is 2.2% in the World. In the report, it is stated that most of the money is spent on developing a new technology. This R&D based spending makes the defense industry the technology leader in most of the areas. In fact, Serfati (2008) indicates that most of the technology we use today, including internet, stems from the military usage including internet. Apart from other industries, defense industry has a direct connection with governments, actually the customer is generally the government itself. Besides, the technology is high tech and products are complex and require harsh testing conditions, which is why new entrants cannot catch up the technology and enter the market since there is a vertical integration in the system. In Turkish Defense Sector, like most of other countries, there are a few main defense industry companies (ASELSAN, HAVELSAN, TAI, FNSS and ROKETSAN) and in this sector project base approach is the common view. The tenders are such huge projects that only these main defense industry companies could participate. Therefore, the suppliers in the defense sector strictly dependent on collaboration with the above mentioned dominant companies. The interactive relationships between main industry firms and their suppliers transform the whole chain. We argue that capability performance of defense industry cannot be understood without examining the relationships between the main driving firms and their suppliers. These suppliers, which are highly dependent on the buyer, and the governance approach of the buyer are called "captive suppliers" (Clauss and Spieth, 2016). These suppliers can increase their capability via a vertical integration with main defense industry firms, and this is a niche area for researchers. The question is how we decide on this capability? We choose the capability type by analyzing the issue from the competitive advantage view. Dynamic capabilities have no doubt been relevant to achieving competitive advantage (Wang and Ahmed, 2007).

[1] https://www.sipri.org/sites/default/files/Milex-share-of-GDP.pdf (accessed on 05.12.2017)

Dynamic capabilities framework goes beyond traditional approaches to understand competitive advantage, in that it emphasizes the traits and processes needed to achieve good positioning in a favorable ecosystem. For fast moving business environments like defense industry open to global competition, in order to get sustainable advantage you need to deliver difficult to replicate (knowledge intensive) products. Teece (2007) indicates cutting edge technologies requires unique and difficult-to replicate dynamic capabilities which can be disaggregated into three capacity measurements; capacity to sense and shape opportunities and threats, to seize opportunities and maintain competitiveness. Besides, the ambition of dynamic capabilities framework is nothing less than to explain the sources of competitive advantage over time. The possession of dynamic capabilities is especially relevant to enterprise performance in business environments which are open to international commerce and fully exposed to opportunities and threats with rapid technological change. Absorptive capability, innovative capability and adaptive capability are the component factors of dynamic capabilities and underpin a firm's integration, reconfiguration and recreation abilities. Absorptive capability, innovative capability and adaptive capabilities has been widely studied empirically in the literature. In the analysis of Wang and Ahmed (2007) there are over 40 qualitative and quantitative analysis in between 1995-2005.

Acquiring knowledge from outside resources is a complex process, requires cognition and it is directly related with the already accumulated knowledge. Assimilating this knowledge is directly related with the firm's organizational learning capability, in fact as broadly studied in last years the "Absorptive Capacity" of the firm. There are different definitions proposed for absorptive capacity but widely cited definition is offered by Cohen and Levinthal (1990). They define "Absorptive Capacity" for a firm as ability to value, assimilate, and apply new knowledge. They argue that the ability of a firm to recognize the value of new, external information, assimilate and apply it to commercial ends is critical to its innovative capabilities. Absorptive capability is broadly studied in technology management field and it is used as a tool to assess firm

capability. A number of different indicators have been proposed to measure the absorptive capability. These indicators evaluated systematically across different industry settings and generally they include R&D expenditures, patent statistics, and statistics on new product introductions. Schoenecker and Swanson (2002) assess their validity in chemical, electronics and pharmaceutical industries and they found these parameters as consistent across these industries.

Another component of dynamic capability is innovative capability and defined as firm's ability to develop new products and/or markets through aligning strategic innovative orientation (Wang and Ahmed, 2004). Innovative activities of the firms enable them to respond the changing environment by revealing new products, services and processes. Innovation for large companies depends on R&D, for SMEs innovation based on clusters and networking and for micro enterprises innovation based on technological improvement and customer needs (Inan and Bitici, 2015). Innovative firms are able to link their core technology strategies with innovation strategy and business strategy. This alignment generates a powerful mechanism for competitive advantage. According to experts top three factors to measure the innovation capability of a company are; revenue from new products, market share of new products and products that are new to the world.

The other capability in our concern is the adaptive capability and it is defined as a firm's ability to identify and capitalize on emerging market opportunities (Chakravarthy 1982). Chakravarthy (1982) distinguishes adaptive capability from adaptation. The latter describes an optimal end state of survival for a firm, while adaptive capability focuses more on effective search and balancing exploration and exploitation strategies (Staber and Sydow 2002). Powell (1992) indicates that recent empirical evidences suggests that "adaptive capability" is a source of sustainable competitive advantage and a source of developing long lasting exchange relationships between suppliers and customers. Tushman and O'Reilly (1996) indicate that successful organizations are aligned and efficient in their management of today's

business demands, while also adaptive enough to changes in the environment that they will still be around tomorrow.

In this thesis, we aim to examine whether the subcontracts that are conducted with main defense industry firms contributes to dynamic capability of supplier firms or not. In fact, we will be looking for the capability contribution of main defense industry firms to their captive suppliers and role of government policies and other non-profit organizations on this development.

The novelty of the study is being the first known study that examines contribution of main defense industry firms on their suppliers based on capability contribution perspective. While conducting this study our main aim is contributing on the capability perspective in supplier and main driving firms for Turkish Defense Industry. Mainly by interviews current situation is analyzed, in other words with the help of interviews general defense industry relation is mapped, afterwards necessary policy actions are decided in order to increase the capabilities of suppliers.

The research structure of this study is summarized in below Figure 1. Vertical integration through government, mainly Undersecretariat for Defense Industries (SSM-Savunma Sanayi Mustesarligi) to main defense industry firms (ASELSAN, HAVELSAN, TAI, FNSS and ROKETSAN) and from main defense industry firms to captive suppliers are both in the interest area of the thesis.

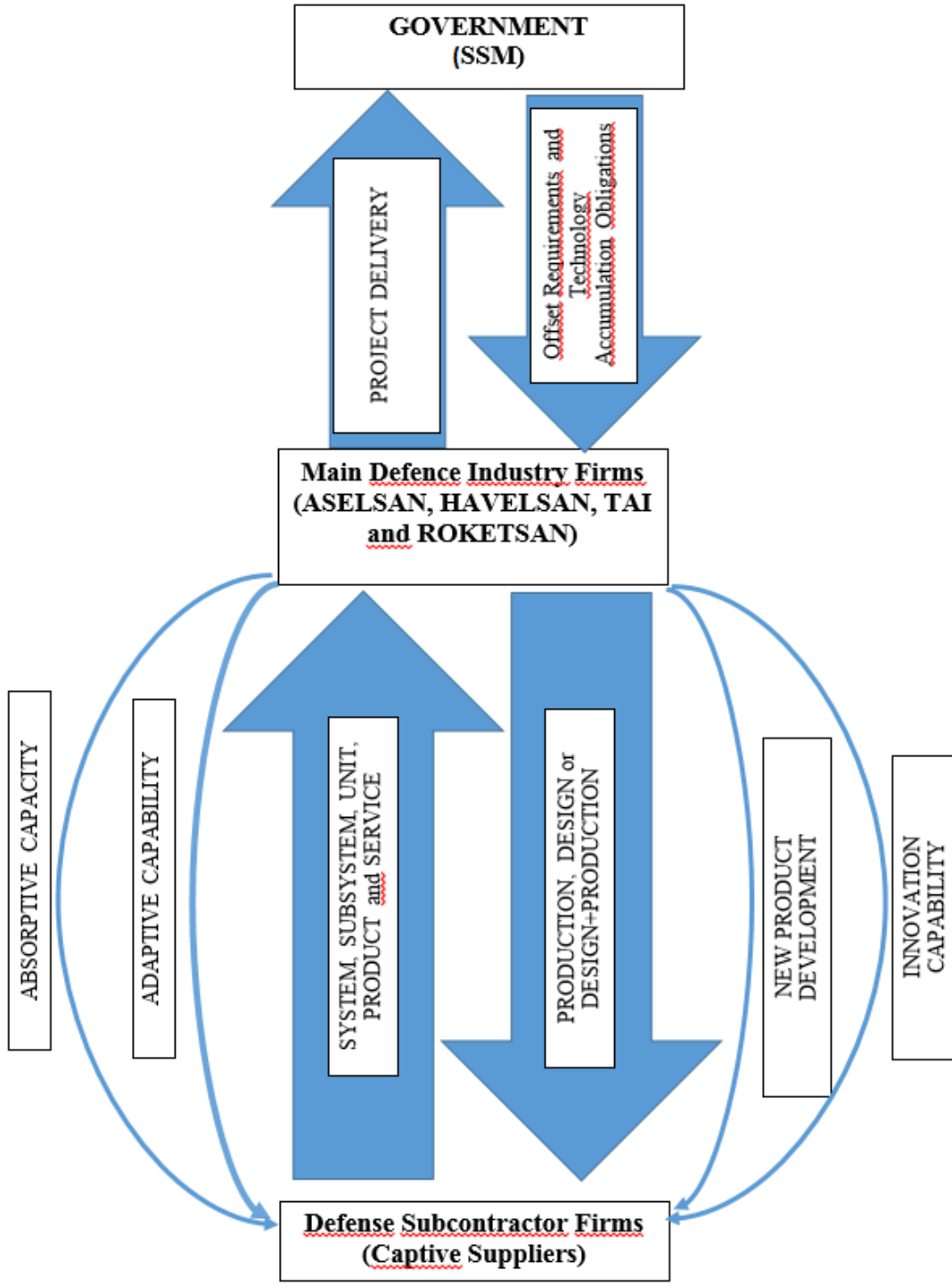


Figure 1 Main Research Structure of the Thesis

In the thesis one-to-one interview method is used to assess below hypotheses.

H1: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' absorptive capability.
H2: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' innovation capability
H3: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' adaptive capability.

By verifying these hypothesis it is aimed to see the effect of main defense industry firms on the dynamic capabilities of their suppliers. Therefore within this context, the contribution related with competitive advantage is investigated.

Besides a regression analysis is performed in order to test the findings. Finally and most importantly we will figure out what kind of policy actions can be done to increase the competitiveness of the supplier firms in Turkish Defense Industry. Structure of thesis is summarized as below.

In the next section, development of Turkish Defense Industry and where our thesis stands in the scope of this development is focused. Moreover, our study is compared with the future vision of Turkish Defense Industry.

Third chapter includes the literature review of the study both theoretically and empirically from the views of; technology, knowledge, capability, dynamic capability and competitive advantage.

Afterwards methodology that we followed for conducting the study is presented. In this part; how we plan and design the interviews, how we select the firms and which actors contribute to our study are focused.

Fifth chapter is data analysis part and from obtained data results and findings are produced. In this part both quantitative and qualitative findings are explained, reliability and validity of our questionnaire are focused and a regression analysis is conducted with capability assessment view.

Then at the sixth chapter policy recommendations are presented. In this comprehensive chapter, after analyzing the results, we try to answer what needs to be done in order to increase the capabilities of supplier firms. While focusing on this; policy aims, policy recommendation and necessary policy tools are focused. Despite conducting a comprehensive analysis, it is observed that there still exist potential areas that can be conducted in this area.

At the final stage of the thesis conclusion and potential future studies are presented. Final remarks and possible future study areas related with defense industry are highlighted again.

CHAPTER 2

DEVELOPMENT OF TURKISH DEFENSE INDUSTRY

Roots of Turkish Defense Industry goes beyond until the rise of Ottoman Empire. In rising era first weapons were produced with local capabilities and technology was well beyond of other countries. First weapon construction "Tophanei- Humayun" had the capacity of 1060 weapons and 360 kg gunpowder at once[2]. Besides, naval facilities were also beyond other competitors. Even completely destroyed at Inebahti War completely, navy produced 200 ships in five months. However, 18th year technological growth which is currently called as Industry 1.0 changed the whole paradigm. Especially European countries got the technological lead in defense and this descend continued until First World War. After this war effectiveness of defense industry had completely destroyed and during the first years of Turkish Republic there were no serious heritage related with defense except for a few production facilities constructed during Turkish Independence War.

First private sector Defense Firm was constructed in 1925 in Istanbul Golden Horn by Sakir ZUMRE and it was constructed completely with local capital. During the first years of Republic despite economic problems defense industry was represented as one of the most important branch of development plan. In those first years despite financial and technological problems, some initiatives were started which represents the base for national defense industry. One of the first important movement was construction of Military Factories General Management Institute.

[2] http://www.aydin.edu.tr/tr-tr/arastirma/arastirmamerkezleri/sstuam/Pages/tss.aspx (accessed on 01.12.2017)

After a few years an entrepreneur Nuri DEMIRAG, surname of whom was given by Turkish Republic President Mustafa Kemal Ataturk due to his success in railway industry, constructed an aircraft factory in 1936. In this factory different types of aircrafts were produced with brand NuD (See Figure 2). In those times it was the biggest aerospace facility in Europe. In addition to increasing local orders even export orders were given, but after an accident resulted with death of engineer pilot all orders were canceled and factory closed which had the biggest aircraft facilities in Europe in those years. If this capability were kept Turkish Aerospace Industry could have been one of the leaders in the area (from the interview with Bilge KUM, granddaughter of Nuri DEMIRAG).

Figure 2 Nu.D Aircraft Produced by Nuri Demirag[3]

Another paradigm shift occurred after World War II, in fact after the war some of the countries closed their gates and started to construct their own local defense industry. In those Cold War years Turkey depended on foreign aid and met its defense

[3] https://www.ssm.gov.tr/website/contentlist.aspx?PageID=47&LangID=1 (accessed on 27.11.2017)

requirements through and in the framework of NATO. In 1944 Lead and Lease Law is revealed and with this law USA transferred 95 Million USD war equipment. Besides second agreement was made with USA in 1945 related with Second World War. I think this foreign aid base defense industry is the main cause of not be able to construct a national defense industry in those years. Even though equipment were free, their maintenance was problem which required 400 Million Turkish Lira yearly in those economic recession years. Besides, these aids prevent local entrepreneurs from development due to lack of orders and Military Factories General Management Institute was tied to Machinery and Chemical Industry Corporation (MKEK) in 1950.

Even if MKEK which was formed as a State Economic Enterprise on 15 March 1950 and Research and Development Department formed in 1954 under the Ministry of National Defense, due to political reasons and Cyprus crises in 1963 and 1967, main activities started around 1970. Cyprus problem brought an important lessons learned. Turkey was not able to use the weapons that brought by aid without the permission of those countries. Furthermore, after 1974 Cyprus Peace Operation due to arms embargo imposed on Turkey, national defense industry had been seen as a must for country. Having suffered a great deal because of its dependence on foreign supply, Turkey started to seek ways to reactivate national defense industry. As the first move, production of G-3 and MG-3 rifles by MKEK under German licenses was concrete example of these policies put into practice. The 1970’s were an era when solid initiatives were put into force so as to establish a national defense industry. ASELSAN was the fruit of this development. During the 1980's, state initiative was undertaken to realize the modernization of the Turkish Armed Forces Undersecretariat for Defense Industries (SSM) was born in 1985 under Law No: 3238. This law introduced a totally new approach and mindset to the Turkish defense industry. Law No: 3238 also instituted a highly flexible and efficient administrative mechanism, the three main pillars of which are: Defense Industry Executive Committee, Undersecretariat for Defense Industries, The Defense Industry Support Fund.

Defense Industry Executive Committee:

The main decision making body of the system, Defense Industry Executive Committee is chaired by the Prime Minister, and includes the Chief of General Staff and the Minister of National Defense as its members. The Executive Committee makes the critical decisions relating to defense industry issues and major defense procurement projects. The Committee is also required to provide nation-wide coordination between all entities regarding defense industry. To be more specific, Defense Industry Executive Committee drives and leads Turkish Defense Industry. Actually, this Committee is expected to draw a major road map and make slight modifications in each meeting; however this is not the case for the situations that Turkey is involved. Since the threats are rapidly changing for Turkey, priorities are changed and even among 2 or 3 consecutive meetings major changes occur in defense strategy. Another problem is the non-linear and less predictable characteristics of defense technologies and distinct threats that Turkey fce with make it impossible to follow a specific technology pathway.

Undersecretariat for Defense Industries (SSM):

SSM is founded with above mentioned law for following focus "establish an institution capable of generating long term defense policies and principles, and supplementing them with a continuous flow of financial resources". SSM in a unique autonomous organization and this structure is specific for defense and it does not exist such government organizations for other sectors. With this characteristics SSM is represented as the ruler of Turkish Defense Industry. Based on my observations with my a decade experience and having interviewed with almost all actors in the sector SSM is a success story and could be a role model for other sectors from the government perspective and in the next sections we focus on these issues.

Major task of SSM is defined as to constitute a modern defense industry in Turkey and to achieve the modernization of the Turkish Armed Forces. In order to attain this objective, the main principle applied by SSM is to meet military

requirements through domestic suppliers in the most technically and economically feasible way possible. The main duty of SSM, the second organ established by the Defense Industry Law, is to enact the decisions taken by the Executive Committee. According to the Law, SSM has a separate legal entity, as well as its own extra-budgetary financial resources to perform the following functions:

- To carry out the decisions taken by the Defense Industry Executive Committee,
- To reorganize existing Turkish Industry in line with the prerequisites of defense industry,
- To plan the production of modern arms and equipment at private and public sector,
- To conduct research and development of modern arms and equipment and to have their prototypes manufactured,
- To coordinate export and offset trade issues relating to defense industry products.

SSM coordinates the related projects ranging from; research and development, prototype manufacturing or export and offset trade issues. Vision of SSM is Making Turkey Superior in Defense and Security Technologies. Mission of SSM is Management of industrialization, technology and procurement programs that assures the continuous improvement of Turkey's defense and security capabilities. Priorities of SSM mainly decide the path of defense industries, strategic priorities of SSM are;

- Sustainability of the Defense Industry
- Achieving Maturity in Program Management
- Developing Technological Competence
- Employees who create value and Receive Recognition

SSM gives priority to local development, including all design phases. On the other hand, if this not possible international consortium or co-development is preferred, this includes joint development of local and foreign partners. Even this is not possible then direct procurement from a foreign firm can be conducted. Moreover, SSM conducts extra responsibilities and coordination facilities such as Istanbul Sabiha

Gokcen Teknopark and Kazan Air&Defense Region. Besides, SSM conducts operational facilities like standardization of supplier audit system, which we will focus in later parts. In addition, SSM supports defense industry clusters and encourages cluster structure which we will focus again at the next sections.

SSM has distinct mechanism, an important example for this is the firms that are constructed by SSM for special purposes. These firms and their facility areas respectively; TRD Micro-Electronic (for photo-detector production), ULAK Communication (for producing and marketing National Base Station), Delta V (For developing hybrid fueled rocket technologies), TR Motor Power Systems (For developing design capabilities for motor technologies), SSTEK Defense Industry Tech (For developing cutting edge technological systems), YİTAL (Semi-conductor production) and TR TEST (For developing test capabilities).

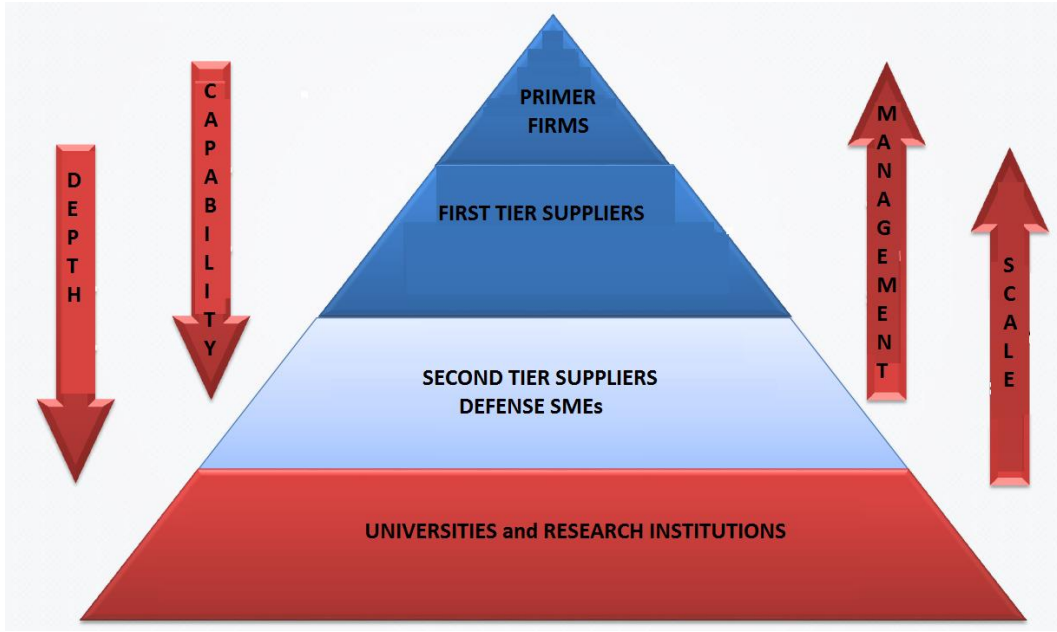
Apart from other government organizations SSM has an autonomous structure. Some bureaucracy procedures are neglected in order to lead the National Defense Industry effectively. Lastly, on 24 December of 2017 autonomous structure of SSM move further and with 696 Decree-Law SSM is tied directly linked to President in order to decrease bureaucracy. One of the major tool of this autonomous structure is the independent fund structure Defense Industry Support Fund.

The Defense Industry Support Fund:

The Fund, designed to enable SSM to carry out its tasks with highly flexible and bureaucratic formality-free mechanism and with a constant flow of financial resources, fully in control of SSM. Among the main cash inflow groups are; allotments from corporate taxes fees and levies imposed on alcoholic and tobacco products, and all forms of lottery, betting and games of chance etc. Since 1986, 80% of a total of US$11 billion was allocated to domestic production purposes, 16% to direct procurement projects and 4% to ATIP (Advanced Technologies Industrial Park) Project.

SSM stands an important role in the evolution of national defense industry. After construction of SSM, localization policies started to arouse. Military crucial communication, weapon and command&control systems was designed and produced in Turkey. The policies behind these developments were main driven company oriented. Companies like ASELSAN, HAVELSAN and TAI were seen as panacea of national defense industry and each firm constructed their own supplier ecosystem which lacks a central coordination and cooperation. After 2000s national defense industry concept started to spread to subcontractor firms. A central structure was necessary in order to put the capabilities on same path and prevent repetitive activities. After constructing the infrastructure during 2000-2005, SSM produced “2007-2011 Defense Industry Sectoral Strategy Plans". This plan focuses on a strong defense industry firm structure and the structure named as “strong defense ecosystem”. Besides, new offset and technology acquirement obligations introduced to sector with this plan. These revisions especially offset policy and technology acquirement obligation bring important paradigm shifts in the sector. Projects signed with offset requirement and technology acquirement obligations with main driving firms, force them to cooperate more with suppliers. Especially, technology acquirement obligation not only increases the shares of defense industry suppliers in the projects, but it also worries about the capability accumulation within the supplier.

2007-2011 Defense Industry Sectoral Strategy Plans Document is revised by “2017-2021 Defense Industry Sectoral Strategy Plans" which was introduced at the end of year 2016 increased the focus on subcontractor and motivates the main driving firms to focus on their core technologies. Spin off and incubator firm terminology also encouraged with this plan. One of the most important issues on this plan is that SSM formally introduced the Industrialization Triangle (Figure 3).



Source: SSM

Figure 3 SSM Industrialization Triangle

This triangle represents the main strategy of SSM beginning from 2016. Based on triangle, the depth of main driven firms on the projects decreases and capability focus on suppliers increases. Besides, it prevents main driven firms to work on detail project issues and make to focus on the big picture. Besides, main driven and supplier firms are not categorized strictly and sometimes they might compete on same projects, with this triangle SSM wants to stabilize the firm category level. Main driven firms are given the role of constructing huge systems and focusing on core technologies and not even follow the technological developments rather lead the defense industry. Moreover, while constructing this triangle main aim is constructing a capable supplier ecosystem that would provide value earned service for main driven firms.

Our thesis is just confronting to these developments and would be an important tool in order to detect effects of these policies. It is aimed to analyze the capability contribution of main defense industry firms on their supplier firms. Even if SSM aims to increase the capability of suppliers there are a few main defense industry

companies in the defense sector (ASELSAN, HAVELSAN, TAI, FNSS and ROKETSAN) and in this sector project base approach is the common view. The tenders are mainly huge projects that only these main defense industry companies could participate in and win. Therefore, the subcontractors in the defense sector are strictly dependent to collaborate with above mentioned main companies. Capability increase of subcontractor is might not be the sole priority for the main defense company.

Novelty of our study comes from being the sole study focusing on the capability development of captive suppliers of defense industry.

Evolutionary development of defense industry summarized in below Figure 4 and as can be estimated results of our thesis could be a good reference in order to design the strong defense ecosystem of future.

Figure 4 Development of Turkish Defense Industry

According to SIPRI Yearbook (2016) report, Turkey spends 2.0% of GDP to defense industry (a little below the average 2.2%). Main defense industry companies took the

largest share of these projects and they subcontract jobs to subcontractor firms. The logic behind this allocation is mainly the supply chain relationship. The vertical integration in the sector includes; defining technical specifications, concurrent engineering, strategic engineering cooperation, quality control, product co-development, certification of suppliers, etc. Main defense industry firms take the project and first defines own part depending on the core technologies. On the other hand, due to scarcity of labor force and material all issues cannot be conducted within the firm. In this process firstly, technical specifications and requirements are defined and proposals are collected from the approved supplier database. Generally at least three proposals are collected which includes technical and commercial parts. Then these proposals are evaluated based on criteria (such as Analytic Hierarchy Process or Pros-Cons Analysis) which is previously defined depending on the type of the contract. Afterwards, suitable firm is defined and contract starts.

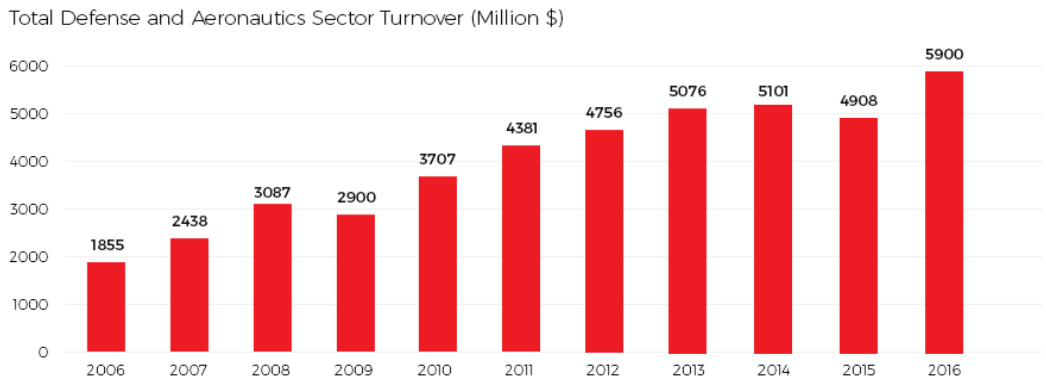
Even if the relationship is mainly supply chain sometimes value chain which bases on repeated interactions for certain cases applies. For these cases above procedure is neglected and a "Sole Source Document" is produced that defines the value chain among the firms. However, "Sole Source Document" cannot be utilized occasionally because it eliminates the price competition and might cause problem. Besides, single source procurement does not always represent value chain rather sometimes for technical or economic reasons firms might prefer single sourcing.

The last but not the least important point about the importance our thesis is that Defense Industry Executive Committee indicates at the last meeting (May 2017) focusing on the capability developments of subcontracts and increase of R&D investment in defense industry. These developments designate that our thesis just confronts with the current developments and future trends of Turkish Defense Industry.

In the next sections we first focus on the current situation Turkish Defense industry with related values, next we will be focusing more on the capability focus of Turkish Defense Strategy.

2.1. Current Situation of Turkish Defense Industry

Defense Industry is one of the fast growing sectors of Turkey. Total turnover increases with a sustainable manner year by year and reach almost up to 6 Billion USD in 2016 as shown in Figure 5.

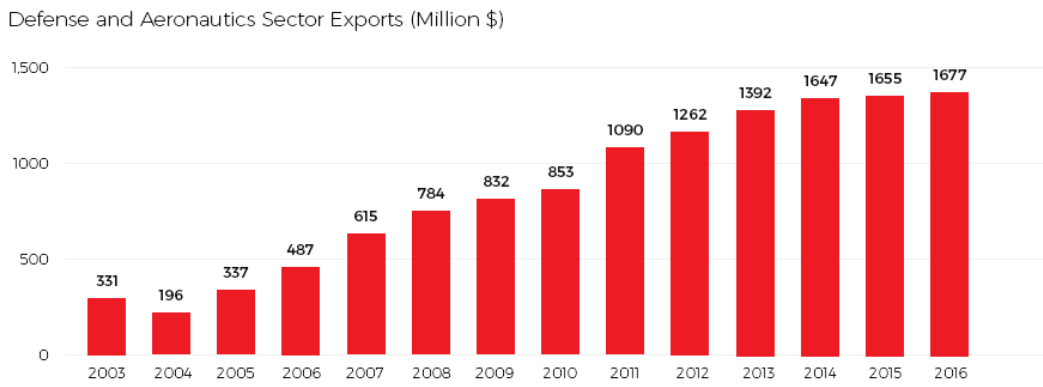


Source: SSM Web Portal

Figure 5 Total Defense and Aerospace Turnover[4] (Million USD)

In the same way, export in the sector increases yearly. Being the second valuable item after jewelry, total export reach up to 1.67 Billion in 2016 as shown in below Figure 6.

[4] https://www.ssm.gov.tr/WebSite/contentlist.aspx?PageID=48&LangID=2 (Accessed on 26.01.2018)



Source: SSM Web Portal

Figure 6 Total Defense Export of Turkey[4] (Million USD)

Moreover in 2002 budget of defense projects was 2.2 Billion, whereas, this value increased 8 times and reach 41.4 Billion in 2016. Besides, in 2002 number of total defense projects were 66 and in 2016 this number is 553 (SSM industrialization web portal).

When this development is compared with the global development for the sector, even if there is a general increasing trend Turkish Defense Industry is growing faster than average. This can be verified by the Top Hundred List of Defense News, which is a globally accepted organization. In 2007 there was not a Turkish Defense Company and first ASELSAN entered the list from 98th level in 2008. Afterwards, ASELSAN continuously move upwards through the list and by 2017 there exists 3 distinct Turkish Defense Companies in the list; ASELSAN, TAI and ROKETSAN. ASELSAN is at the 57th level, TAI is at the 61st and ROKETSAN is at the 98th degree.[5] This result represents an important base for comparing Turkish Defense Industry with the defense industry of the World.

2.2. Capability Focus on Turkish Defense Strategy

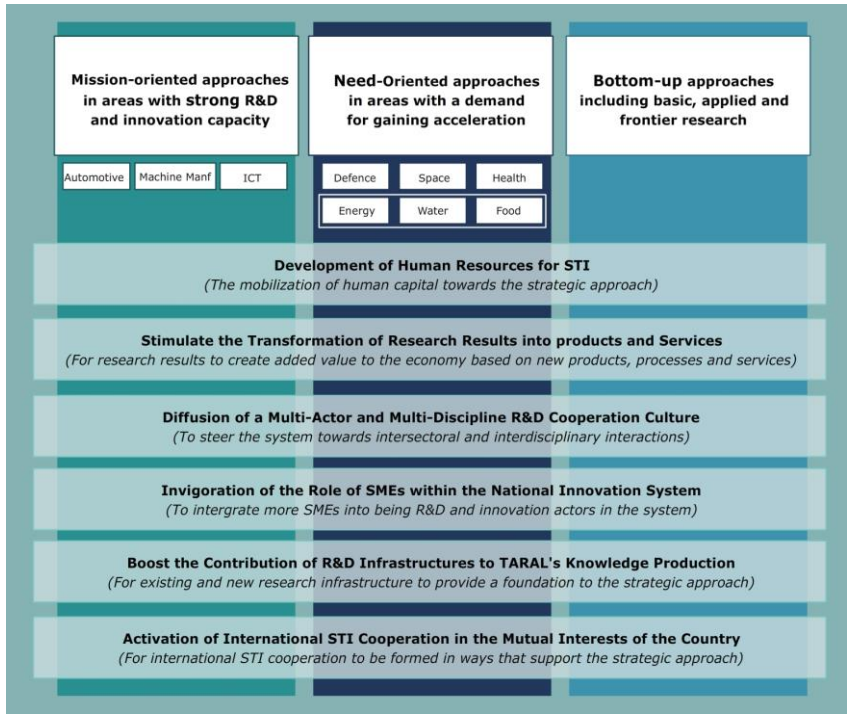
At the 7th meeting of the Supreme Council of Science and Technology (SCST) which was held on 24 December 2001, the document entitled “Vision 2023, Science and

[5] http://people.defensenews.com/top-100/ (Accessed on 25.01.2018)

Technology Strategies" has been formulated with the aim of forming the scientific and technological vision of Turkey. Main goal of this strategy is to increase production power and competency in science and technology. In parallel with this strategy "National Science, Technology and Innovation Strategy 2011-2016" was approved during the 22nd meeting of the SCST.

The vision of the National Science, Technology and Innovation Strategy (2011-2016) is "to contribute to new knowledge and develop innovative technologies to improve the quality of life by transforming the former into products, processes, and services for the benefit of the country and humanity".

In line with these targets, within the period 2011-2016 following focus points are defined; disseminating culture of multilateral and multidisciplinary RDI cooperation, stimulating sectoral and regional RDI dynamics, encouraging SMEs to become stronger actors within the national innovation system, and enhancing the contribution of research infrastructures to the knowledge creation capacity of TARAL. The strategic framework of National Science, Technology and Innovation Strategy (2011-2016) comprises of three vertical axis and six horizontal axis that serves to the vertical ones (Figure 7).



Source: TUBITAK[6]

Figure 7 The Strategic Framework of UBTYS 2011-2016

This figure illustrates the R&D and innovation focus of National Innovation System (NIS). I think strategic framework provides an important interface in order to link NIS with national defense industry development path. SSM constructed this link with "2011-2016 Technology Management Strategy Document", which focuses on technology management in the sector. In this document, main technology management activities are defined as;

- To construct the technological infrastructure for the modernization of Turkish Armed Forces,
- To provide the industry and university collaboration within the scope of Defense R&D Facilities,
- To obligate Technological Acquisition Liability for all Procurement Facilities,
- To lead R&D and Technological Acquisition in the sectoral base,
- To monitor the R&D and Technology Facilities from the Global Institutions,
- To support innovation in the Defense Industry,

[6] https://www.tubitak.gov.tr/en/about-us/policies/content-national-sti-strategy-2011-2016 (accessed on 07 June 2016)

Revealing this document also increase the technology management perspective of the sector and Technology Readiness Level (TRL) analysis introduced to whole sector. After this document SSM applied the rule “obligate Technological Acquisition Liability for all Procurement Facilities” for all new project contract agreements. This rule enabled important Technology Acquisition Projects and provide and important base for capability development for suppliers.

On the other side SSM produced strategy documents “2007-2011 and 2017-2021 Defense Industry Sectoral Strategy Plans". These strategies also increased the supplier capability development focus with an evolutionary manner.

2007-2011 plan indicates general objectives such as; integration of SME and main defense industry firms with offset obligations, “providing 50% of Turkish Armed Forces total demand is applied by local firms”, “allocating budget for R&D studies”, “Increasing the local procurement ratio via creating supply chains spread over tiers”, “Ensuring the private sector’s active role in the whole life cycle, extending from product design to manufacturing and logistics support”. Even if these objectives are seen as paradigm shift related with capability development, they are too superficial to produce real impact in the sector. On the other hand, provide important feedback for construction of 2017-2021 Defense Industry Sectoral Strategy Plan, which implies more focused objectives. For instance, in this plan objective 2.1.3 states that main defense industry firms will be forced to use local outside resources. Besides, objective 2.1.4 states that capability inventory of defense industry supplier firms will be developed. More detailed focus for capability is given in objective 2.1.7 as increasing the competitive advantages of supplier firms. Finally as capability perspective reference objective 3.1.2 indicates direct system production for main defense industry firms by suppliers. There exist other related objectives such as providing finance for increasing export capabilities or supporting patent applications of the supplier firms. In summary, from the capability contribution perspective we can conclude that “2007-2011 Defense Industry Sectoral Strategy Plan" provide an important base for capability developments of suppliers, whereas 2017-2021 plan

focus this objective to more concrete cases in order to construct strong supplier ecosystem.

In addition to this, after 2010 SSM increased to supports given for R&D projects. Even if SSM stands for being the main supporter in defense industry, there exists some other R&D supports in Turkey either, these are; The Scientific And Technological Research Council of Turkey (TUBITAK)-TEYDEB Support, Industry Thesis Program (San-Tez), Technology Development Foundation of Turkey and Small and Medium Enterprises Development Organization (KOSGEB) Supports and Development Agencies. Besides, the Law Concerning the Promotion of Research and Development Activities - Law no: 5746" enables some financial privileges to companies that perform R&D activities. Aim of this law is increase the competitiveness of country with the help of R&D and innovation. Supports that can be utilized by defense industry firms are given in Appendix A. These support mechanism brings important privileges to sector but as we focus in later parts and based on our interviews, supports need to be revised in order to increase effectiveness.

So far, SSM has followed the performance of suppliers indirectly over the main defense industry firms. But, currently SSM works on a program to construct a central audit mechanism in order to measure the capabilities of the suppliers. This program is Industrial Capability Evaluation and Supporting Program (EYDEP-Endüstriyel Yetkinlik Değerlendirme ve Destekleme Programı). Since this program is the most close capability assessment and development action of the government and since I am one of the team members of the program on behalf of ASELSAN and make use of this program during thesis field and being most updated capability development approach in the sector next section is devoted for describing this program.

2.3. SSM Industrial Capability Evaluation and Supporting System (EYDEP)

As mentioned above defense industry firms conduct their procurement facilities from their approved suppliers. This implies an approval process which is executed by main defense industry firms separately. In fact, some of the firms contains different branches and each branch has own distinct approval and audit mechanism. These audits require great repeated efforts both for main defense industry firms and suppliers.

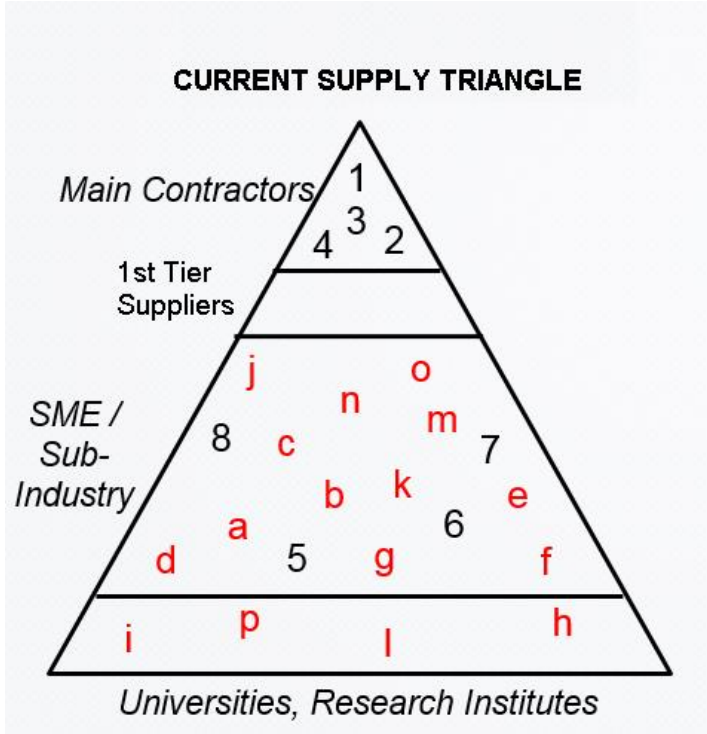
SSM started a project in order to standardize the audit system for the sector. The stakeholders of EYDEP Committee are SSM and main defense industry firms. This committee generated a common question list and an auditor pool which consists of member from each main defense industry firm. This study aims to make a mapping analysis of defense industry subcontractor firms and come up with a firm scaling portfolio. Resulting outputs will not only provide feedback for firms related with their improvement path, but it will also provide a decision support mechanism for SSM for strategical decisions. For the upcoming stages, after scaling the firms SSM plans to group the firms according to capabilities then assign jobs based on defined category sets. Firms will be grouped as Class A, Class B, Class C or Class D based on their performance score and SSM could be able to produce the capability map of the sector. For a specific project SSM might insert constraint to requirements like “a certain portion of the project will be done with Class B firms”. Moreover, SSM and main defense industry firms might propose the ways upgrading of class level. So that EYDEP aims not only to simplify the audit process on supplier firms, but it also aims to extract the capability map of defense industry. By utilizing this capability map, leading the Turkish Defense Sector would fit on a more systematic path; in fact EYDEP would serve SSM as a decision support system.

This current study of SSM, also confronts to our thesis because main aim is defining the capabilities of the firm and developing them based on the requirements of the

defense industry. During the field study of interviewing suppliers, this program helps us to reach the suppliers and facilitate to make interviews with the firms.

Furthermore, this program is seen as the key tool for constructing industrialization triangle. Because in current in supply pyramid does not include system or subsystem provider 1st tier suppliers (Figure 8). Project management, configuration management and supply chain management is conducted by main defense industry firms and all products are supplied to main defense industry firm.

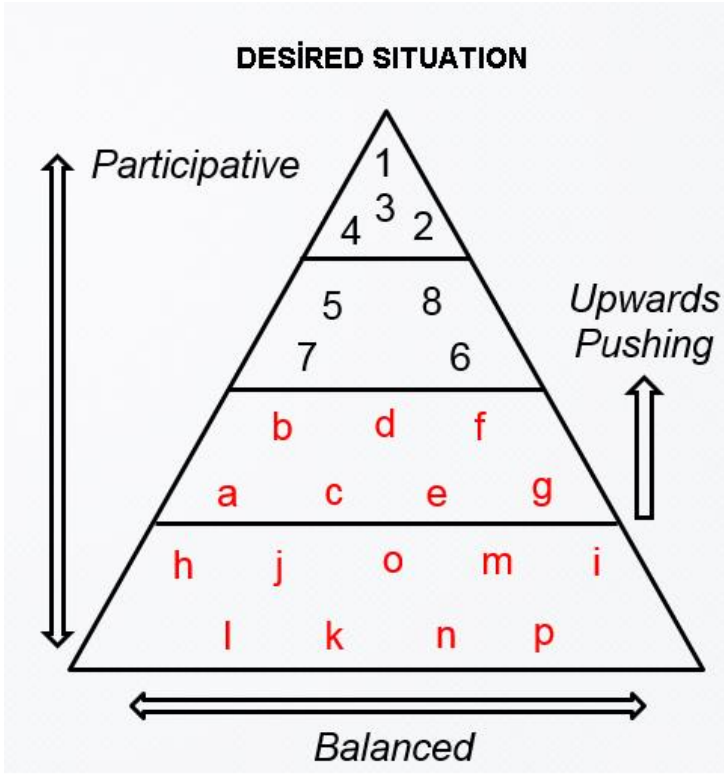
In the figure numbers 1-4 represents main defense industry firms and numbers 5-8 represents the potential first tier Sub-industry firms with related capability but in current situation they also act as second tier. Distributed letters represents SMEs, Research Institutions and Universities. Main idea, behind this figure is that since capability discrimination is not systematically applied structure is not homogeneous. As a result of this, these SME and Sub-industry firms provide low level products and services to the main defense industry firms and capability accumulation occurs at the main defense industry firms.



Source: SSM

Figure 8 Current Supply Triangle

On the other hand, EYDEP aims to differentiate and develop related capable firms as first tier firms with project management, configuration management and most importantly with supplier management capability and obtain Figure 9. One of the main motivation of EYDEP is producing capable firms in order to fill the 1st tier supplier gap and finally coming up with below organized situation Figure 9. In this case, first tier suppliers are expected to provide directly a system or subsystem for projects. Main motivation behind this is distributing capability to the whole industry. As a concrete example in the current case firms provide units or articles to the main defense industry firms and main defense industry firms conduct the main integration. At the desired situation, first tier firms expected to design and produce a whole system such as; top turret of a tank, airfoil or shelter of a huge project as a whole. That means, first tier firms need to have own; project management, configuration management and supply chain management and construct a whole system as a turn-key solution to the main defense industry firms.



Source: SSM

Figure 9 Desired Industrialization Triangle

Desired triangle is the optimal solution of vertical integration of defense industry, in which capability is distributed to lower tiers and all efforts accumulate on the same path. In desired case, even small SMEs would increase their capabilities in related facility area, moreover main defense industry firms would focus on their core competencies and take necessary action to lead the technology instead of following. At final stage, letters a-g represents second tier SMEs and h-p represents universities and research institutions. Main motivation of EYDEP is constructing this balanced case and design the development policies according to the requirements of the defense industry.

In summary, in the last years and for upcoming near future main actions of SSM accumulates around capability assessment and increasing capability of defense industry supplier firms and coming up with a strong supplier ecosystem. These

developments indicate that our thesis not only confronts with the development path of defense industry but also its context intersects with the future vision of Turkish Defense Industry.

In the next section we focus on the literature review of the thesis in order to analyze the development of dynamic capabilities and different approaches to dynamic capability. Another important feedback of literature review is focusing on the capability assessment parameters. Because, in this study we also linked the capability assessment parameters to the related literature. Moreover, empirical results also focused in the literature and they are utilized as reference for the data analysis.

CHAPTER 3

LITERATURE REVIEW

Merriam-Webster Dictionary defines success as “favorable or desired outcome”. From my side in this definition outcome seem to be as the key word. Sometimes it is easy to define the outcome for success as for a student or for a worker based on defined performance score. On the other hand, in some cases defining necessary outcome could be more complicated. In fact, from a firm perspective success factor could be multidimensional such as; revenue, profit, turnover rate, market share, brand value or personnel satisfaction rate. One of the most popular definitions used for firm success is competitive advantage. Moreover, success is defined as a result of action but potential success is much more important which stands for a more proactive term. In the literature for the firm perspective this potential success is called as “capability”. So that in order to diagnose the success factor of a firm, capability assessment tools are utilized.

Capability assessment issue has been broadly studied in the literature both theoretically and empirically. Theoretical studies generally focus on the asset perspective of capability and it is generally material based, however beginning with market dynamism empirical studies took the largest portion due to focusing on financial success and value based assessments. As adopting evolutionary perspective for capability assessment we also trace the development of concept on the time scale. That is why first asset perspective is focused and move gradually to the empirical vision. At the end of this evolution we end up with dynamic capability which is almost used as a synonym to competitive advantage with its comprehensive dimension.

In addition to this, roots of gaining capability lies under knowledge accumulation and learning organization concept. Therefore, we also need to analyze the knowledge structure and construction methodology. That is why in the theoretical part we first focus evolution of knowledge from data and information starting from technology. In order to understand knowledge accumulation these incremental step should be well understood. Afterwards, in the second part of theoretical literature, background of dynamic capability is focused. In this part, evolution of capability assessments to dynamic capability is summarized. Next, empirical studies related with capability assessment are mentioned especially from dynamic capability perspective. There are various empirical studies and generally they focus on single parameter and conduct assessment based on that parameter; however there exist some studies which focus on multiple capability dimensions and discriminated the effects of dimensions which are more look like to our study. Below Figure 10, briefly demonstrate our literature review approach with a schematic representation.

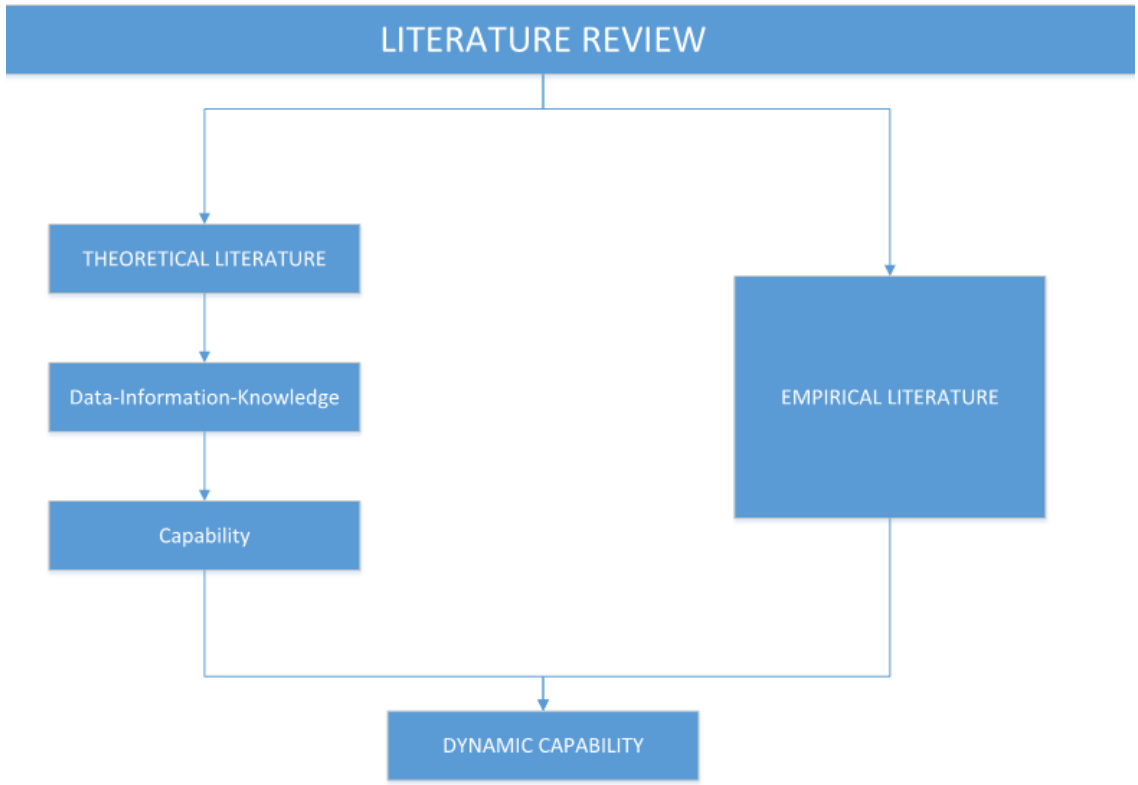


Figure 10 Graphical Representation of Literature

3.1. Theoretical Literature

As illustrated in Figure 10 theoretical literature is designed with an iterative manner. First knowledge concept is focused, process starts from data and information and evolves to knowledge is analyzed. Then path through knowledge to capability accumulation is presented. Next we move towards from general picture of capability assessment to specific dynamic capability and link with competitive advantage.

3.1.1. From Data and Information to Knowledge and Technology

Brian Arthur defines technology as "a means to fulfill a human purpose". Merriam Webster Dictionary defines technology as "the principal application of knowledge especially in a particular area" and "a capability given by the practical application of knowledge". Technology is generally used to refer a certain technology or simply high technology or sometimes specifically to consumer electronics.

According to Neoclassic approach "technology" is a non-rivalry and endless public good and it can be consumed by anyone without decreasing it. On the other hand, Dosi and Nelson (2010) views technology as a competition object and there are winners and losers in this competition. Winners are the ones which have the capability for innovation in order to increase technological knowledge. For our study, we are closer to the Dosi and Nelson (2010) view. Because in high-tech sectors like defense, main competition focus around technology.

Before coming to this concept first of all; data, information and knowledge chain is analyzed. In order to understand the knowledge issue we also analyzed the literature background of these issues.

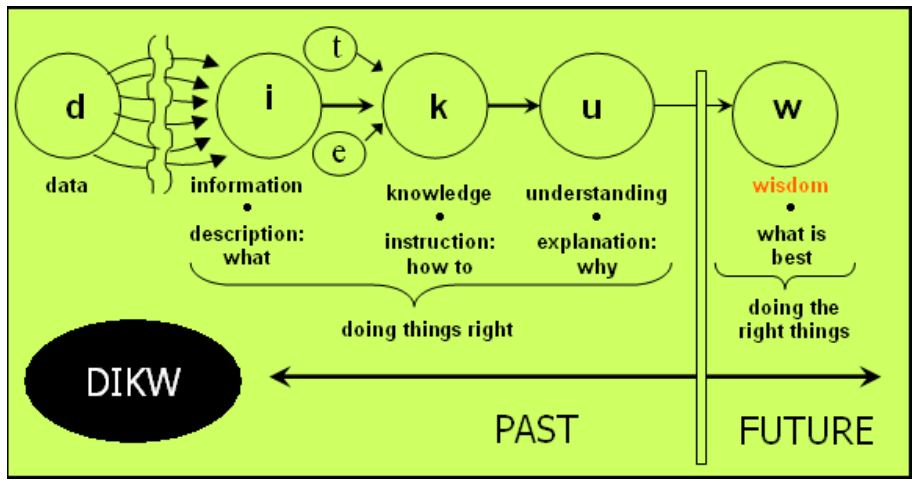
Chaim (2007) defines data as symbols or signs, representing stimuli or signals and characterize as unprocessed information and have no meaning. Whereas information can be measured and transferrable in fact it is meaningful data. Information is the

meaning of sensory stimuli. Classic example given is the noise example. The noises that you hear are data but giving a mean to the noise such as, engine running, wind noise or water noise is information. Knowledge is structured and organized information which is stocked at the cognitive system of the individual. Rowley (2007) adds the wisdom as the ethical and aesthetic values that this implies are inherent to the actor and are unique to personal and produce DIKW (Data, Information, Knowledge and Wisdom) Pyramid.

Source: Rowley (2007)

Figure 11 DIKW Hierarchy

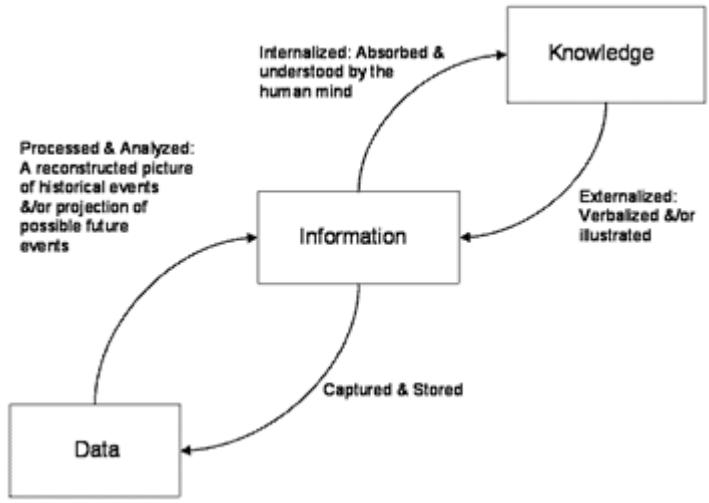
Even if the above Figure 11 shows a passive hierarchy in actual case there is continuous flow among these actors. In fact, there exists studies that shows this relation as flowchart, for instance Wei (2000) represents this relation with continuous flowchart (Figure 12).



Source: Wei (2000)

Figure 12 Flow Diagram of DIKW Hierarchy (from

Continuous flow mechanism explains the relation better, yet it is not enough either. Because even if being continuous the relation is not one way rather there exists a feedback mechanism among these actors (Figure 13). Another approach is the one that shows the relation with feedback mechanism (Liew 2007).



Source: (Liew 2007)

Figure 13 Relationship Amongst Data, Information and Knowledge

For this thesis knowledge construction with feedback mechanism is adopted because in such a high-tech industry environment knowledge spillovers is quite crucial and one of the most familiar case of knowledge spillover is by discrimination of knowledge to information and data. So that, one way knowledge construction structure does not fit our case and when we refer knowledge that generally represents a two way process like in above figure.

Knowledge is the key item for collective growth of the firm. Firms increase their knowledge base by internal resources such as Research and Development, learning by doing or interacting with external knowledge sources. Forbes and Wield (2003) indicates that technology capability of a firm can be increased either by learning by doing or learning by investment. The latter process is more complex because it involves analyzing, explicit action and research and development. Passive "doing-

based" learning is insufficient for efficient capability building generally represents production or other repeated action facilities. Learning cannot be accomplished just by doing; it should include new technology monitoring and application, research and development, knowledge flow from outside and training. This means there should be knowledge diffusion from an outside source. According to Ernst and Kim (2002), this knowledge diffusion can be conducted only when transmitted knowledge is assimilated and transferred into technological capability. In other words, firms can absorb the knowledge only if they have already developed the internal knowledge. This internal knowledge is organizational knowledge and firms can increase this knowledge only if they have the organizational learning capability. As a further step in cluster concept this organizational learning concepts transforms to mutual learning. Even if we focus on the defense industry clusters we observe that it lacks mutual learning attribute so far, that means an important knowledge source is neglected. We focus on the reasons and necessary policy actions at the final chapter.

Knowledge creation and cooperative learning of the firms are interactive processes. For smaller firms outside knowledge can be easily articulated within the firm due to repeated interaction of all shareholders continuously. On the other hand, for larger institutional firms there are strict borders among the departments and knowledge flow is not an easy direct process. Necessary knowledge spillover systems must be constructed by the institution in order to create learning organization. Besides, this learning capability would be sole asset of firms in order to detect and absorb the external knowledge.

In general, apart from our first definition that relates capability to success, in the literature; getting, assimilating, adapting and changing existing knowledge and to create new knowledge and to develop new products or services referred as "capability". And in this thesis from the firm perspective capability assessment is our main focus. In various studies capability refers a subjective talent and includes personnel bias, but in the last decade studies that receive capability as a measurable metric abundantly increased which conceive the concept with an objective manner.

Actually, there exists a comprehensive literature in order to detect and measure the firm capability. In previous years these assessments cover only yearly turnover, number of personnel or financial data, rather there exists comprehensive approach that covers the concept better. One of these comprehensive measurement is dynamic capability, which is defined as a firm's behavioral orientation constantly to integrate, reconfigure, renew and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage. Since this concept is at the focus of our study, in the next section literature related with dynamic capabilities and sub branch of this concept is focused.

3.1.2. Dynamic Capability

Main purpose of this thesis is analyzing the contribution of main defense industry firms on their suppliers. As mentioned before this capability refers to dynamic capability of the firm, which is used as a base for competitive advantage of the firm. There are different definitions, but a common understanding for dynamic capabilities which compiles on the definition of Teece et al. (1997). They define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match or even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resources configurations as market emerge, collide, split, evolve and die (Eisenhardt and Martin, 2000). Dynamic capabilities are essentially change-oriented capabilities that help firms redeploy and reconfigure their resource base to meet evolving customer demands and competitor strategies (Zahra and George, 2002). A newer source of competitive advantage to analyze how firms are able to cope with environmental changes (Lu et al., 2010). Dynamic capabilities aroused from combination of asset view with high-technology.

Dynamic capability context investigates the sources of wealth creation especially for rapid technology change environment so that this another attribute of dynamic capability for utilizing in defense industry. Defining competitive advantage in defense sector is a complex phenomenon, dynamic capability which is aroused as a synonym for competitive advantage is a suitable base for defense industry competitive advantage concept. From our thesis respect, this relation already studied and verified in some high-tech sectors and tailoring dynamic capability and competitive advantage concept to defense industry would be another contribution of this research.

In common dynamic capabilities are firms' cultural orientation which includes sustainably redesign, renew and recreate its resources and capabilities and more importantly continuously reconstruct core capabilities with respect to changing environment. Besides in these studies, absorptive capacity, innovation capability and adaptive capability are used as sub elements of dynamic capability.

Dynamic capability studies originated by Resource Based View (RBV) in other words "Assets" approach. The essence of the RBV lies in the emphasis on resources and capabilities as the genesis of competitive advantage: resources are heterogeneously distributed across competing firms and are imperfectly mobile. Origin of this view reaches up to Penrose (1959), which introduces the theory of effective resource management as a differentiation mechanism among firms. In fact, this study provides a methodology to link RBV with competitive advantage and also links resources with profitable firm growth. Even if Penrose (1959) criticized due to being static by Rugman and Verbeke (2002) I think Penrose (1959) does not directly link competitive advantage with more possession of resources rather effective and efficient management of resources. Besides RBV does not only mean real assets for instance Penrose (1959) relates success of managers and their effective management as an effective resource management and include in RBV either.

Actually RBV perspective of Penrose (1959) is quite close to our dynamic capability approach. For instance it is stated in the book that, direction of a firm growth is decided by current knowledge base and infrastructure of the firms which refers

absorptive capability. Besides, Penrose (1959) focus on time dimension of innovation and protection of competitive advantage with sustainable efforts represents the focus of innovation capability.

RBV has been able to bring a more systematic approach to firm-level analysis by characterizing the firm as a collection of resources and capabilities, rather than a set of product market positions (Wernerfelt, 1984). RBV assumes that performance differences across firms are due to differences arising from valuable, rent-generating, firm specific resources and capabilities that cannot be easily imitated or substituted (Amit and Schoemaker, 1993; Barney, 1991). Based on these characteristics we can say that RBV seems to be first systematic approach for detecting capability and it is still utilized and valid in lots of the occasions, however with high-tech industries market dynamism also changed and RBV approach become lose the priority and new approaches aroused.

Entering the 1990s, the highly dynamic business environment challenged the propositions of the RBV as being static and neglecting the influence of market dynamism (Eisenhardt and Martin, 2000). Even the structure of Penrose (1959) considers dynamic figures, resulting structure RBV is found as static especially for high-tech sector. After RBV has been found as too static to respond for changing environment and competitive environments dynamic capabilities are confined with market dynamism. (e.g. US metal-working sector, one that fell into 'complete disrepair' after World War II owing to its inability to respond to the rise of new competitors, particularly due to continuous improvement and innovation capability increase). RBV still keeps its position in dynamic capability studies; however, the importance in of RBV has changed, indeed dynamic capability concept has shifted. Studies that link dynamic capability with firm overall performance and competitive advantage gained more importance due to respond the market dynamism. At late 1990s and beginning of 2000s studies aroused on market dynamism; the internal and external integration of knowledge in a healthcare firm (Petroni 1998), dynamic learning in telecommunication firms (Majumdar 1999), capability possession,

deployment and upgrading in international expansion (Luo 2000), technology accumulation in cross-border transactions of biotech firms (Madhok and Osegowitsch 2000), continuous transformation of organizational forms in Yahoo! and Excite (Rindova and Kotha 2001) and knowledge creation, absorption, integration and reconfiguration in a Danish hearing-aid manufacturing firm (Verona and Ravasi 2003).

In summary, final structure of dynamic capability has enhanced the RBV by inserting the evolution of the firm to environmental changes. Dynamic capabilities are not simply processes, but embedded in processes. Capabilities refer to a firm's capacity to deploy resources, usually in combination, and encapsulate both explicit processes and those tacit elements (such as know-how and leadership) embedded in the processes. Hence, capabilities are often firm-specific and are developed over time through complex interactions between the firm's resources (Amit and Schoemaker 1993). Wang and Ahmed (2007) map these relations to a hierarchical order. Resources are the foundation of a firm and the basis for firm capabilities. Therefore, resources are the 'zero-order' element of the hierarchy. Capabilities are 'first-order' and this is likely to result in improved performance, when firms demonstrate the ability to deploy resources to attain a desired goal. Core capabilities are 'second order' and are a bundle of a firm's resources and capabilities that are strategically important to its competitive advantage at a certain point. For example, the success of Zara in the fast-changing fashion industry relies on its core capability in responsiveness to customers, which in turn is derived from a bundle of capabilities, including swift copy of catwalk design, advanced information systems, just-in-time (JIT) production and shop-floor-led stock control, which combine together for success. Therefore, the emphasis of core capabilities is on the 'integration' of resources and capabilities in light of a firm's strategic direction. However, even core capabilities can become irrelevant or even 'core rigidities' if and when the environment changes (Barton 1992). Hence, the 'third-order' dynamic capabilities emphasize a firm's constant pursuit of the renewal, reconfiguration and re-creation of resources, capabilities and core capabilities to address the environmental change.

Thus, dynamic capabilities are the 'ultimate' organizational capabilities that are conducive to long-term performance, rather than simply a 'subset' of the capabilities, as Teece et al. (1997) suggest. Since we are dealing with the potential of a firm as a future success we designed our study based on the dynamic capability branches.

In line with Barney et al.'s (2001) argument that the ability to change quickly and alertness to changes in the market are costly for others to imitate and can be a source of sustained competitive advantage, we posit that dynamic capabilities are a source of sustained competitive advantage. Main motivation for innovation investments of defense industry lies under being the first and come up with hard to imitate products. Dynamic capabilities provide a comprehensive look with its articulated branches; absorptive capability, innovative capability or adaptive capability provide the base for this approach.

For the absorptive capability, Cohen and Levinthal (1990) is seen as one of the base studies and they define it as the ability of a firm to recognize the value of new, external information, assimilate and apply it to commercial ends decides the absorptive capability of the firm. In fact, with adopted view absorptive capacity is related with prior knowledge. The development of absorptive capacity and in turn innovative performance depends on firm's R&D investment and this investment directly contributes to firm's absorptive capacity. Some types of information are more difficult to assimilate, as learning is more difficult, more prior knowledge is has to be accumulated via R&D. In addition, more difficult learning environment increases importance of R&D on absorptive capacity. This model implies that as the ease of learning diminishes, learning becomes more dependent on firm's own R&D. Some studies refer absorptive capacity as ability of a firms to use outside knowledge; on the other hand, some authors define it as a performance indicator for a firm which measures openness of firm to technology change in both case absorptive capacity is directly linked to firm technology capability. While explaining absorptive capacity Cohen and Levinthal (1990) defines firms as human, which can use background information in order to assimilate or generate new knowledge. In our absorptive

capability we generally utilized the criteria decided by Cohen and Levinthal (1990), which stands for as a base for such absorptive capability assessment for different concepts. They focus on percentage increase of R&D investments in relation with sales trend we also use this already verified R&D measure in our analysis.

From another perspective Zahra and George (2002) define absorptive capacity as dynamic capability for improving economic performance in a sustainable way. In here absorptive capacity is referred as organizational routine that the firm acquire, transform and disseminate knowledge with dynamic organizational capability. Cohen and Levinthal (1990) offer that firms follow the similar path to individual in learning in a way that the prior knowledge that a firm accumulates defines the effectiveness of their later efforts to gain external knowledge. Moreover, firms have memories, which can be used for stocking knowledge, and consequently it is possible to state that the bigger the knowledge base of firms, the more probable that they will sense new external knowledge and absorb it.

Absorptive Capability is generally measured by financial statistics especially on research and development spending. These measures can be either aggregate (total or average R&D spending) or relative (R&D spending as a percentage of sales or per employee) and have the advantage of being widely available various types of industries, companies and even countries. Aggregate R&D spending is more closely aligned with the overall scale of a firm's technological activities, while the relative R&D spending provides more information on the emphasis of firm put on R&D. That is why we also design our study from the overall R&D perspective of the firm.

Innovative capability refers to a firm's ability to develop new products and/or markets, through aligning strategic innovative orientation with innovative behaviors and processes (Wang and Ahmed 2004). As indicated in the definition, innovative capability encompasses several dimensions. Prior research has emphasized different combinations of these dimensions. For example, Schumpeter (1934) suggests a range of possible innovative alternatives, namely, developing new products or services,

developing new methods of production, identifying new markets, discovering new sources of supply and developing new organizational forms. Other studies that focus on the importance of innovation capability on firm performance are; Calantone et al. (2002), argue theoretically and stay neutral in the debate and indicate that innovation capability might have positive or negative effect on innovation. They indicate that innovation may be source of cash flow of firms, on the other hand innovation means heavy investments and might take long time to realize the return and reach up to breakeven. To sum up, innovation capability can be briefly described as the actions of the firm management that most affect the innovation success.

As we will see at the next empirical literature section findings consensually support the positive effect of innovation capability on the firm competitiveness. Innovation capability can be regarded as an organizational capability because it is the act that deploys resources with a new ability to create value. We will see these effects in detail at the next section. Unlike absorptive capability, there is not a consensus related with innovative capability measurement. Despite debates related with innovative capability, new product development keeps its position as a base for innovative performance. That is why in our analysis we also included new product ratio among all sales.

Another parameter of dynamic capability is adaptive capability. Chakravarthy (1982) defines Adaptive capability is as a firm's ability to identify and capitalize on emerging market opportunities. Rindova and Kotha (2001) provide a vivid account of how Yahoo! and Excite adapt themselves and compete through continuous morphing permeated in many aspects of the organizational 'life': firms undergo 'comprehensive, continuous changes in products, services, resources, capabilities and modes of organizing'. The case illustrates that dynamic capabilities are reflected through a firm's adaptive capability in terms of strategic flexibility of resources and the alignment between the firm's resources, its organizational form and constantly shifting strategic needs (Rindova and Kotha 2001).

Other empirical studies (e.g. Alvarez and Merino 2003) also reveal that the ability to adapt to environmental changes and align internal resources with external demand is critical to firm evolution and survival in several industries. They analyze the evolutionary models of Spanish savings and loans institutions. Firms that have high levels of adaptive capability exhibit dynamic capabilities (Teece et al. 1997).

In the existing literature, measures for adaptive capability are multidimensional, including a firm's ability to adapt their product-market scope to respond to external opportunities; to scan the market, monitor customers and competitors and allocate resources to marketing activities; and to respond to changing market conditions in a speedy manner (Oktemgil and Gordon 1997).

Gibson and Brikinshaw (2004) measures adaptability through evaluating whether the firm's management systems encourage people to challenge outmoded traditions, practices and sacred cows, allow the firm to respond quickly to changes in the market and evolve rapidly in response to shifts in its business priorities. Alvarez and Merino 2003 relate the extreme end of this success in a sector as export potential. They claim that if a firm able to export for technology this is a high end of adaptation and they empirically show this relation for high tech firms. Exporting in defense is completely a distinct concept. Even making export is quite complex in high-tech industries for Turkey for the case of defense it is more complex because besides high-tech there exist restrictions, end-user requirements or country-based problem. In fact, Turkey's kg based export value is around 1.40 USD, whereas this value is around 27.5 USD for defense products. In addition to this, defense products are the second valuable products in export that comes after jewelry (from SSM interview). Therefore, assessing export capability of defense industry firms seems to provide quite useful feedback.

Adaptive capability, absorptive capability and innovate capability are the most important component factors of dynamic capabilities and underpin a firm's ability to integrate, reconfigure, renew and recreate its resources and capabilities in line with

external changes (Wang and Ahmed, 2007). Even if these three factors seem to be distinct and each has particular emphasis they are generally correlated. Adaptive capability mainly focuses on the ability of firm to adapt itself to the time fashion environmental changes with their flexibility of resources and capabilities. In other words, adaptive capability is related with the performance of aligning internal factors with respect to changes in environmental (external) factors. Whereas, absorptive capability focuses the importance of combining external knowledge with the internal knowledge, assimilation of external knowledge and linking with internal knowledge and utilizing knowledge for internal use. On the other side, innovative capability examines the performance of new products and/or organizations of the firm based on the market. It links the firm capabilities with product market. Existing empirical studies of dynamic capabilities, primarily based on qualitative case studies, have found that the three component factors are indeed common across several industries, as discussed above, although firms may develop their dynamic capabilities from their unique starting points and through their unique paths (Cockburn et al. 2000; Eisenhardt and Martin 2000).

The search for an empirical link between dynamic capability and firm performance is also included in Pegels and Thirumurthy (1996) study. These authors develop and test a three-stage model that demonstrates strong relationships between technology cycle time and R&D intensity, technological strength and operating profits. More specifically, the authors found that firms that were closer to the cutting edge of technology (shorter cycle times) spent a higher proportion of their revenues on R&D and had shorter cycle times tended to be more profitable. Two other variables, total assets and sales per employee, were included in the model to control for the effects of firm size and employee productivity. These results designate that analyzing dynamic capability will give us an important clue related with the firm performance.

Dealing with defense industry which is high-technology based sector aforementioned issues all conforms to our problem. So far, we have seen that dynamic capability would fit our analysis for firm capability assessments theoretically. Theoretical

background complies with our thesis structure; now in the next section we will check the same relation with empirical literature of dynamic capability.

Besides, there already exists empirical studies of capability assessment and next section is devoted for these empirical analyses. From this aspect, we thought that our study is not only a good empirical contribution, but it also provide policy base in order to increase the capability perspective for Turkish Defense Industry.

3.2. Empirical Literature

From the theoretical side we understand dynamic capability provide a comprehensive look for capability assessment, in this section we focus on the literature of dynamic capability with practical focus studies. In capability assessment measurement studies general approach is, focusing on a single parameter or indicator and assessing the effect of it. For instance, patent statistics is an important parameter for absorptive capability Narin et al. (1987) is a classic in this segment, which make use of citation-based indicators as performance factors. Their study examines the links between corporate patent and patent citation data, and several other indicators of corporate performance: changes in sales and profits, research and development budgets, scientific productivity, and expert opinions of company technological strength. The study covers 17 US pharmaceutical companies and found that the patent data are an excellent indicator of overall corporate technological performance. Proponents of the use of patent statistics also point to the ability of the various indicators to measure different dimensions of a firm's R&D program, particularly the scale of its operations and quality of the innovations that it produces. Chang et al. (2012) investigates the influence of patent performance upon corporation performance in the pharmaceutical industry and shows that higher patent index has a positive effect on the market value, sales and ROE. However, in our study in the pilot interviews we have seen that patent statistics cannot be used as an indicator, because patent is not applicable for the software and sometimes confidentiality of defense prevents patent application. Therefore, in our study we omit patent questions at the field study, because it could

not designate a success level in the defense industry. Apart from defense industry, patent statistics might show great variations among industries. For example, Scherer (1983) found considerable variation in the propensity to patent across industry groupings. For each $1 million in R&D spending, firms in the electrical equipment industry produced ten times more patents than did firms involved in motor vehicle production. Besides, Basberg (1987) indicates that patent data have limitations in measuring technological innovation and recommends that patent date should be used cautiously and doubtfully to obtain something from it.

In addition to this, some common empirical studies focused around R&D intensity and absorptive capability. For instance Helfat (1997) focus on the study of exploring the know-how and other RBV assets in relation with R&D capabilities and in this research 26 largest US energy firms are used and figures out that firms with high R&D investments performs better in the market. Other studies like Chen (2004) use multiple indicators to measure the extent of the firm's ability to assimilate and replicate new knowledge gained from external sources, Zahra and George (2002) reckon that absorptive capability is a multidimensional construct and propose four component factors of the absorptive capability construct: knowledge acquisition, assimilation, transformation and exploitation. The review study of Wang and Ahmed (2007) indicate that the more a firm demonstrates its absorptive capability, the more it exhibits dynamic capabilities. From our perspective, these results are not surprising because in general R&D investments for defense is seen as the main technological development tool and besides R&D investment is seen as the major tool of absorptive capability.

From the innovation capability perspective before Wang and Ahmed (2007), Deeds et al. (1999) link new product development as a parameter of dynamic capability. In this research they work with 94 pharmaceutical biotechnology companies and conclude that firms that have high portion of new product tend to perform better. This study is quite important because it is the first study measuring the new product on performance for a high-tech industry, which has already been measured in healthcare

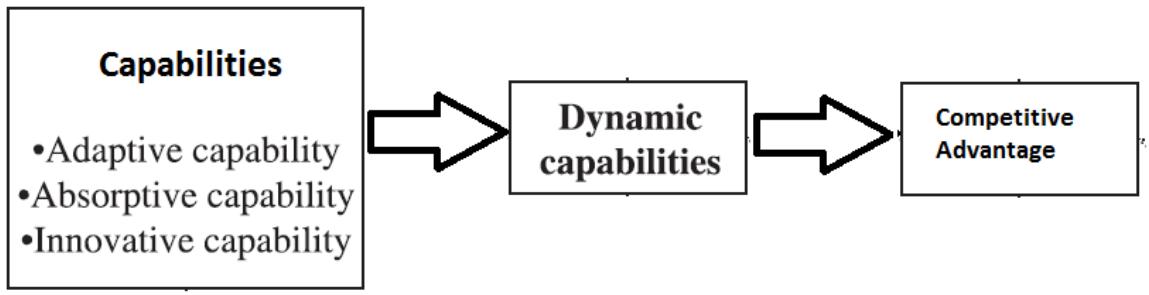
industry (Petroni 1998). Empirical research on innovation capability is long standing. In order to effectively measure organizational innovative capability, multiple indicators have been developed (i.e. strategic innovative orientation, behavioral, process, product and market innovativeness). These studies indicate that the more innovative a firm is, the more it possesses dynamic capabilities. R&D expenditures can be considered an input measure of innovation, because allocating financial resources to research and development constitutes a crucial early step in developing new products or new technologies (Griliches, 1990). ImPRovE Consortium confirmed that new products, services, processes, business models or organization models can help companies to sustain and prolong profitable growth during an economic crisis (Wall, 2010). Phan (2013) conducted empirical analysis in order to measure the innovation capabilities of the firms. It includes a comprehensive analysis which bases multi-criteria hierarchical decision model (HDM). Results indicate that firm revenue success is proportional to innovation investments. By this model multiple innovation measurement factors are accumulated around a hierarchy. Potters (2009) conducted an analysis with 3247 firms and concludes that innovation output measures have a positive relation with firm performance. Vega-Jurado et al. (2008) analyze the product innovation capability of 6094 Spanish manufacturing firms and identify that the main determinant of product innovation is the firm technology competence. Their findings have had an important role in designing Spain's innovation policy. R&D performance was comparable for us but new product development is not measured effectively. There exists some minutes of meetings of defense council related with increasing new product for Turkish Defense Industry but these attempts lack necessary policy implications. On the other hand, empirical studies in the literature gradually increasing related with new product development.

One of the most important and recent empirical study about effect of innovation capability on the performance of firms is Saulina et al. (2014). This study examines the relationship between innovation capability and firm revenue for the Finnish small-sized and medium-sized enterprises (SMEs). Apart from other studies this study examines the determinants of innovation capability and these determinants are

quite similar to our parameters. Besides, this study is one of the unique examples that focus on high-tech SMEs. As having the most resemblance to our study, findings of this study are quite crucial for our case. Their findings indicate that new product development has a direct positive impact on performance but organizational changing capability is not meaningful. Because organizational changing mostly consists high infrastructural changes and it might take long time to effect firm performance. Therefore, it seems there is consensus that innovation capability, which is mostly defined as introducing new product in fact mostly used as new product ratio, has a positive relation with dynamic capability and firm performance.

Even if Chakravarthy (1982) first mentions adaptive capability, initial empirical studies are conducted by Rindova and Kotha (2001) on how Yahoo! and Excite adapt themselves and compete through continuous morphing. In this study adaptive capability is represented as strategic flexibility and quantitative results indicate that firms with strategic flexibility perform better in information and communication technology business. Even if representing a common purpose technology adaptive capability study is an important step. But more suitable studies exist that conforms to our study. For instance, Alvarez and Merino (2003) state adaptive capability as environmental adaptation. They focus that the ability to adapt to environmental changes and align internal resources with external demand is critical to firm evolution and survival in several industries. In this study extreme success of adaption is stated as reaching the export level in the sector. We used this parameter in our analysis because exporting in defense is much harder and it means an important competitive advantage measure. Firms that have high levels of adaptive capability exhibit dynamic capabilities (Teece et al. 1997). D'este (2002) also conducted and analysis with 67 Spanish domestic pharmaceutical firms and conclude that firms with more capable firms tend to export more goods to abroad than the other ones and these firms are stated as more adaptive than others. In comparison with our analysis, by inserting export parameter we include an important side of adaption which is seen as a meaningful aspect for high-tech industries.

In conclusion, it is hard to define a single parameter as firm competitive advantage parameter, because even if they are searched individually in some manner they are linked. Defense industry has already a complex and nested structure and trying to explain it with a single capability measurement could be worthless. For this reason, we utilize the combination of capabilities as in the case of dynamic capability. For example, R&D capability is suggested in literature as one of the core technology capabilities. However, core production firms or production focus firms, which are mainly focus on pure production and asset based, are neglected in the study. In fact, there are leading firms in production facility area, which have competitive advantage in the sector. Hence, capabilities are often firm-specific and are developed over time through complex interactions between the firm's resources (Amit and Shoemaker 1993). For example, quality control is a process that can be easily adopted by firms, whereas total quality management (TQM) is not just a process, but requires the firm's capability to develop an organization wide vision, empowering employees and building a customer-orientation culture. We base our capability assessment methodology to the following Figure 14.



Source: Wang and Ahmed (2007)

Figure 14 Components of Dynamic Capability and Relation with Performance

This figure is a schematic representation of the effects of capabilities on competitive advantage. Since it encompass a wide range of capabilities it is suitable for defense industry by taking into consideration with above constraints.

This figure constitutes the base for our methodology because defining the capability assessment tool was quite crucial for defense industry. This comprehensive method of

Wang and Ahmed (2007) constitutes almost all aspects of our intended analysis and building methodology over this concept would be more analytical and understandable.

In summary, as focusing on capability contribution of main defense industry firms on their supplier firms, so far we have shown that our thesis just confronts with the strategical development path of Turkish Defense Industry. As capability contribution parameter dynamic capability is utilized that is aroused to be suitable for high-tech industries. Then, in this chapter we focus on the related literature with an evolutionary manner from data-information-knowledge to capability and from capability to dynamic capability. In this chapter, we have figured out the parameters that will be used in our analysis in order to link all findings with related literature. On the other side, we also focus on the empirical studies related with dynamic capability and branches of dynamic capability; absorptive, innovative and adaptive capabilities. At the next chapter we discuss our methodological approach within the scope of above explained literature.

CHAPTER 4

METHOD OF STUDY

Main aim in this thesis is to diagnose the contribution of main defense industry firms on their suppliers from the dynamic capabilities view. In this part, methodology of thesis is focused that leads us to results and related policy recommendations.

In this thesis since defense industry is main focus, one of the main concerns is keeping confidentiality. Firms in defense sector are quite closed and they share data only if the confidentiality concerns are met. Because of this reason, some of alternative study methods are eliminated such as; online survey. Moreover, if an online survey is applied, there is no way to be sure whether the suitable experts answer the survey or not. Therefore; eligible method of study is planned as conducting interview with related experts of firms. Making interviews with firms not only make the firms comfortable about confidentiality, but also it increases the objectiveness with the study. Furthermore, in survey method respondent might lose the focus of the questions or misunderstand the aim of survey; however, interview method enables respondent to focus of the intended subject. Hence, data related with firm dynamic capability is collected by one-to-one interview with the experts of supplier firms and other stakeholders.

Despite these efforts and one-to-one interview method, even some firms do not accept to share their data. During face-to-face interviews some firms hesitate to share their data, especially monetary values, in order to solve this issue interview questions are redesigned to assess the percentage change of the variables. Sometimes, iterative interviews conducted to accumulate required data. Then, gathered data by interviews

analyzed and based on the obtained results necessary policy implications are recommended. Summary of our applied methodology is given in below Figure 15.

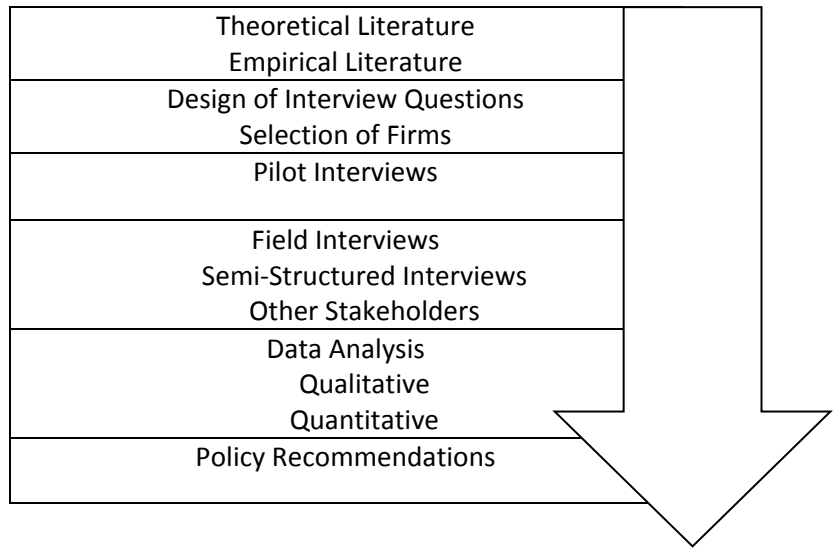


Figure 15 Method of Study

Based on the methodology followed; first issue is the design of interviews questions and then criteria that are utilized in order to select the firms. After selecting firms, pilot interviews conducted and based on the feedbacks interview questions are revised. Afterwards, field interviews, which we collect the data, are conducted. While conducting field interviews, besides supplier firms, other actors such as; main defense industry firms, government agencies, non-profit organizations and foreign firms are also interviewed. For some of these interviews we conduct semi-structured interviews. After gathering data, we analyze and come up with both qualitative and quantitative findings. Obtained results also compared with the related literature. Based on our results and interview feedbacks we decide necessary policy recommendations. Since all analysis bases on interview data, what is asked to suppliers and other stakeholders is quite important, in the next section "how we design the interview questions?" is focused.

4.1. Design of Interview Questions

Designing the interview questions is one of the most challenging parts of this study. Since with these questions we would be able to analyze the capabilities of the firms, we focus iteratively on this issue. As seen in Appendix B our interview questions has 12 sections. Some of our questions were open ended questions, whereas some of the questions were likert type and there are questions which require numerical data. While designing questions we inspired especially from Figure 14 of Wang and Ahmed (2007) and collect the questions from related literature.

In order to construct consistent interview questions we try to link our questions with corresponding literature. Our designing procedure includes firstly, general information about the company related with assets; personnel, sales and facilities to detect the volume of the firm. Besides, questions related with personnel structure are inserted. In these questions we asked for the experience and education background of personnel structure. Afterwards, questions related with R&D expenditures, R&D personnel are included especially for detecting absorptive capability. New product development questions also included in order to detect innovation capability. In addition to this; export, defense specific sales and approval of main defense industry firms are asked. Besides, we ask the effect of working with defense industry on the R&D expenditure, new product development and export of the firms as an open-end question. Membership and cluster based facilities also analyzed. Some qualitative questions are asked related with adaptive capability. Moreover, questions related with supply chain also included. Remaining open ended questions are asked to give insight for future debates and collect other information during informal part. The last but not the least important point is that firms are asked for verbal assessment of dynamic capability corresponding to defense collaboration. In summary, interview questions are designed in a way to cover dynamic capability assessments from all perspective.

As mentioned before, questions included in the interview questionnaire are linked with related literature. General and defense industry sales information are used as a base for competitive advantage as stated in Wang and Ahmed (2007) and Porter (1985). Especially Wang and Ahmed (2007) verified this concept with distinct sectors. R&D personnel and R&D investments are used as the signs for absorptive capability (Cohen and Levinthal, 1990), Schoenecker and Swanson (2002), Zahra and George (2002). Especially Cohen and Levinthal (1990) focus specifically on R&D investments and conclude it as an indicator for absorptive capability. Despite, not conducting separately Schoenecker and Swanson (2002) focus on the positive effect of R&D investment on absorptive capability. However, Zahra and George (2002) combines R&D investment with personnel and come up with combined verification and in our thesis we also analyze them separately and link our questions mainly with the question structure of Cohen and Levinthal (1990) and Schoenecker and Swanson (2002).

For innovation capability questions main source are the empirical studies of Cockburn et al. 2000, Deeds et al. (1999) and Saulina et al. (2014). In these studies some empirical studies conducted for innovation capability and we link our innovation capability questions mainly with these questions (especially with Saulina et al., 2014) which focus on new product launch portion on total sales.

For adaptive capability, export data is utilized as used by Alvarez and Merino (2003). In this study especially for high-tech industries, making export seen as the main indicator of adaptability. Furthermore, Chakravarthy (1982) is a well-known study related with adaptive capability but includes only few quantitative finding, whereas Chakravarthy (1982) is utilized for qualitative questions. Besides; Rindova and Kotha (2001), Staber and Sydow (2002) also included similar questions for measuring adaptive capability of firms for different sectors.

Apart from these questions related with clusters and cluster methodology for defense industry are also asked in order to learn the expectations of supplier firms from clusters.

Remaining questions, which are generally open ended, are utilized as a tool for specific information related with firm or with sector. In these, open ended questions firms could be able to speak freely and while designing our policy structure we utilized the information gathered from these parts.

Before finalizing interview questions firstly pilot interviews are conducted with selected 18 firms. In these interviews feedback are collected and we verified our questions. From the feedbacks obtained, we revised our interview design and reconfigure the questions. For instance, before pilot interviews we included patent questions in order to measure capability, which is already included in various studies. After pilot interviews, among 18 firms only 2 patent applications are found. It is concluded that patent numbers do not contribute to firm discrimination and it would be worthless to insert patent questions in the questionnaire and patent questions are removed from questionnaire. All revisions conducted for pilot interview questions are summarized in the interview section.

Another problem related with question design is that while dealing defense industry confidentiality brings important borders. Monetary values, which even could be problem for sectors, are hardly given outside for defense industry. On the other hand, percentage changes are easier to collect. So, we include percentage scales for monetary questions.

Design of interview question is important but another important issue was defining sample. At the next section our approach for selecting firms both for pilot and field interviews are focused.

4.2. Selection of Firms

Since the aim is to investigate the effects of main driving firms on suppliers firms in defense industry we need to define the firm with such a sample that suitably represents the subcontractor firms set in Turkish Defense Industry. First of all, we conduct pilot interview studies with 18 firms and we decide these firms from the SSM industrialization web portal.[7] In this portal firms are categorized as; design, production and design&production. For pilot interviews we collected 6 observations from each category.

During this stage of the study, still the supports of stakeholders such as; SSM, OSSA, SASAD or main defense industry firms were not obtained. Therefore, it could not be easy to conduct such analysis. In fact, some of the direct attempts with firms were unsuccessful, either they refuse or even if they accept they just provide partial data which could not be used in the analysis. In that structure first cooperation was constructed with SSM and EYDEP Project and they provide necessary supports. Being in part of EYDEP Project I would be in the audit team of EYDEP. EYDEP decided 6 firms from each SME area of production, design and design&production based on the size of the SME; micro, mezzo and macro 2 from each randomly. We utilized the same procedure and mainly followed the audits of EYDEP for pilot interviews. After support of SSM, usually firms are willing cooperate in all aspects but some firms are reluctant to share some information such as; financial data, R&D spending or personnel structure. Even these firms did not refuse to share information; rather they addressed the SSM web portal and propose to take the financial information from SSM directly. We can conclude that for pilot interview firm selection we basically followed the same path with EYDEP.

After finalizing interviews, based on the feedbacks necessary updates are conducted and then in real interviews we were planning to interview with about 90 firms that

[7] http://sanayilesme.ssm.gov.tr/SanayilesmeFaaliyetleri/Sayfalar/default.aspx accessed on 15 June 2017.

represent the 96 percent of total defense industry subcontracting sales, 97 percent of total employees, 98 percent of total R&D expenditures and 96 percent of total work packages (SSM industrialization web portal). Among these 90 firms 76 firms accepted to be part of this study and their contribution enables to have a good representation of the whole sample. For these 76 firms, interviews are conducted but 26 firms are not able to give sufficient data. As a result of this, 26 major data insufficiency cases also discarded from our analysis and we focus on the remaining 50 firms.

Among these 50 firms 5 of them belong to government or Turkish Armed Forces Foundation (TSKGV-Turk Silahlı Kuvvetlerini Güçlendirme Vakfı) or affiliates of the main defense industry firms. We exclude these firms because during bidding if these firms are in the potential list then main defense industry firm tend to work with them in other words they have the priority. That means they are not obligated for competition. Since results of these companies might bias our quantitative results we exclude them from the set either.

Remaining 45 firms included in our analysis which still represents 83 percent of total defense industry subcontracting sales, 85 percent of total employees, 87 percent of total R&D expenditures. Therefore, for quantitative analysis we interviewed with 12 design, 18 production and 15 design&production firms, which has almost similar ratio with SSM supplier portal, the universal set of Turkish Defense Industry Supplier list.

As focused in the design of interview questions part, in defense industry collecting data is quite sensitive and for especially monetary values we defined percentage increase assessments instead of real values. However for small firms, percentage increase cause bias in the model. Especially for small firms even small increments might be seen as high percentage and might fail the model. For instance if the firm has 2 R&D personnel and hired 2 new R&D personnel that corresponds to 100%

increase. On the other side, dealing with 45 firms which is good representation of whole set this problem is also alleviated.

After analyzing how we select the firms both for interviews and for conducting analysis, next we focus how we conduct these interviews in detail. Although supplier firms are the main concern during the interviews, other stakeholders also interviewed details of which explained below.

4.3. Interviews

We conduct our analysis by face to face meetings with the firms. In order to verify the questions and finalize the structure of the interview questions we conduct pilot interviews with 18 different firms as explained before. Based on the feedbacks necessary updates are done and then in field study this number increased to 45 firms that explain the whole set as explained in previous section. On the other hand, firms are not the only actors in our case; we also need to interview with; SSM, main defense industry firms and other actors such as KOSGEB, defense industry clusters meanly; OSSA (Ostim Defense Cluster), SAHA (Defense and Aerospace Cluster), ESAC (Eskisehir Aerospace Cluster), BASDEC (Bursa Aerospace and Defense Cluster), TSSK (Techno park Defense Industry Cluster) and Konya Cluster, SASAD (Defense and Aerospace Industry Manufactures Association) in order to see the picture from different aspects of the stakeholders in the sector.

Moreover, we also conduct interviews with foreign firms. For instance, an interview is conducted by the ex-supply chain branch manager of Airbus and we interviewed with 6 successful defense SMEs in China for comparison of results. In total with 103 distinct stakeholders, 153 interviews are conducted and approximately it took 345 hours effort (net interview time). Number of interviews conducted is summarized in below Table 1 with respect to unique interviews and repetitive ones.

Table 1 Interviews and Numbers

Interview Type	Unique	Repeatedly
Firm Interviews	76	103
SSM	1	12
KOSGEB	1	6
SASAD	1	4
TSKGV	1	3
Main Defense Industry Firms	5	5
Defense Industry Clusters	6	8
Foreign Companies	7	7
Others	5	5
TOTAL	103	153

Making interview with defense firms is quite complex due to the nature of the sector, in general interview or questionnaire attempts fail to reach the required amount due to this nature. Most of the studies change their path because of this complexity. For our case including main actors in the sector such as; SSM, SASAD, TSKGV and main defense industry firms in the study make the supplier firms more comfortable regarding sharing information.

From the supplier side we succeed to interview with 76 firms and among them we could be get required data successfully from 50 firms. Both interview acceptance ratio 76 over 90 means 84% and full data accomplishment ratio 50 over 76 represents 66% value are over expected results for defense industry in which questionnaire feedback is 40% and full data 24% (information obtained from SASAD interview). We can conclude that response and data obtained from interviews seems to be considerably good reaction for such defense industry case. In the next section we will focus on the details of interviews conducted with these stakeholders.

4.3.1. Interviews with Supplier Firms

Main actors in the sector are supplier firms which constitutes 98 percent of the total firms (from SSM interview). We designed a questionnaire as a base for interviews, but face to face meetings provides brain storming environment and sometimes enables information flow beyond the questionnaire. As mentioned before; there exist two different interview types for supplier firms, first one is the pilot interviews conducted with 18 firms and second one is the field interviews with 76 firms.

4.3.1.1. Pilot Interviews

We conduct pilot interviews with 18 different firms, 6 firms from each activity area. During the field interviews we have verified our questions and we conclude with a few minor changes we could construct field interview questions. We benefit from pilot interviews from various aspects, after pilot interviews we got the opportunity to,

- Correct the question that cause misunderstanding,
- Decide the format of data can easily be collected and analyzed,
- Define the most suitable person in a firm to get the whole answers,
- Omit the questions that does not add value to the analysis (patent questions),

Based on these feedbacks we have changed some questions. First of all, firm size question is aimed to ask the size of the firm in square meter. We have detected that some firms could not get the main idea and we add closed firm size (m^2) and open part (m^2) to the introductory questions. Next, monetary values that firms hesitate to answer are changed to percentage values such as revenues or R&D spending. As a format change, in pilot case it is asked that "Do you think clusters are useful?" question was "Yes/No" question, we have changed this question to likert type 1-5 to provide consistency with the other related questions and to discriminate the effect. In pilot interviews we have asked the number of patents and patent applications to the firms, on the other hand, the answer obtained provide no discrimination for firm capability; therefore, patent questions are neglected for field interviews which do not add value.

After applying these corrective actions next step is the field interviews that we collect the required data. In these interviews again one-to-one appointments are arranged with the professionals of the firms, these professionals are generally; CEO, Account Manager, R&D Manager, Sales Director, Vice President or Member of Boards of the firm. Besides, in pilot interviews it is observed that same professional could not answer all questions especially for industrialized high volume firms, in that case more than one professional attend the meetings. Sometimes firm prefer to send specific answers after the interview and these answers might not be in the desired format and corrections might be problem. These complex questions also simplified and it is aimed to take whole answers within the interview. By keeping these key feedbacks in mind, we started field interviews.

4.3.1.2. Field Interviews

For the field interviews, questions are revised and we utilize the experience that is acquired in pilot interviews. From those firms that are interviewed earlier phase answers are recollected in order to reflect the last updates. Interviews are conducted generally by visiting firm facilities but sometimes meetings are conducted at the outside of the firm. Field interviews almost took 1.5 years and 76 supplier firms are interviewed during this period.

In pilot interviews our sample include equal number of firms from each activity area; however these activity areas are not equal in the universal set, which is the firm portal of the SSM (SSM industrialization web portal). In the field interviews for quantitative analysis samples are decided compatible to the proportion of the firms in each segment. In SSM portal 27 percent of the firms are design based, 41 percent of the firms are production based and 32 percent of them are both design and production based. Distribution of our firm set is also compatible with this general ratio.

Interviews conducted with supplier firms are one of the most important items of our methodology, but as explained before we also conduct interviews with the other

stakeholders of the Turkish Defense Industry sector. In order to reflect their view we have conducted semi-structured interviews, details of which are presented below.

4.3.2. Semi-Structured Interviews with Other Stakeholders

As mentioned before other actors in the sectors also interviewed in order to understand their view according to their role. First of all, main defense industry firms are interviewed as being the main actor in the capability development process of the suppliers. In the same way, lots of meetings conducted with SSM both for obtaining some general quantitative data and understand their role and approaches to capability development of the suppliers as the main policy maker. Another important actor KOSGEB is also at the critical role for supporting firms. Defense Industry Clusters are both important for investigating cluster structure and for supporting the study to get required data from firms. Besides, it is moving trend currently in the sector and investigating this structure could provide important feedbacks. In addition to this, interviews are conducted with foreign firms. First of all, 6 Chinese SMEs, which are selected as best SMEs in related business, are interviewed in order to compare our findings with them. Finally we also conduct interview with AIRBUS, which is one of the biggest defense company in the World, to understand the view of a huge firm in the sector as a comparison.

4.3.2.1. Interviews with Main Defense Industry Firms

Even if most of the main driving firms (ASELSAN, HAVELSAN, TAI and ROKETSAN) are belong to same organization Turkish Armed Forces Foundation (TSKGV) in the defense sector, each firm has its own distinct activity area and own policy approach. That means their supplier management policies differ from each other. Therefore, we also need to interview with those firms in order to understand their supplier management policies and effects of these policies on the suppliers. We conduct them interviews with the semi-structured questions given in Appendix C in order to understand their supplier capability development vision and related policies. Besides, during pilot interviews it is observed that firms are reluctant to share

information without the support of their customer. Including feedbacks of main driving firms and their support in the study make the firms more comfortable about sharing information.

4.3.2.2. Interviews with SSM

Interviews are conducted with SSM as the main policy maker of the system. We already focus on the role of the SSM in previous sections, that responsibilities cause SSM to be perceived as the owner and ruler of the Turkish Defense Industry by the firms and this structure is explained as a role model and success story for other sectors. We observe this role of SSM during our interviews and we conducted 12 different meetings and lots of informal meetings with the professionals in SSM in order to take the answers of the semi-structured interview questions given in Appendix C. Especially Department of Industrialization deals with the Supply Chain Management and Offset Policies of Defense Industry and we interviewed with managers and professionals of Department of Industrialization. Furthermore, SSM industrialization web portal where we collect data is designed and updated by the same department. Since the number of firms has changed during the process, it took almost two years to collect data from firms, for that reason iterative meetings have been conducted in order to revise the answers.

4.3.2.3. Interviews with KOSGEB

One of the main actors in the sector is KOSGEB that provides various types of incentives for the firms. Semi- structured interviews are conducted with KOSGEB based on the questions given in Appendix C. Main investigation focus around, types of the incentives provided, application mechanism, SME constraints, specification of incentives, feedback analysis of incentives and relation with other actors. Results of these interviews are focused in the data analysis chapter, they provide important aspects for our analysis and for succeeding policy implication chapter.

4.3.2.4. Interviews with Defense Industry Clusters

Defense Industry Clusters are increasing with a rapid growth in the defense sector. OSSA has been constructed in 2008 and remaining clusters have been constructed after 2015. We also interviewed with defense clusters; Ostim Defense Cluster (OSSA), Istanbul Defense and Aerospace Cluster (SAHA), Eskisehir Defense and Aerospace Cluster (ESAC), Bursa Defense Cluster (BASDEC), Techno Park Defense Cluster (TSSK) and Konya Defense Cluster in order to understand the motivation for their construction and their compatibility with the cluster structure in the literature. We mainly investigate the path dependent characteristics and value chain behind them. Besides, we focus on Regional Innovation System (RIS) structures of the clusters and we check this structure with National Innovation System (NIS). We investigate these issues with the questions provided in Appendix C.

4.3.2.5. Other Interviews

Besides meeting with local actors we also conduct interviews with foreign actors. An important interview is conducted with the one of the ex-Supply Chain Managers of AIRBUS. Manager has explained the supply chain management policy of AIRBUS Company, which is the 7th biggest defense company in the world with 4000 suppliers. This interview provides great insights for the study. Questions asked for AIRBUS Company is given in Appendix C.

In addition to this, interviews are conducted with 6 distinct Chinese High-Tech firms with questions given in Appendix C. We conduct these interviews because these SMEs are success stories in related industry and they could provide important feedbacks and comparison opportunity for the study.

Apart from formal interviews we conducted meetings with SASAD and TSKGV in order to take their support for obtaining information from the firms and finally one-to-one meeting is conducted with Bilge KUM (granddaughter of Nuri DEMIRAG) in

order to learn the story of Nuri DEMIRAG and to understand the “why these attempts were failed?” from a person who lived those times.

To sum up, based on explained methodology, above required data obtained and categorized based on qualitative and quantitative perspective. We have utilized structured interviews with supplier firms, semi-structured interviews with; SSM, main defense industry firms, KOSGEB and defense industry clusters and informal meetings with SASAD, TSKGV and Bilge KUM (granddaughter of Nuri DEMIRAG). These comprehensive meetings provide important knowledge related to the sector dynamics with capability contribution perspective.

It should be noted that obtaining interview in defense industry is quite problematic due to national security characteristics of the sector. Besides, firms perceive such studies as burdensome and do not want to share data. Despite, these problems, by utilizing necessary actors required data is collected from each actor with a comprehensive field study. In the next chapter results of data analysis are presented both from qualitative and quantitative perspective.

CHAPTER 5

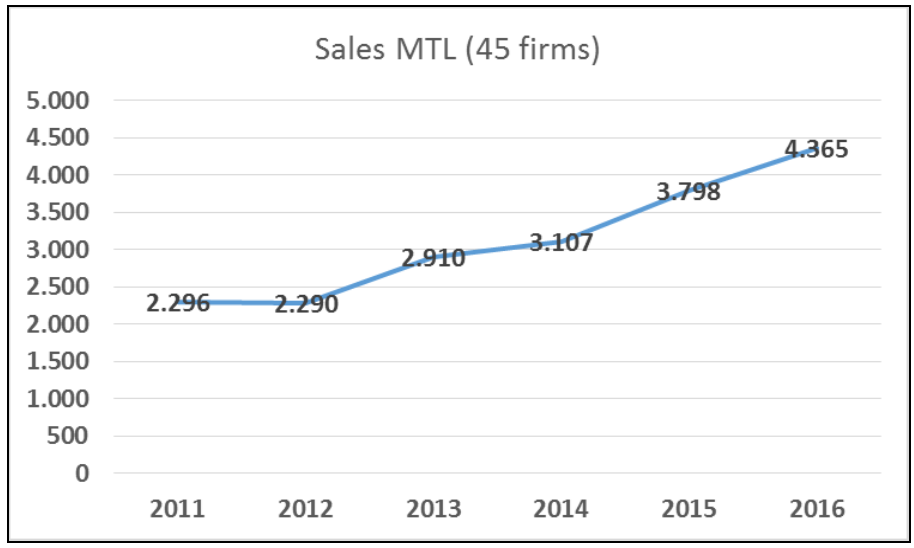
DATA ANALYSIS

Having completed 153 different interviews we got substantial data regarding Turkish Defense Industry. In this section this data are analyzed and come up with the results. Interviews are the main source of data and as focused before interviews are conducted in two stages, during the pilot interviews gathered data is analyzed for feedback, main data comes from field interviews, even pilot interview data is revised during field interviews. Since we are dealing with the capability contribution of main defense industry firms on their suppliers, supplier interviews are at the origin of the process and we continue with structured interview question that is given in Appendix B. On the other hand, we also conducted semi-structured interviews with other stakeholders; SSM, Main Defense Industry Firms, KOSGEB and defense industry clusters main motivation is getting their perspective or contribution related with this vertical integrated capability accumulation. Furthermore we also interviewed with 6 successful defense SMEs in China and AIRBUS for comparison.

As can be seen in Table 1 we have interviewed with 76 firms from the top 90 of SSM. Among them for 26 of the firms we could not be able to collect sufficient data. Either firm could not be able to reveal data or because of the confidentiality they do not want to share data. 5 of the firms omitted as out of competition due to being TSKGV or affiliate of a main defense industry firm. Therefore, for our supplier analysis, results of 45 interviews are utilized.

Before starting data analysis we first analyze the volume that we are dealing with. First of all, our scope (45 firms) approximate cumulative sales and R&D data are

given in order to understand the volume that we are dealing with (from SSM web portal). Below Figure 16 indicates the sales volume of 45 firms of interest, as it can be seen in general there is an increasing trend for the sales of these 45 firms.

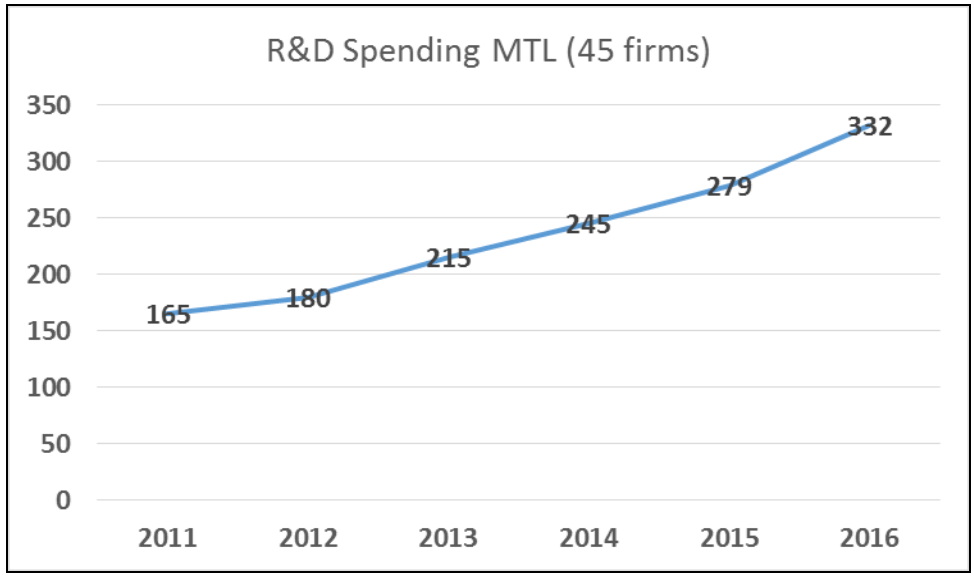


Source: SSM Web Portal

Figure 16 Total Sales (MTL) for 45 firms

When compared with total sales, we can roughly detect that our set represent almost 26% of the whole defense turnover on average. Remaining amount is realized mostly by main defense industry firms (ASELSAN, HAVELSAN, ROKETSAN, TAI and FNSS etc.).

Another parameter that is followed with percentage R&D spending is also collected and as can be seen from Figure 17, there is a sustainable increase in R&D spending. As can be seen from the figures R&D increase is more sustainable than the sales.



Source: SSM Web Portal

Figure 17 Total R&D Spending (MTL) for 45 firms

After having idea related with the volume that we are dealing with we will be focusing on the data analysis. We base and design data analysis depending on the methodology presented in previous section. In the scope of data analysis, firstly data collected with interviews are analyzed from the validity and reliability perspective. First of all, interview findings are focused then we check the compatibility of quantitative results with related literature. Afterwards, as a final procedure regression analysis is applied to verify our findings. At the next section validity and reliability of interview data is inspected. Beside, we also asked semi-structured interview questions we will be focusing on the results obtained by semi-structured interviews.

5.1. Validity and Reliability of Data

As focused in the literature, these types of sector-specific researches generally proceed by questionnaire method. On the other hand, due to confidentiality concern of defense industry, getting the correct answer from the corresponding responsible could not be possible for defense. Besides, return ratio of questionnaire could not be satisfactory, hence we applied interview method to collect data, but even applying interview does not guarantee validity and reliability of data. Therefore, before

conducting data analysis validity and reliability of numerical data provided by the interviews need to be confirmed.

Firstly, as it is mentioned a pilot study was carried out with 18 defense firms. In this pilot study, content consistency was analyzed by examining the issues such as clarity of the questions and consistency of the received answers. For the field interview, which is mainly used for data analysis, validity of data is tested by "factor analysis" and reliability of the interview data is assessed by "Cronbach's alpha" calculation.

5.1.1. Validity Analysis

Factor analysis is used to reduce the number of variables by identifying the basic variables or factors grouped in the observed variables. Defined each factor are chosen by looking relationship of variables. Aim of these analyses is to find and discover a small number of uncorrelated factor groups. In other words, the correlation is low among factor groups, variables are highly correlated within groups. Most of the times rotation methods are employed for providing independency among factors.

In order to be able to perform factor analysis, the value of Kaiser-Meyer-Olkin (KMO) have to be greater than 0.6 and Bartlett test statistic have to be lower than 0,05 (Kaiser, 1974). We conduct analysis as summarized in Table 2.

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,879
Bartlett's Test of Sphericity	Approx. Chi-Square	244,205
	df	21
	Sig.	,000

Calculations show that KMO value is equal to 0.879 which greater than 0.6 and p value of Bartlett Test Statistics is 0.00 which lower than 0.05. Therefore, it can be said that both cases are suitable for ongoing factor analyses.

Before, continuing factor analysis the parameters that are applied factor analysis are:

R&D : Percentage R&D change of the firm

DFNS : Ratio of defense in the whole sales

DFNSTURN : Percentage change of turnover obtained from defense

EX : Percentage export change of the firm

NEWPRO : Percentage of new product in the total sales

P_R&D : Percentage change in R&D personnel

TOTTURN : Percentage change of total turnover of the firm

While deciding factor critical issue is analyzing the explanation of each variable by factors. Table 3 indicates that explanation of each variable by factors. Explanation of all variables is quite well except P_R&D which is 0.063. DFNSTURN and TOTTURN are explained with the rate of 0.903 and 0.863 while DFNS and NEWPRO explained with rate of 0.701 and 0.753. Although EX variable's explanation power is low especially when it is compared to DFNSTURN and TOTTURN, it is quite high which is equal to 0.582.

Table 3 Communalities

Variables	Initial	Extraction
R&D	1,000	,768
DFNS	1,000	,701
DFNSTURN	1,000	,903
EX	1,000	,582
NEWPRO	1,000	,753
P_R&D	1,000	,063
TOTTURN	1,000	,863

In order to determine the number of factors, eigenvalues are used. If eigenvalue of a factor is greater than 1, this factor should be taken into consideration to perform analyses. If eigenvalue of a factor is lower than 1, that factor should be excluded from data set. Another important point of factor analyses is that independence of factors. In other words, to provide independency among factors rotation methods are employed. For this reason, Varimax rotation method is used.

Based on the factor analysis explanation percentage of each factor and total explanation rate are reported in below Table 4.

Table 4 Total Variance Explained

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	4,633	66,188	66,188	4,633	66,188	66,188	4,538	64,834	64,834
2	,968	13,828	80,016	,968	13,828	80,016	1,063	15,182	80,016
3	,485	6,931	86,947						
4	,359	5,135	92,082						
5	,283	4,042	96,124						
6	,219	3,132	99,256						
7	,052	,744	100,000						

According to the results, the first two factors' eigenvalues are greater than 1, which are equal to 4.538 and 1.063 respectively. Thus, two valid factors has been found from factor analyses. In the absence of rotation, total variance is explained by first factor with 66.2% approximately and the explanation power of second factor is equal to 13.8 %. These two factors explain about 80.0% of the total variance.

Even if obtained result is satisfactory still Varimax rotation is conducted in order to verify the method. After the Varimax method, the total variance explanation rates of these two factors are 64.83%, and 15.2%, respectively. After rotation process, even though rate of disclosure of each factor has varied a little, cumulative explanation of total variance has not changed and after rotation it is still again 80.1%. Normally, it is assumed that determined factors should explain cumulative the total variance at least 50%. Having obtained 80.0% we can conclude that rate of disclosure of total variance can be thought as sufficient.

Relationships between variables and factors also analyzed and their outputs are reported. For this reason, component matrix and rotated component matrix are given

below. In order to decide factor of each variable, correlation relations are used. Components of variables; R&D, DFNS, DFNSTURN, EX, NEWPRO and TOTTURN are in first factor while P_R&D component is in second sector as (Table 5).

Table 5 Component Matrix

	Component	
	1	2
R&D	,876	-,007
DFNS	,837	-,089
DFNSTURN	,950	,052
EX	,763	-,087
NEWPRO	,868	-,136
P_ R&D	,251	,965
TOTTURN	,929	-,029

In order to confirm findings analyses are performed again with using Varimax rotation method as given in Table 6.

Table 6 Rotated Component Matrix

	Component	
	1	2
R&D	,866	,134
DFNS	,841	,047
DFNSTURN	,929	,204
EX	,767	,037
NEWPRO	,878	,005
P_ R&D	,092	,992
TOTTURN	,922	,121

After Varimax rotation, all factors take part in first factor except component of P_ R&D meaning that results are stabilized with or without rotation. In other words, variables take part in the same factors according to both component matrix and rotated component matrix.

Main logic behind depending on Factor Analysis is to provide uncorrelated factors which are highly correlated in them. This analysis conducted as given in Table 7.

Table 7 Component Transformation Matrix

Component	1	2
1	,987	,161
2	-,161	,987

As it is expected, the correlation is very high within factors (0.987) while there is a little correlation (-0.161) between factors. Hence, we conclude that one factor explains all the factors except for P_ R&D. As we will focus at the next parts actually P_ R&D behaves different than other variables.

Therefore, validity of questionnaire has been confirmed by factor analysis. However, this does not ensure that this questionnaire is reliable. Reliability of the questionnaire should also be checked. At the next section reliability of model is focused.

5.1.2. Reliability Analysis

Reliability analysis is done to reveal the degree of closeness of the questions to each other. Most famous method used for performing this analysis is Cronbach's Alpha method. Based on the value of Cronbach's Alpha reliability of data has sectional results as summarized below (Cronbach 1951).

where "a" is Cronbach's Alpha value,
* if 0.00 <a <0.40, the scale is not reliable,
* if 0.40 <a <0.60, the scale has low reliability,
* if 0.60 <a <0.80, the scale is quite reliable,
* if 0.80 <a <1.00, the scale is considered highly reliable.

Cronbach's Alpha can be calculated with two ways. If Cronbach's Alpha is calculated by using covariance, it is named with non-standardized values of Cronbach's Alpha

whereas if it is calculated with correlations, it is named with standardized values of Cronbach's Alpha. In this thesis to avoid scale biasness correlations are used instead of covariance. In other words in order to decide reliability of questionnaire, standardized Cronbach's Alpha is calculated, results of which summarized in below Table 8.

Table 8 Cronbach's Alpha Value

Cronbach's Alpha Based on Standardized Items	N of Items
,898	7

Cronbach's Alpha value is 0.898, which is at the highest scale, it can be said interview questionnaire is highly reliable. As a result, we have shown that questionnaire, which is used for data collection, is valid and reliable.

Having completed validity and reliability analysis, before analyzing data descriptive statistics related with data is summarized in below Table 9.

Table 9 Descriptive Statistics

	DFNSTURN	TOTTURN	DFNS	EX	NEWPRO	R_D	P_R&D
Mean	0.33	0.32	0.33	0.22	0.30	0.29	0.47
Median	0.38	0.35	0.40	0.20	0.35	0.30	0.41
Maximum	1.00	1.00	0.60	0.65	0.75	0.80	4.00
Minimum	-0.45	-0.45	0.00	0.00	0.00	-0.35	-0.53
Std. Dev.	0.29	0.27	0.15	0.14	0.16	0.20	0.65
Skewness	-0.87	-0.76	-0.57	0.62	0.07	-0.49	3.4
Kurtosis	4.45	4.96	2.70	3.88	3.55	4.62	19.5

In this table all variables are in percentage form and this structure will be utilized for the analysis. Minus signs indicates a percentage decrease and values over 1 indicates over 100% increase. Summary of data is given in this table, will be analyzed in detail at the next chapters.

We conclude that being valid and reliable, variables of this questionnaire can be used to perform data analysis. After being sure about validity and reliability of data, next stage is producing the results. In the next chapter we will start with Detail Interview Analysis.

5.2. Detailed Interview Analysis

As we have already mentioned we conduct both structured and semi-structured interviews and we make use of both interviews during policy implementation. In fact, interviews conducted with defense industry suppliers are at the focus of our analysis in order to support our hypothesis. We have three distinct hypothesis all of which bases on working with supplier firms with main defense industry firms from the absorptive capability, adaptive capability and innovative capability views. For hypothesis 1 “The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers’ absorptive capability” we ask effect of defense industry sales on R&D Spending. For the second hypothesis “The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers’ innovation capability” and we will be looking for the contribution from the new product perspective as mentioned before and finally for third hypothesis “The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers’ adaptive capability.” parameter is selected as export capability.

In the scope of this concept, 85% of the firms indicate that working with defense industry increased their R&D capability. They indicate defense industry as main R&D building sector. They indicate that working with defense industry not only enables them to increase R&D personnel but also increase the motivation for investing on these personnel. Number of R&D personnel increases 15% on average for respective three years. R&D personnel with PhD has been doubled at the last year and R&D personnel with MSc increased 57% for the last year. Generally firms indicate that they would train their own R&D team with these qualified engineers. As

a final remark approximately 90% of R&D personnel are engineers on three years average.

From innovative capability perspective, 76% indicate that working with defense enables them to introduce new products to the market and working with defense enables them to increase new product ratio. Although we focus on new product ratio for innovation capability we also focus on innovation types during the interview. Among innovation types; 76% of all innovations are either product or service innovation. Remaining 24% percent are process or organizational innovations. Furthermore, main technology following tool is technical consultancies from abroad with 45%, secondly 28% of the firm pursuit technology by technology cooperation with other firms, 15% is the educations taken from abroad. Remaining 12% is devoted for inner-firm educations, assigning a specific personnel for the issue and inner-firm information sources. Highest ratio is consultancies because according to trend firms tend to work consultancy firms in order to follow developments in the industry including; technology, new trends, incentives and other government regulations.

Besides type of innovation, we also asked the content of the innovation; innovation for the firm, innovation for the country and innovation for the World. As we expected most of the innovations are innovation for the firm; 48%, then innovation for the country is 36% and finally 16% percent is stated as innovation for the World. In fact, these result is understandable because for such a high-tech sector producing an innovation for the World is not easy and confidentiality might also decrease this ratio either.

Finally, from the adaptive capability side from the 38 firms that are making export 85% indicates that working with defense increase their export capability. Besides, we also included qualitative questions related with adaptation, firms indicate that firms with high portion in defense have better adaptive capabilities.

To sum up, findings obtained from firms indicate that defense industry contributes R&D potential, new product launch and export capability with considerable amounts of 76-85%. Therefore, we get an important support that working with defense industry contributes to all branches of dynamic capability; absorptive capability, innovative capability and adaptive capability. This is most importantly verified by the top managers, CEOs or top managers, whose are at the main decision body of these defense supplier firms. Besides, quantitative sides most of these high-level managers indicate defense industry as the major know-how builder. In addition to these findings, my opinion is that, despite its low volume, high-quality standards and complex procedures firms still prefer to stay in the defense business. I think this is an important evidence of capability contribution of defense industry because it seems these disadvantages do not discourage firms being in the sector. I think these top managers sometimes sacrifice from feasibility for the sake of capability development. We focus on this claim more with extra supports at succeeding sections.

Furthermore, focusing on hypothesis we analyze this relation as a whole for policy implications. From this perspective, one of the most important and trend issue is defense industry clusters. As mentioned before, especially for the last years defense cluster concept has increased and as already highlighted at the methodology part we also interviewed with these clusters with semi-structured interviews and analysis of this semi-structured interviews will be focused later. On this part, we analyze the cluster issue from the defense industry supplier perspective.

Among 45 firms, 42 of them already joined to a cluster, 8 of them joined more than one cluster and 2 of them about to join a cluster. That means, 93% of the firms already joined to a cluster, which is a good portion. 3 years before only 15% of them was part of a cluster during the times when only OSSA exist. Among 42 firms, 88% of them (37 firms) find clusters are as useful. By focusing on these 37 firms, we analyze the reasons behind finding clusters as useful. In the interviews we have listed below reasons and give as a multiple choice question,

Joining a cluster,

- makes the production relation commutations visible,
- increase cooperation among firms,
- facilitates mutual production environment,
- provides to make mutual marketing/advertisement facilities,
- provides mutual education facilities,
- enables to cooperate on R&D projects,
- facilitates to reach the common labor potential,

Firms enabled to make more than one choice and most of them (54%) selected mutual education as top most important facility, secondly mutual marketing/advertisement facilities with 35% is selected as second choice. Increase cooperation and support each other is selected with 15%, facilitates to reach the common labor potential and enables to cooperate on R&D projects are selected by 8%. Remaining items are almost negligible. That means main cluster motivations; mutual learning, R&D cooperation, repeated past interactions or moving on path dependency does not exist in existing defense clusters rather only; general educations provided by cluster or marketing facilities that are conducting by visiting defense fairs are given importance. These findings indicate that cluster concept has not been perceived with its real structure from the supplier side. First of all, clusters cannot be created rather they are natural organization which base on repeated interactions at the past. Besides, path dependent characteristics, knowledge spillover mechanisms, related actors such as universities and research institutions are all neglected in this process. We will also focus this issue from the defense clusters' perspective at the semi-structured interview section.

Besides, structured questions we ask firms their opinion with open-ended questions in order to reflect their views. Firms have provided important feedbacks related with the subject and we also focus them.

First of all, 30 firms among 45 firms, without a directed choice, indicate that small, newly constructed or as they call "fictitious" firms attend the bids without certain

assets, if requirements are not designed properly they could even win the bid. Then, such critical projects are performed by underqualified firms. Moreover, capable firms lose the volume and they might miss the change of return of their investments. These firms suggest that restrictions should be well defined and certain assets should be asked as a must. Their another claim is that if such a problem occurs sometimes this firm fail to succeed the project and bid is repeated again with drastic delays in the project. Even if frequency of such problem occurs rare, these firms demand a solution for this problem.

Another interesting finding is that 50% of production and design firms (9 firms) started business with core R&D perspective on the other with sole R&D focus they could not be able to sustain in the business so that they opened production facilities just to finance the firm and R&D facilities. During the interview with Airbus it is indicated that when they construct R&D firms they made the firm to just focus on R&D and do not let to enter production facilities and he said they already construct necessary mechanism for this. This is an important dilemma because as mentioned in Strategic Documents of SSM, it is aimed to increase R&D focus but current structure just prevents firms from focusing on core R&D.

Furthermore, most of the firms complained about incentives mechanism, 69% of them found incentive mechanism complex. In fact, paperwork and procedures for these supports demotivate them to apply. Moreover, supports are not generally industry or technology specific and most of the high tech investors cannot utilize them.

Moreover, among 45 firms there exists 8 firms with personnel above 200 and 6 of them are detected to have number of personnel 240-250 for three consecutive years. It shows us that only two firms overpass the SME constraint but remaining 6 firms indicate that in order to preserve the SME status and continue to make use of incentives they stop development. This is an important finding it conflicts with the strategies of SSM and will be focused more at the next sections.

Among the firms, 9 of them were constructed as spin-off firms from main defense industry firms. All of these firms indicate that the culture obtained from main defense industry firms brought them important advantages in the market, however during the beginning of the business none of them start with an assigned order rather they struggle for order in order to take projects. Hence, they indicate that being a spin-off in defense is hard to deal with especially during initial stages because of lacking nursing market and guaranteed orders.

In summary, with this detail analysis, first of all support for hypothesis are investigated and important findings are focused. These results would be important inputs while designing policies. Besides, these findings indicate that open-end questions provide an eligible environment for firms to share their comments, criticisms and feedbacks on issues related with Turkish Defense Industry, results of which again utilized during policy recommendations. After focusing on these issues, at the next section comparative analysis is conducted especially with related literature and then regression analysis is used to test our findings.

5.3. Comparative Analysis

Design of interview question is already discussed in chapter 4.1, main motivation while designing interview questions is linking the questions to the related literature. In this section obtained quantitative results are discussed in the scope of related literature. Even if our analysis include multidimensional approach most of capability assessment studies are single dimensional. We make comparison with both analysis based on our results.

First of all, for the absorptive capability questions of interview one of the main bases is Cohen and Levinthal (1990). In their analysis, to test the predictions for R&D activity, they used cross-sectional survey data on technological opportunity in the American manufacturing sector collected from R&D lab managers. They suggest that

an increase in quantity of knowledge (knowledge spillover), should have a positive effect on R&D intensity.

Their theory suggests that when the targeted quality of knowledge is less (i.e., learning is more difficult), an increase in the relevance (i.e., quantity) of knowledge should have a more positive effect on R&D intensity. In their analysis, they divide the knowledge spillover into sub parameters and analyze the effect one by one. On the other hand, our main focus is their general findings of knowledge spillover. In their model, they gather data with questionnaire and they include questions in order to detect knowledge spillover and they compare results with R&D. Their findings indicate that knowledge spillover has certain effect on R&D intensity. While performing this analysis they conduct correlation relationship among the knowledge spillover parameters and found out that basic research is the most effective element that affects R&D.

In the same way we want to detect the effect of working density in defense on R&D spending in order to detect absorptive capability likewise Cohen and Levinthal (1990) which links R&D directly with absorptive capability. Schoenecker and Swanson (2002) also utilize correlation analysis with R&D and technological development and they found corresponding correlation as 0.82 and finally Wang and Ahmed (2007) included comparative analysis to show the effect of R&D on firm competitive advantages. They also verified that R&D investment has positive effect on the competitiveness of the company and in fact based on the regression results it is most effective one with highest coefficient.

If we focus our own hypothesis related with absorptive capability, first relation between working on defense industry (DFNS: ratio of defense in sales) with R&D sales percentage (R&D: percentage change of R&D sales).

> *H1: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' absorptive capability.*

In order to analyze this relation comparative graph of DFNS and R&D is produced based on firms as in the Figure 18.

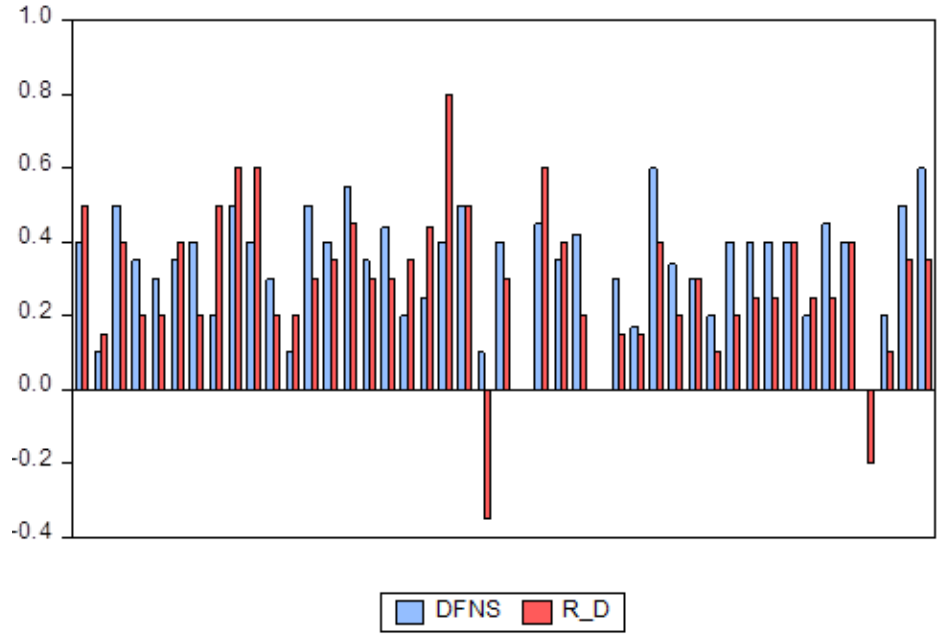


Figure 18 Comparative Graph of DFNS and R&D

It can be observed from the graph that percentage changes of working with defense industry and percentage changes of R&D spending variables act together. By another saying, working with defense industry and R&D spending generally connected to each other for our case. This relation gives us important clue for proving the hypothesis, however as conducted in above mentioned paper more proof is included to verify the hypothesis at later parts.

From other component of dynamic capability, innovation capability view Schoenecker and Swanson (2002) assess and find that new product development has a positive significant effect on firm performance in chemical, electronics and pharmaceutical industries and they found this parameter is consistent across industries. In this paper they utilize the correspondence and regression analysis at the same time and found out that New Product Ratio has significant effect on technological capability. For different sectors they found 0.7-0.8 relation which

represents a good relation. Besides, Deeds et al. (1999) and Saulina et al. (2014) also revealed relation of innovative capability and performance of firm. Both of these analysis and Wang and Ahmed (2007) approach also supports that new product ration on total product is a good representation of innovative capability.

Similarly, by using the same approach with these studies we analyze following ratio in order to detect innovative capability. Working ratio with defense (DFNS: ratio of defense in sales) with ratio of new product on total sales (NEWPRO: new product sales / total sales).

> *H2: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' innovation capability*

Again comparative graph of DFNS and NEWPRO will give us a clue about their relation in below Figure 19.

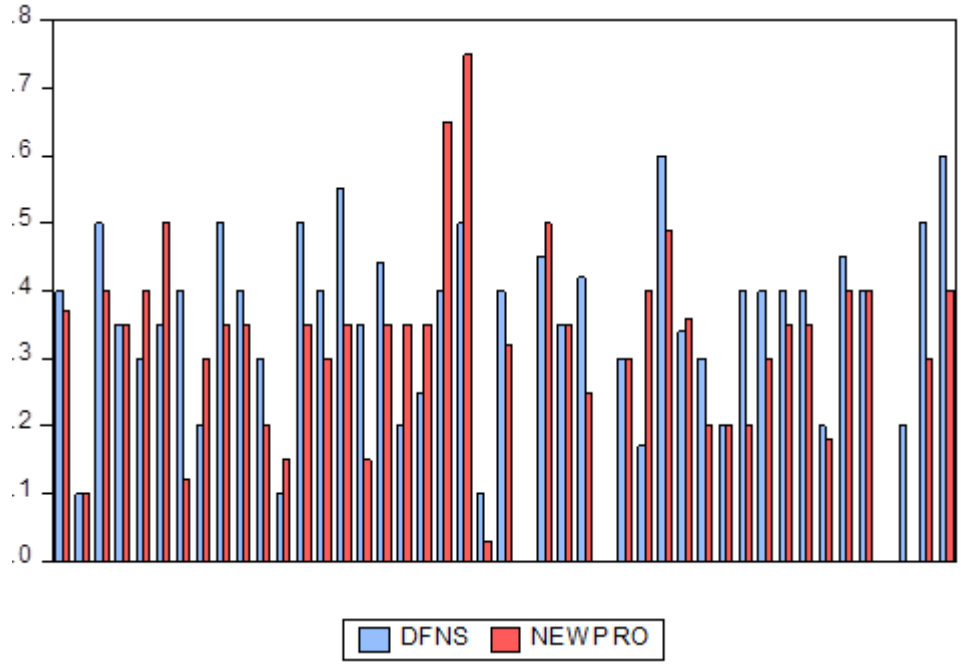


Figure 19 Comparative Graph of DFNS and NEWPRO

Figure indicates that there is a strong connection between percentage changes of working with defense industry and percentage changes of new production. Therefore,

we got the clue of working with defense industry has positive effects to increase production of new products.

We will be searching for the same clue related with adaptive capability. Actually first Chakravarthy (1982) introduced this concept but in that paper main concern is differentiating adaptability from adaptive capability. This study proves that firms with more adaptive capability tend to be more successful. For the quantitative side, Alvarez and Merino (2003) verified that adaptive firms are more successful and one of the parameters utilized is export data for specifically high-tech industries. From our thesis aspect, we utilized the export view either with below hypothesis:

> *H3: The higher the collaboration between main defense industry firms with their suppliers, the higher their suppliers' adaptive capability.*

In order to check the hypothesis we perform the same analysis. Figure 20 demonstrates percentage changes of working with defense industry and percentage changes of export level. Movements of these variables are usually close to each other. Hence, we get important clue about working with defense industry has beneficial effects to expand exporting capability.

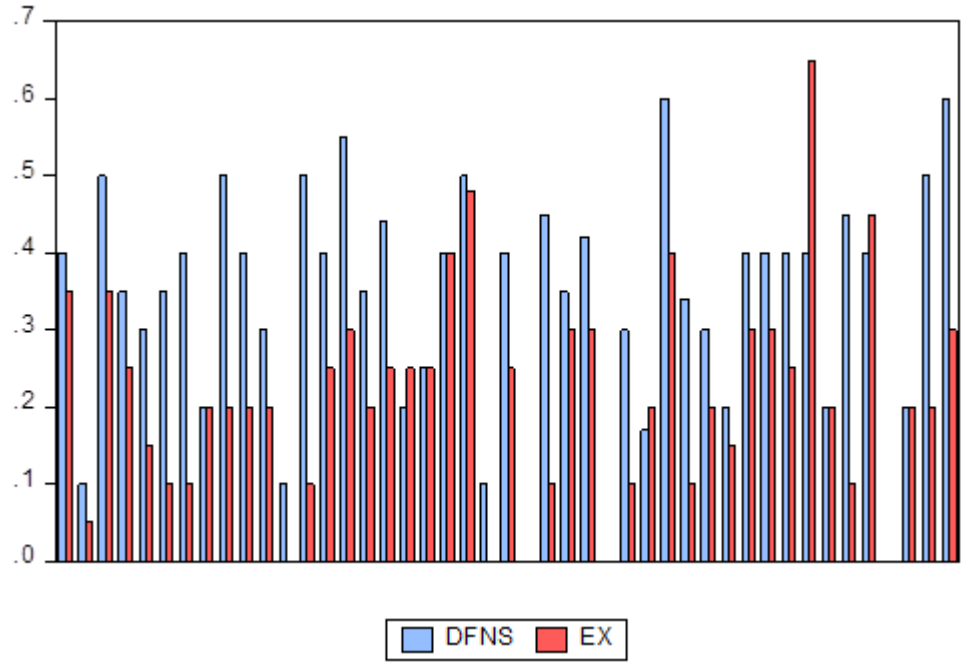


Figure 20 Comparative Graph of DFNS and EX

Comparative analysis give important clue about the relation of variable, but in some of the studies in the literature these analysis also supported by correlation analysis. In order to verify our above findings, the effects of firms working in the defense industry on R&D spending, new product and export capacities are analyzed together. To discover these relationships firstly their correlations are calculated and interpreted as summarized in below Table 10.

Table 10 Correlations and Significances

	DFNS	NEWPRO	R&D	EX
DFNS	1.000	0.645	0.687	0.601
P Values	-	0.000	0.000	0.000

Correlation table indicates that working with defense has positive correlation for all R&D, New Product Ratio and Export. Besides, it designates the intensity of correlations between DFNS and R&D, DFNS and EX, DFNS and NEWPRO. Correlation between DFNS and R&D is highest and it is approximately 69%. The second highest correlation coefficient belongs to DFNS and NEWPRO. Correlation coefficient between DFNS and EX seems to be low when it is compared to correlation coefficients of DFNS and R&D, which is 60%. Correlation coefficient between DFNS-NEWPRO, DFNS-R&D, DFNS-EX are statistically significant. Therefore, it can be concluded that working with defense industry has positive effects on R&D spending, new production and export capability and that means working with defense industry contributes to absorptive capability, innovative capability and adaptive capability of firms. From the general view, these results supports that working with main defense industry firms contributes to dynamic capability of firms and so that working with main defense industry firms increase their competitive advantage.

In previous section, we have shown that working with defense industry contributes to all branches of dynamic capability based on the interview results conducted with the managers of supplier firms and in this section with comparative analysis these

findings are supported with another evidence. Our claims are supported not only by using comparative graphs but they are also proved with correlation analyses. In addition to this, at the next chapter we will test our findings with regression analysis.

5.4. Regression Analysis

At the above sections we have already obtained important supports regarding contributions of defense industry on the capability of the suppliers. By conducting a regression analysis we try to verify the effects of aforementioned dynamic capability parameters on the firm performance.

In this part, the effects of some determined variables on firms' total turnover level and firms' turnover level in defense industry are searched empirically. Two different regression models were set up for discovering impacts of dynamic capability variables. In this context, to be able to do international trade, producing new products, spending money for research and development areas, number of personnel working for research and development are added to regression models, again to represent the dimensions of dynamic capability. As we mentioned in the Methodology Chapter for regression analysis we used data of 45 companies and all data were collected by one-to-one interview method.

Firstly, increasing of firms' total turnover was searched with independent variables. Secondly, firms' defense industry turnover level was analyzed. The reason of analyzing of total turnover change and in the defense industry turnover change separately is to figure out impacts of each independent variable not only for total basis but also for defense industry basis.

5.4.1. Regression Model for Total Turnover

First regression model is constructed based on total turnover with equation;

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mathcal{E}_t \qquad (1)$$

In this equation, Y_1 is a dependent variable and it represents firms' average turnover 2014-2016. X_1, X_2, X_3, and X_4 are independent variables. X_1 is percentage change of R&D spending, X_2 is percentage rate of export level, X_3 represents percentage rate of new product turnover and X_4 represents percentage change of R&D personal on average between 2014-2016. In this model it is expected that R&D spending, number of R&D personal, export change and producing new products would cause to increase firm's total turnover level. Therefore, β_1, β_2, β_3 and β_4's sing are expected to be positive. Results of regression analysis are given in Table 11.

Table 11 Results of Regression Analysis Based on Firm's Total Turnover

Y_1 = -0.0845 + 0.5463R&D + 0.3811EX + 0.5227NEWPRO + 0.0182P_R&D
(0.1132) (0.0046***) (0.0860*) (0.0288**) (0.6171)
R^2 = 0.6963 Adj R^2 = 0.6659 Prob (F-statistic) = 0.0000***
-P values in parentheses
*** shows significant level of 1%,
** shows significant level of 5%,
* shows significant level of 10 %,

According Table 11, since Prob (F-statistic) equals 0.0000, this model is statistically significant at 1% meaning level. Coefficient of R&D is statistically significant at 1% level too, while coefficient of NEWPRO is statistically significant at 5% level and coefficient of EX is statistically significant at 10% level. On the other hand, constant and coefficient of P_R&D are not statistically significant. In addition to them, signs of variables are consistent to expectations. Normally it is expected that number of R&D personal would cause expand firm's revenue. However, in this equation, number of R&D personal is insignificant (detail regression output table is given in Appendix D).

To sum up, Table 11 shows that R&D, EX and NEWPRO has beneficial effects for increasing companies' total turnover level. As it is known that R^2 indicates explanation power of dependent variable by independent variables and it is equal to approximately 70%. Actually it can be told that explanation power of this model is

quite high. Adjusted R^2 is approximately equal to 67% which is lower than R^2 meaning that there is at least one independent variable is not necessary for this model. This situation could be explained by insignificant variable P_R&D.

Obtained results imply that R&D is the most important variable and NEWPRO is the second to increase companies' turnover volume. The third variable is EX. Actually this result is compatible with the literature background of capability.

Increasing R&D spending not only increase absorptive capability and but also as Cohen and Levinthal (1990) mention it increase the value add in the product so that both profit and revenue of the firm. What we have shown is nothing but we confirm this theory for defense industry either.

Focusing on producing new products would create new market potentials that helps to assist sales level (Eisenhardt and Martin, 2000; Wang and Ahmed, 2004). We also verified that new product ratio has positive effect on competitive advantage for defense industry.

It is already focused that rapid adaptation of technology provides good opportunities for companies that brings them export capability at the end. It provides new exporting markets to enhance export amount. But, its coefficient is not high as much as R&D and NEWPRO. This result can be considered as meaningful. Export capability would be an important tool for firms however, for defense industry exporting is more than a usual export case. Because, besides firm or product quality there are also issue to be solved among nations. Defense products cannot be exported without permissions. Besides, custom formalities are more complex than other sectors and each country has own rule. Therefore, it is understandable that export capability does not add value as added by other parameters to the competitive advantage of the firm.

Results obtained from regression model are as predicted except for the number of R&D personnel. Effect of number of R&D personnel is unexpectedly insignificant.

Despite being surprising it is explainable for the case. R&D personnel situation has not been adopted by the firms, even if the personnel are called as R&D personal as title, in much of the case they are not working fully to R&D studies. They are conducting the same operational jobs with remaining firm personnel. It can be inferred that, although the number of R&D staff increases, the added value provided by these personals does not increase at the same rate. Another explanation of this case can be done by considering quality of these personals. Quality of R&D staff may be important than number of them.

Obtaining the result is not enough for the regression analysis least square estimation (LSE) tests should be conducted in order to finalize the model. Before starting analysis since they are focused as concurrent capabilities we might have multicollinearity between R&D spending and new product development. Because, in some studies these two capabilities act together we worry about this issue occurs for our analysis too. LSE tests of the regression model are given in Appendix D.

Results of these tests indicate that for first regression equation all assumptions are satisfied and that means the results already obtained are valid. Now we conduct the same analysis by inserting defense industry sales instead of total turnover as competitive advantage parameter (Y_2).

5.4.2. Regression Model for Defense Turnover

In this regression model, independent variables are same as those in the first equation. However, Y_2 is represented by firms' revenue for defense industry instead of total turnover level. Furthermore, expectations of effects of independent variables are exactly valid for this equation either.

$$\mathbf{Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_t} \qquad \mathbf{(2)}$$

Table 12 Firm's Turnover in Defense Industry

Y_2 = -0.1284 + 0.6019R&D + 0.4433EX + 0.5532NEWPRO + 0.0011P_R&D
(0.0122**) (0.0011***) (0.0349**) (0.0144**) (0.1215)
R^2 = 0.7671 Adj R^2 = 0.7439 Prob (F-statistic) = 0.0000***
-P values in parentheses
*** shows significant level of 1%,
** shows significant level of 5%,
* shows significant level of 10 %,

Results of second regression model are summarized in Table 12 with from defense industry revenues perspective. Table 12 indicates that since Prob (F-statistic) equals 0.0000, so that model is statistically significant at 1% meaning level. While coefficient of R&D is significant at 1% meaning level, coefficient of NEWPRO and EX are significant at 5% meaning level. On the other hand, P_R&D coefficient is again insignificant. Coefficients of all variables R&D, EX, NEWPRO and P_R&D are again positive as expected. The order of importance of independent variables on dependent variable is the same as first equation. In other words, the most important variable is R&D, the second important variable is NEWPRO and the EX is again at the same level for defense industry revenues of firms. Whereas, P_R&D is turn out to be insignificant again. According to results, R^2 and adjusted R^2 are approximately %77 and %74 respectively. Possible explanation for this is that, there is at least one independent variable is not necessary for this model. This situation again could be explained by insignificant variable P_R&D.

Besides, for LSE tests of this regression model all assumptions are also satisfied as given in Appendix D.

Second regression model is a kind of verification of first one. In this thesis our claim is working with defense industry firms causes to rise for R&D spending, to increase new products ratio and to expand export volume. In first regression it was found that R&D, NEWPRO and EX have favorable effects on firm's total turnover. However, the positive effects of these variables on trade volume might belong to out of defense

industry. To figure out this point, defense industry revenues of companies was searched with again same independent variables and similar results are obtained.

When these equations are compared to each other, it can be observed that there is no big difference between these two results. Since variables of R&D, NEWPRO and EX also have positive significant effects on companies' defense industry revenues, our claim is proved. In addition to this, R^2 and adjusted R^2 values are higher in second model. It means that the explanation powers of variables are stronger for estimating turnover level in defense industry as expected.

Now in the next section we fill focus on the results that is obtained from the semi-structured interviews of other stakeholders.

5.5. Semi-Structured Interview Analysis

Although core of the interviews conducted with supplier firms we also conducted semi-structured interviews with other stakeholders of the sector; SSM, Main Defense Industry Firms, KOSGEB and Defense Industry Clusters. Moreover, we also conducted interviews with successful SMEs in China and AIRBUS Company. For all these stakeholders semi-structured interview questions are listed in Appendix C.

5.5.1. Main Defense Industry Firms

Main Defense industry firms are main actors for capability development on supplier firms. Therefore, learning their perspective provide important feedbacks for our analysis. Therefore we conducted interviews with ASELSAN, HAVELSAN, TAI, ROKETSAN and FNSS as the main driving firms in the sector.

First of all, we asked them about outsourcing decision and how do they conduct make-or-buy analysis. They all claim that SSM Offset Policy is an important base for them and these decisions are conducted within the project and they do not have central mechanism for allocation of work packages to supplier firms. In fact, obtained

feedbacks indicate that none of the main defense industry firms have systematic make-or-buy decision support system.

Besides, we also asked main defense industry firms about the supplier selection and evaluation methodology. They all have definite and unique systems; however, in common they just conduct quality, administrative and technical audits to supplier firms and firms with certain score taken as approved firm. In addition to this, the firms have their own mechanisms to support their suppliers.

We also ask main defense industry firms about the defense industry clusters and based on the similar responds we can infer that main defense firms also perceive defense industry clusters as agglomerations.

5.5.2. SSM

Being the policy maker of the sector SSM has been interviewed many times both for collecting information regarding firms, current situation of defense industry, background of policies, approach for spin-off firms and current developments especially for capability development with given semi-structured interview questions in Appendix C.

Based on the semi-structure interviews conducted with SSM; we have learned that main focus of SSM is constructing strong supplier ecosystem as defined in 2017-2021 strategic plan. And EYDEP is stated as the main tool for achieving this and capability assessment studies in the sector. EYDEP is designed to be the infrastructure to construct industrialization triangle of the sector. With the industrialization triangle SSM aims to focus the capability of the industry on the same path. With this triangle SSM aims to focus main defense industry firms on the core competencies.

Besides, SSM indicate that parallel to this strategy in order to distribute the capability through the sector spin-offs are encouraged. SSM suggest that increasing number of

spin-off in the sector could create focused and competent firms so that export potential of the industry would increase. On the other hand, it is stated that only a few spin-offs managed to stay in the market others just vanished from the sector. These firms mainly move to other sectors like pharmaceutical, home-electronics or automotive sector. In 2017-2021 strategy document spin-offs are encouraged. SSM expects defense industry firms have their special focus and decrease repeated developments to minimum.

5.5.3. Defense Industry Clusters

As mentioned before clusters are important actors in the sector and their importance increases gradually. There exist 6 defense clusters (OSSA, SAHA, BASDEC, ESAC, TSSK and Konya) in the sector and we have interviewed with all these clusters based on semi-structure interview questions given in Appendix C. All these clusters indicate their main motivation as producing synergy by keeping firms together within the cluster. Again with consensus, clusters are constructed manually and even OSSA which is constructed on a path dependent environment of OSTIM indicate that they partly take these path dependent characteristics into consideration.

Besides, all these clusters are asked for capability analysis evaluation and contribution of the firms. For evaluation they refer to capability matrices of the firms, on the other hand, all the matrices provided include just the facility areas of firms and capability perspective is not included.

In addition to this we also investigate the contributions and future planned contributions to their member firms. Responds again generally focus on the education and advertisement facilities.

Furthermore we also asked clusters about their link of RIS with NIS. All these defense clusters produced their own RIS without a systematic reference with NIS and

all clusters claim that they are focusing on localization issues as government supports but do not take NIS into consideration as a process.

In summary, interview results with suppliers was shown that clusters are not utilized properly with its real structure and these findings also verified by the management of clusters. Cluster issues with; value chain, path dependency, mutual learning, common labor pool, regional proximity and link with NIS concepts seem to be not included in the process of these clusters, however, for such an high-tech industry clusters could contribute to development of firms together.

5.5.4. KOSGEB

KOSGEB is the main incentive mechanism for SMEs in Turkey and this is also valid for defense industry. Results obtained from firms are quite pessimistic about incentives by interviewing with KOSGEB we want to analyze the situation from another perspective. First of all, incentives that can be utilized by defense industry SMEs are focused and collected as given in Appendix C.

Besides, in the interviews arguments related with SME constraint is focused and KOSGEB indicate that they also want to relax this constraint. Because they state that SMEs of Turkey stay at SME stage for 18 years on average, whereas Europe or USA SMEs jump to higher stage in 4-5 years and they also want to revise this structure for Turkey either.

As firms and main defense industry firms KOSGEB also complains about the contribution of incentives. As they claim, they do not have a formal feedback mechanism for detecting the effects of previous incentives. Besides, with this interview we have learned that KOSGEB coordinates all incentives of the government in order to prevent incentive overlap in the sector.

5.5.5. Other Semi-Structured Interviews

In addition to above semi-structured interviews we also conduct two foreign interviews with AIRBUS and 6 successful Chinese SMEs. First of all for AIRBUS we ask their supplier selection, evaluation and development facilities. Important feedbacks are collected from this meeting. Especially, patent and spin-off approaches provide important insights for our study. Besides, interviews with 6 Chinese SMEs enable us to compare situation with an important base. In these interviews we have learned that SME structure in China is different than usual and not stabilized for incentives. Another important finding is related with patent issues. Even with SME dimension these defense firms have hundreds of patents.

In summary, in this chapter we have come up with the results corresponding to our methodology. Interviews are the main data source for data analysis and we have conducted data analysis based on interview findings. Based on our findings we obtain important supports related with our hypothesis. First of all, our hypotheses are verified by top managers during the interviews. They indicated that working with defense industry contributes to R&D spending, new product development and exporting capabilities of their firms. Besides, we conduct comparative analysis with literature findings and figure out that our findings are compatible with related literature. In fact, as we expected working with defense contributes to all aspects of dynamic capability also supported by correlation table and related significance. Finally, with regression models, we verified our findings by checking the contribution of defined parameters on firm performance. We obtained that all these parameters have positive effects on firm performance, however contribution R&D personnel is found as negligible.

Now based on these results and interview findings we will focus on policy recommendations at the next chapter in order to increase the dynamic capabilities of suppliers.

CHAPTER 6

POLICY RECOMMENDATIONS

As shown in Table 1, 153 distinct interviews are conducted for this thesis. Quite valuable data has been gathered, which is hard to get especially in defense industry, through these interviews. Both quantitative and qualitative data is collected. Findings are analyzed and presented above. Experts gave important feedback and, from those feedback necessary policy recommendations are produced. In fact in this section, we discuss our policy recommendations, based on our findings and results.

The main methodology behind suggesting policies includes, initially a mapping of the current structure, which is already done in the previous sections. Based on the results, required policy recommendations are inferred. In this structure, first main policy aim is defined, and then policy recommendations are decided as second category to reach this policy aim and finally policy tools, which explain "how to proceed for putting these policies into practice?" are included. In other words, policy tools indicate the necessary tools that will be utilized for realizing the policy.

Based on the mapping analysis and results obtained, we define three distinct policy aims; regulating SME supporting structure, promoting the cluster structure for defense industry and promoting R&D focus for defense industry.

In the following sections, we first present the results that lead us to propose the related policy, then we explain the policy recommendations regarding each policy aim and afterwards we finally focus on the policy tools to be used to succeed in the policy approaches.

6.1 First Policy Aim: Regulating SME Supporting Structure

First of all, initial focus is the results from interview which lead us to suggest this policy. According to 635th Ministry of Science and Technology Organization and Facilities statutory decree 28th clause dated 3 June 2011, SME is defined as those firms with personnel below 250 and with revenue below 40 Million Turkish Lira. This definition depends on the No.:2005/9617 rule of cabinet with name "SME Definition and Classification Regulation" dated 19/10/2005. Based on this rule, an SME would lose its status if it cannot match this rule in two consecutive years.

Although this rule aims to preserve the SME structure and already provides important advantages for SMEs, especially for defense sector, this rule causes problems for the firms.

As it can be inferred from our results, among the firms we interviewed with there exists 8 firms with over 200 employees and 6 of them has 240-250 personnel, which have potential to exceed 250 personnel. On the other hand, they limit their size between 240-250 personnel for 3 consecutive years. As they explain their main motivation is to make use of the SME incentive mechanism. Actually, according to SSM 2011 Offset strategy, firms are encouraged to work more with SMEs. In fact, they need to give at least a certain percent of the total project amount to SMEs, and besides there exists some extra multipliers for R&D based orders regarding SMEs. In addition to this, most of the supports we present in Appendix A are designed or encouraged for SMEs. Therefore, it can be inferred that SMEs are given important privileges in defense as well.

Our findings shed light on an important dilemma because as stated in the Figure 3 SSM aims to construct industrialization triangle. In order to construct this triangle with sustainable manner, SSM needs strong 1st Tiers. On the other hand, SME definition causes what I called "incentive dilemma", in which firms are motivated to grow but should not lose the SME advantage. As mentioned before these policies

make SMEs of Turkey stay at SME stage for 18 years on average, whereas Europe or USA SMEs jump to higher stage in 4-5 years (from KOSGEB interview). Based on our interviews there is a consensus that SME constraints should be revised. It might be thought that relaxing this constraint might decrease the incentives for the firms, actually there are only 7 or 8 firms that will be affected with these changes. In fact, 1st tier supplier set is not expected to be a huge structure, and market conditions are definite in defense, so it could not devastate the incentives for other firms.

Related to this dilemma, another common problem aroused by potential 1st Tier suppliers is industrialization problem. During industrialization these firms make investments and so that their overhead cost increases. During competition these overhead costs cause them to lose the bids. 66 percent of SMEs indicate that they lose their business to fictitious firms and they expect a solution for their problem.

Furthermore, as focused before unlike other sectors defense industry is a hard to catch up sector. New entrants could not be easily adapted to sector without prior experience, therefore spin-off structure is quite important for defense industry in order to spread the capability to the whole sector (interview with SSM). On the other hand, as a spin off sustaining in the market is quite hard. Our findings indicate that all 9 spin-offs interviewed indicate common problems as tax burden and market problem. 9 firms complain about that during construction despite their capabilities they could hardly take offers and all of these firms just stay in the market with their own equity. Furthermore, spin-offs would mitigate the risk of embeddedness paradox of main defense industry firms.

These findings indicate that SME supporting structure should be regulated. Therefore we define “Regulating SME Supporting Structure” as main policy aim and related policy recommendations and policy tools as summarized in below Figure 21.

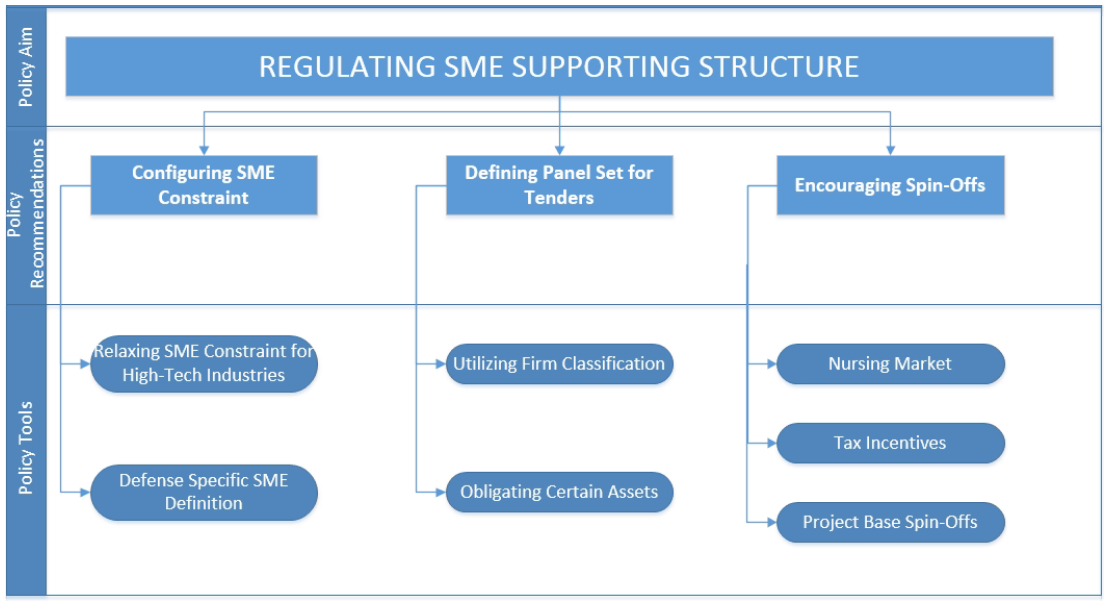


Figure 21 Methodology of 1st Policy Aim: Regulating SME Supporting Structure

Three distinct policy recommendations are suggested; Configuring SME Constraint, Defining Panel Set for Tenders and Encouraging Spin-Offs details of which are focused in the next sections.

6.1.1 Configuring SME Constraint

First policy recommendation is related with SME constraint because as focused before there is incentive dilemma and in order to solve this dilemma first choice could be regulating the SME constraint "personnel below 250 and revenue below 40 Million Turkish Lira". Because, with its specifications like working at cutting edge technology and vertical integration characteristics, in order to construct the Industrialization Triangle and in order to develop capable first tier structure SME constraint should be revised at least for defense industry. We define two distinct policy tools in order to deal with both of these two dimensions and we try to figure out ways to realize this policy recommendation. In other words, with these tools we will figure out "how" we will achieve desired policy outputs. First policy tool is Relaxing SME constraint for high-tech industries and defense specific SME definition.

6.1.1.1 Relaxing SME constraint for high-tech industries

We propose that relaxing SME constraint at least for high-tech industries could alleviate the problem especially for defense industry, product of which is the second highest export source after jewelry for Turkey. In order to do so, related law should be revised. The law No.:2005/9617 rule of cabinet "SME Definition and Classification Regulation" dated 19/10/2005, should be revised for specific high-tech sectors and so that defense industry suppliers could grow without the concern of sacrificing SME advantages.

Concern related with this revision could be that incentive shares could decrease for the firms that already utilized these incentives. On the other hand, for defense perspective there are only a few firms (8 firms based on incentives) within the scope of this revision. If this tool is applied it is expected that firms could grow without losing SME advantages and these firms could be main candidates of being 1st tier supplier in the industrialization triangle.

6.1.1.2 Defense Specific SME Definition

Another answer for how to configure SME constraint is to differentiate sector base SME definition. As mentioned in data analysis part, during the interviews conducted by Chinese firms it is focused that, it does not exist a certain SME definition for Chinese firms rather there exist differentiation for SMEs from the sector base. Similar application could be used for Turkish firms and SME definition could be revised for SMEs. In order to so again, the law No.:2005/9617 rule of cabinet "SME Definition and Classification Regulation" dated 19/10/2005, should be revised and sector specific SME definitions should be added.

Revising this definition for defense sector, would encourage first tier firms to appear in the defense sector.

In summary, by suggesting “configuring SME constraint” policy recommendation we expect “incentive dilemma”, which includes trying to produce strong 1st tier firms while keeping SME structure, to be solved.

6.1.2 Defining Panel Set For Tenders

Second problem for SMEs for the sake of development, they increase their overhead costs. These increases cause them to lose tenders to small enterprises and they could not get the return of their investments. During the interviews at open end questions or explanations parts 66% firms stated their concern about incapable firms join the bids and even if they take the project either they fail and firm revised or they create mess and project tender is revised. In order to solve this issue a panel set can be defined and only these firms can be invited for tenders.

With this policy recommendation we expect, only capable SMEs would compete and they could be able to provide sustainable development. We suggest two policy tools to realize this policy recommendation. Utilizing the firm classification and during tenders only firms from specific classes could be invited, with certain assets, which bases on RBV perspective of dynamic capability (Penrose 1959).

6.1.2.1 Utilizing Firm Classification

As we present in the development path of Turkish Defense Industry and in EYDEP program part, one of the main motivations behind capability assessment is constructing the capability map of defense industry. In order to construct the panel set approach, capability inventory is quite crucial which enables to select firms from a certain classified set. By utilizing the firm classification tenders can be opened for specific capable suppliers and related risks could be mitigated. Main defense industry firms already conducted by themselves but this structure lacks central coordination. For this policy tool studies already started with EYDEP Project and we propose EYDEP project to cover all suppliers. This can be provided by separating EYDEP from SSM and continue with an autonomous structure. As another alternative specific

fund could be provided for EYDEP in order to conduct the capability analysis, continuously track capabilities and keep, defense industry capability map, updated sustainably.

Utilizing firm classification is expected to result in a firm capability set map that can be traced by SSM. By using this tool, SSM could design and restrict the tenders for certain capabilities so that firms with high capability could take their return their investment and increase their capabilities further.

6.1.2.2 Obligating Certain Assets

As focused in literature part one of the main roots of dynamic capabilities bases on the resource based view. Origin of which reaches up to Penrose (1959), the first systematic approach to define capability. In spite of being in usage, it is now replaced with market dynamism especially for high-tech sectors. In this policy tool, RBV approach can be utilized by forcing firms to have certain assets to prevent fictitious firms from attending tenders.

Our motivation for suggesting this policy tool is to figure out the ways to solve the concern of defense industry firms related with incapable firms. For a sector like defense industry opening the bid and inviting firms without constraint could be burdensome. This problem is valid for both government side and main defense industry firm side. Since all the firms suggest offer for bids evaluating offers become tedious, besides to decide the suitable firm could not be easy. We suggest here to define certain asset criteria as a constraint to confine the set to core group of interest.

This policy tool has two distinct dimensions; government side and main defense industry firm side. From the government side first of all, defense procurements should be excluded from public procurement law for all stakeholders of the government. Specific regulation could be produced by government and it should provide robustness to defense procurements. On the other side, from the perspective

of main defense industry firm they are conducting their procurements with their own instructions. Generally as a procurement rule tenders are open as general and all firms can attend.

Certain assets; infrastructure, personnel capability, equipment park, testing environment or financial structure could be analyzed and certain asset criteria could be inserted. For instance, for specific critical tenders a certain financial or testing assets could be required. This revision could be added both for public procurement law and procurement instructions of main defense industry firms.

By adding this revision we expect only firms with certain assets could join the bids and problem of failure or concern of capable firms could be alleviated.

In summary, defining panel set could preserve capable firms in the bids and prevent fictitious firms to attend bids without certain capabilities.

6.1.3 Encouraging Spin-Offs

Another policy recommendation suggested in the scope of SME supporting regulation is constructing spin-offs. SSM Industrialization Triangle is a good approach and main motivation behind this triangle is creating 1st Tier firms focusing on core competencies as Uzzi (1997) suggests as a receipt to solve embeddedness paradox. Besides, defense industry is a high tech and it is hard to catch up for new entrants. Therefore, it would not be possible to construct 2nd tier from standard firms. It would be better to motivate spin offs which are already experienced in defense industry firms. Most of the potential 1st tier firms are natural spin-offs of main defense industry firms. This encouragement could be provided either market based or incentive base. Besides, sub packages of certain projects could be outsourced to spin-offs. Normally, growing firms can take advantage of the effort, huge firms have spent during development by copying production methods and technology. They can reach the technology directly by skipping the obsolete parts. For instance, bigger firms

might construct the infrastructure and they can utilize the same technology. Especially due to confidentiality concern this leap frogging approach is not suitable for defense industry, therefore spin-offs directly from project could adopt better.

If we turn to our analysis that made us to suggest this policy is that SSM wants to increase spin-offs to preserve main defense industry firms from embeddedness. During our interviews with SSM, it is mentioned that spin-offs will be supported more. On the other hand, our interview results with 9 spin-off firms do not support this claim. 9 spin-offs all complained about the market and tax problems in the sector. According to our interviews with SSM it is stated that only a few defense spin-offs managed to stay in the market others just vanished from the sector.

In order to solve these issues and for encouraging spin-offs we suggest three distinct policy tools these are; nursing market, tax incentive and project base spin-offs.

6.1.3.1 Nursing Market

Unlike from other industries market in defense industry is quite complex. Generally projects are huge and product numbers are low. With its low volume, high-standards, challenging quality requirements and high investment amount generally discourages firm from entering the sector. From the main defense industry perspective, without the order from government, procurement guarantee cannot be given. Furthermore, as we already discussed trends and threats continuously change in this sector, so that apart from other industries future trends cannot be estimated for defense projects. Therefore, one of the most important challenges for spin-offs in the sector is market problem.

We interviewed with 9 spin-offs in the sector, all of them complained about the market during construction. Based on this analysis we suggest nursing markets as policy tool. Despite above disadvantages by providing nursing market spin-offs can be encouraged. Even if there exists only few serial products there still exists common

products, systems and subsystems such as; connectors, cameras, detectors, printed circuit boards, layout design or power systems. These standard products or for special part of projects specific systems or sub-systems a spin-off can be constructed and process could be entirely outsourced. During our interview with Airbus, constructing spin-off is described as one of the main strategies and they provide nursing market for their spin-offs.

In summary, with nursing market we aim to provide an initial market for spin-offs especially for during their problematic construction period. As mentioned, standard products or services or long shelf life products can be used as nursing market. This structure would enable them to sustain in the sector and focus them to increase their capability.

6.1.3.2 Tax Incentives

There already exist extra privileges and supports for spin-offs but in our interviews we infer from the feedbacks that during start-up phase most important incentive is tax incentive. As illustrated in Appendix A there already exists tax incentives, however their scope should be revised in way that to cover spin-offs. For instance Law No. 4691 and 5746 on Technology Development Areas (TGB) and Supporting Research and Development Activities by T.C. Ministry of Science, Industry and Technology covers R&D activities, so spin-offs dealing with R&D already make use of these incentives. In the same way, tax incentive provided by ministry of finance with the scope of Income Tax Law No. 193 and Law No. 5520 on Corporate Income Tax also focus especially on R&D.

For these specific incentives we suggest it to cover production facilities either uniquely for spin-offs. Moreover, as gathering the capability analysis of SSM, could control defense incentives centrally especially with EYDEP. We suggest special tax incentive tool also included in this structure with spin-off focus.

Relaxing incentives for spin-offs could be seen as a tax deficiency from the government side, but letting these firms to grow would bring high volume and more tax back from them.

6.1.3.3 Project Base Spin-Offs

As the third policy tool we suggest project base spin-off in which we suggest specific system or subsystem given as a whole for spin-offs. For instance, while Airbus used to produce specific velocity sensor under the plane in house, then they separated the whole team outside the firm and construct spin-off. After ten years now this supplier firm becomes one of the top sensor producers in the World. This type of spin-off brought important advantages for both main driven and supplier firms; main driven firm could focus on core competencies and decrease inertia in the firm so that firm get rid of the paradox of embeddedness (Uzzi 1997). Besides as mentioned before catch-up principle with leapfrogging approach cannot be utilized in defense industry, this increases the importance of spin-offs one more time. If spin-offs constructed directly from the project, focused and capable firms can be added to the supplier ecosystem. For realization of this specific policy tool main actor is main defense industry firms. Especially for long run projects such as; national tank, ship or aircraft certain systems or subsystem could be outsourced by constructing spin-offs.

To conclude, by applying this policy aim, we expect SME supporting structure could be regulated with respect to; SME constraint, panel set definition and encouraging spin-off. So that beginning with mentioned six firms, supplier firms increase their volume without a constraint so that we expect to produce eligible first tier suppliers for industrialization triangle. Furthermore, applying resource based constraints will provide competent firms sustain their business based on their capability and enable them to decrease their return on investment period. Finally, applying this policy aim could encourage and increase spin-offs in the sector and so that main defense industry firms mitigate the risk of embeddedness paradox and industry would gain capable firms.

6.2 Second Policy Aim: Promoting the Cluster Structure for Defense Industry

R&D intensive industries such as defense industry tend to be highly concentrated spatially. Because of the tacit nature of knowledge, knowledge spillovers are mostly local and this leads to the formation of clusters. Clusters include; firms, universities, research centers and financial institutions and currently popularities of clusters are increasing and it is inevitable that defense industry affected from this trend.

There exist various clusters in Turkish Defense Industry. OSSA is the oldest and most structured one which is constructed in 2008 with 240 firms currently, there exists other clusters as mentioned before constructed after 2015; SAHA, TSSK, BASDEC, ESAC and Konya Defense Cluster.

As can be observed in the data analysis defense industry firms are highly fond of clusters even with current structure, still they are not aware of the advantages of clusters. Besides, during field studies, interviews are conducted with the managers of these clusters and results indicate that they are also not familiar with the cluster structure. Moreover, interview findings indicate that main defense industry firms are also not familiar with real cluster concept. These clusters in defense industry are much like agglomerations apart from OSSA. Agglomeration refers to geographical groupings of firms. However, the cluster is expected to remain within the shared "value chain" based on repeated interactions, which is the most important notion in clusters. That means clusters are natural organizations based on path dependency, but they cannot be created. However, in Turkish Defense Industry case, clusters are tried to be constructed manually and contains just firms and some of the firms are attending more than one cluster.

Our findings indicate that main defense, supplier firms and clusters themselves do not get the real benefit of clusters. Related results in data analysis indicate that firms attend clusters for the educations conducted by cluster or mutual attendance to

defense fairs rather; mutual R&D, mutual production or common labor pool construction opportunities are neglected in the process. In the same way, clusters themselves are not aware of the cluster structure. For instance, only BASDEC, SAHA and OSSA have regional innovation system (RIS) structure, whereas based on the interviews clusters they explain that they do not check NIS while designing RIS. In fact, these non-profit organizations seem to be agglomerations rather than cluster. With our policy aim "promotion of clusters"; mutual R&D facilities, learning capabilities, mutual solutions for export regulation could be attained. Besides, capable personnel pool can be constructed. As a matter of fact, promotion of cluster would contribute to all; absorptive, innovative and adaptive capability of the firms and increase competitiveness. Besides, our policy aim would direct the clusters to link their RIS with NIS.

We defined two policy recommendations in order to promote cluster structure for Turkish Defense Industry; promote value chain and establish National Innovation System (NIS) and Regional Innovation System (RIS) link as shown in Figure 22. At the next section we focus on these recommendations and tools that answer how we apply the policy.

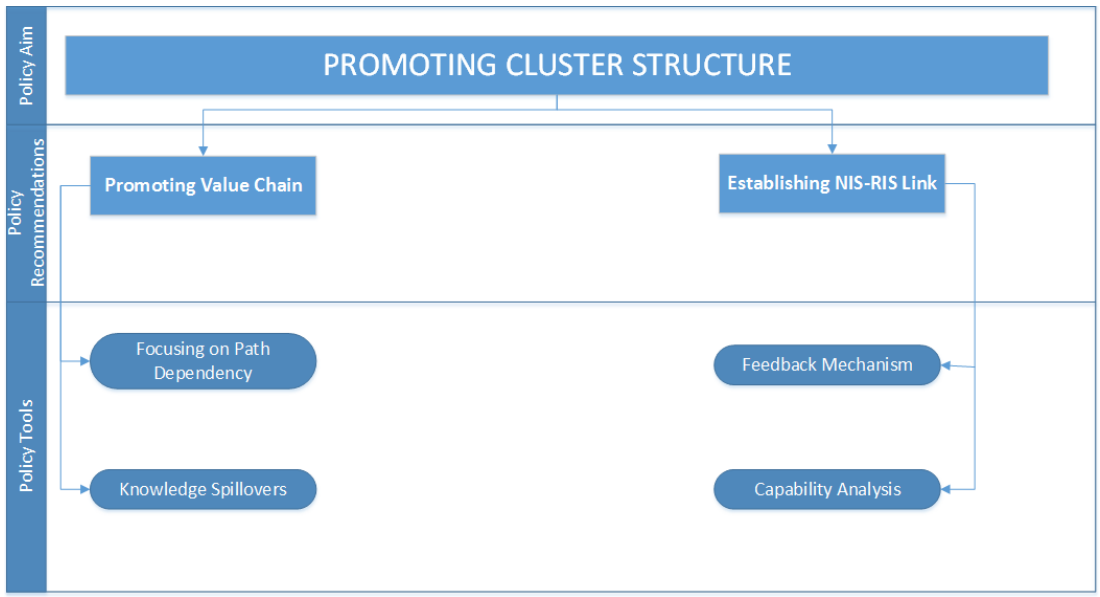


Figure 22 Methodology of 2nd Policy Aim: Promoting the Cluster Structure

6.2.1 Promoting Value Chain for Clusters

Clusters have important advantages such as mutual learning, knowledge spillovers, decreasing overhead cost and facilitate knowledge transfer from external sources. Cluster concept contributes the all aspects of dynamic capability. However, clusters cannot be created they are the natural result of repeated interaction with path dependent characteristics. For instance, Ostim has such background and despite some major problems Ostim Cluster OSSA could be a partial example which includes repeated interactions of agencies with value chain. New constructed clusters also have some value chain characteristics and they should focus on these characteristics in order to increase their effectiveness. In other words, supply chain is not enough to construct clusters rather value chain is more important which base on repeated interactions. Porter (1998) and Ozman (2009) discuss the advantages of being a part of cluster and role of value chain on these advantages, they state that value chain is more important than monetary values and in a cluster concept firms might depend on value chain instead of price.

In order to promote cluster concept in defense industry with value chain focus, we suggest two policy tools; focusing on path dependency and knowledge spillovers.

6.2.1.1 Focusing on Path Dependency

As explained before “clusters cannot be established manually” rather they are natural result of repeated interactions. Policies aiming to build up clusters are totally misleading approaches and as focused before this is just the current case for Turkish Defense Industry. Rather clusters are natural organizations that depend on path dependency and repeated interactions. This policy tool focuses on increasing the value chain of clusters by focusing on the path dependent characteristics of them. The question “how we succeed?” has multidimensional aspect.

From the government side SSM already supports clusters and encourages firm to join clusters, this support should be transferred to firm set with path dependent

characteristics. Besides, non-profit organizations should take into account the path dependency. For instance, there is a value chain in OSTIM organization that depends on the repeated interaction of firms from the past. Clusters that have just around Bursa, Eskisehir, Konya and Techno Park Clusters should focus on the path dependent characteristics of the firms while adding firm they could take into account this issue. From SSM side supports are provided for clusters such as; education, workshop, priorities in projects or attaining EYDEP to clusters with path dependent characteristics. By focusing on path dependence characteristics we expect to have natural structures that base on repeated interactions of the past.

On the other side, path dependent characteristics should not result in stopping knowledge spillover in that case cluster might go into lock-in. In order to get rid of lock-in problem, clusters need to get knowledge from outside. That means continuous knowledge spillover mechanisms should be constructed, so that sustainable knowledge transfer ensured for cluster. That is why as a next tool we focus on knowledge spillovers.

6.2.1.2 Knowledge Spillovers

Although in general clusters are stated to be context-specific, it is important to keep in mind that RIS model emphasizes the importance of being articulated to global chains without pure isolation to get rid of lock-in. That is to say clusters should be open to knowledge spillovers from outside and continuously increase absorptive capability. If it base repeated interaction and path dependency clusters provide the suitable environment for successful knowledge spillover, an externality of knowledge transfer from external sources received via pipelines.

Besides, as clusters cannot be created, the successful policy regarding clusters might be focused on governance of the clusters aiming the establishment of pipelines which enables continuous knowledge spillovers. Major actor for this role is the management

of clusters while depending on path dependency, pipelines should be preserved for knowledge spillover.

Effect of this tool would be preserving the knowledge flow through the cluster which used to base on past repeated interactions and provide a continuous knowledge diffusion to prevent lock-in.

6.2.2 Establishing Link Between National Innovation System (NIS) and Regional Innovation System (RIS)

A national system of innovation may be defined as; that set of different institutions which together and individually contribute to the development and distribution of new technologies and which provides the framework to implement policies for affecting the innovation process (Metcalfe, 1997).

Innovation is an evolutionary and stochastic process that innovation systems may change in time with an unpredictable way with their own dynamics. In case of knowing all the determinants of innovation, it is not possible to establish and control the innovation system. Countries may have different NIS regarding their type of funding private R&D, competence provision, management, incentives to entrepreneurs, etc.

Carlsson (2006) stated that companies' innovative activities are influenced by their national system of innovation in terms of;

- the quality of basic research,
- workforce skills,
- systems of corporate governance, the degree of competitive rivalry,
- local inducement mechanisms (abundant raw materials, the price of labor and energy, and persistent patterns of private investment of public procurement).

Turkey’s national innovation system and its reflections on defense industry is focused in Chapter 2. Defense Industry Executive Committee has the major role in this system in order to construct sustainable strategy. However, this strategy is not oriented on sustainable path for the last years due to the situations of Turkey. In 2015 border security was main issue and most of the projects are launched for border security but in 2016 Committee focus on aerospace projects. This focus in specific areas accumulates the whole sector on specific issue and subcontractor firms could not be able to adopt this. On the other hand, at the last meetings after 2015 supplier focus increased in order to construct the strong supplier ecosystem.

In order to make use of advantages of clusters NIS should be on a sustainable development path and RIS should be linked with NIS. This leads all sources moves for the same path and increases the effectiveness of clusters which will enable dynamic capability increase of the defense industry firms.

During our interviews with clusters we have figured out that their RIS does not designed compatible with NIS. In order to link RIS with NIS we suggest two policy tools as; feedback mechanism and capability analysis.

6.2.2.1 Feedback Mechanism

During the interviews with clusters we have seen all defense clusters construct their strategy independently and do not link with NIS. First policy tool related with NIS-RIS link is to strengthen the two way feedback mechanism between them. Especially for defense industry case this link should be focused. As we focused on chapter 2, Vision 2023 Science and Technology Strategies could be a good base for constructing this link. Vision 2023 designs the scientific and technological vision of Turkey and main goal of this strategy is to increase production power and competency in science and technology. This vision has been reflected to defense industry by SSM with “2007-2011 and 2017-2021 Defense Industry Sectoral Strategy Plans".

Actually, vertical integration characteristics of defense industry enables to construct this link easier, on the other side, backwards part of feedback is not effective as forward. In other words, expectations from the regional level cannot be reflected to upwards. Important feedbacks cannot be utilized as inputs for strategic decisions. Our interviews with regions revealed that they got support from SSM but they claim to construct the link backwards in order to share best practices or lessons learned from the regional level.

Major role in this tool belongs to SSM with periodical workshops with Defense Clusters two way feedback mechanisms can be constructed so that national vision could be reflected to regional vision and deficiencies of regional innovation system could be provided as feedback to national level. By constructing this, we expect a two way feedback mechanism is attained which could be a base for linking NIS-RIS.

6.2.2.2 Capability Analysis

Similar to the classification tool that we focused on 6.1.2.1 capability analysis aroused to be an important tool for NIS-RIS link either. As we mention in EYDEP, main motivation behind capability assessment is constructing the capability map of defense industry. This capability map is also important for constructing NIS-RIS link. If capabilities can be traced from the national level, national innovation can be designed by taking into consideration the RIS aspect. For this tool we suggest either EYDEP cover the whole industry or with auxiliary tools capabilities of firms should be traced centrally. During our interviews with defense industry clusters, we realized that all have capability matrix that classifies the firm in the cluster, but classification mainly refers to facility area rather than capability and it does not exist a standard measurement.

In conclusion, promoting cluster structure is quite important for dynamic capabilities of the suppliers, but for Turkish Defense Industry cluster structure should be

designed, by promoting value chain and by establishing NIS-RIS link. These actions would enable to promote past interactions and mutual learning, mutual R&D and production could be attained. This synergy could be utilized to decrease cost and increase capability. Besides, linking RIS with NIS would increase the effectiveness of clusters and outputs would be cumulative and traceable.

Related policy tools are suggested in order to decide the method to reach required policy aim. For these policy tools governments, non-profit organizations and firms have critical roles as shown in Table 14. By promoting the cluster structure defense industry could make use of clusters in much more efficient way.

Final policy is related with R&D focus which is already proven to be quite important at other chapters.

6.3 Third Policy Aim: Promoting R&D Focus

In general defense industry firms in Turkey devote approximately 7-8% of their revenue to R&D which is already 8-9 times of other industries. Although, it is seen as more depending on other industries it is still less compared to developed countries, which is around 11-12%. In fact, defense industry developments cannot be risked because if your technology is below your competitors that mean you are under threat. Especially for Turkey, having potential threats from various sides, Turkey needs to be more proactive and focus on R&D investments. More importantly, our findings related with R&D spending contributions on dynamic capability and it is found as the most effective item for increasing the competitive advantages of the firms with regression analysis and based on the interview findings.

When vertical integration focused outsourcing decision of main defense industry firm is effective on R&D focus of the supplier firm. As mentioned in semi-structured interview part, we have conducted interviews with main defense industry firms and detect that despite some defined procedures it does not exist a systematic make-or-

buy decision support in none of the main defense industry suppliers. For make-or-buy analysis of these firms, we suggest a make-or-buy decision system model for main defense industry firms.

Furthermore, during the interviews it is observed that most of the R&D houses started production due to financial concerns (9 out of 13 firms). In general they state that "it is not possible to remain in the business with sole R&D focus". In order prevent firms from losing R&D base, R&D focus policies should be suggested and make R&D design houses for specific cutting-edge technologies instead of production.

Another important finding is related with patent. As mentioned before since patent issue is neglected we have seen only 2 applications during pilot interviews since it could not provide any discrimination we exclude it from our analysis. On the other hand, as Narin et al. (1987) and Chang et al. (2012) explain patent as one of the main outputs of R&D. Moreover, 2017-2021 strategy document of SSM includes patent as one of the supporting issues.

Another important issue for promoting patent is incentives. In the interviews 69% of firms find incentive mechanism as complex and they mention that they do not benefit from incentives from the R&D perspective. In the same way interviews with KOSGEB indicated that KOSGEB also is not satisfied with the effects of the incentives and looking for improvements for the process.

In summary based on this process we have suggested promotion of R&D focus with related branches. For promoting R&D focus main defense industry firms has major role while outsourcing work packages. If a decision support mechanism is constructed for these firms, they could be able to make allocation so that R&D focus could be promoted. Besides, patent have important effect for R&D and it is at the main focus of SSM. Finally, incentives are quite important to promote the R&D focus on the firms.

Summary of policy recommendations and policy tools are given in below Figure 23.

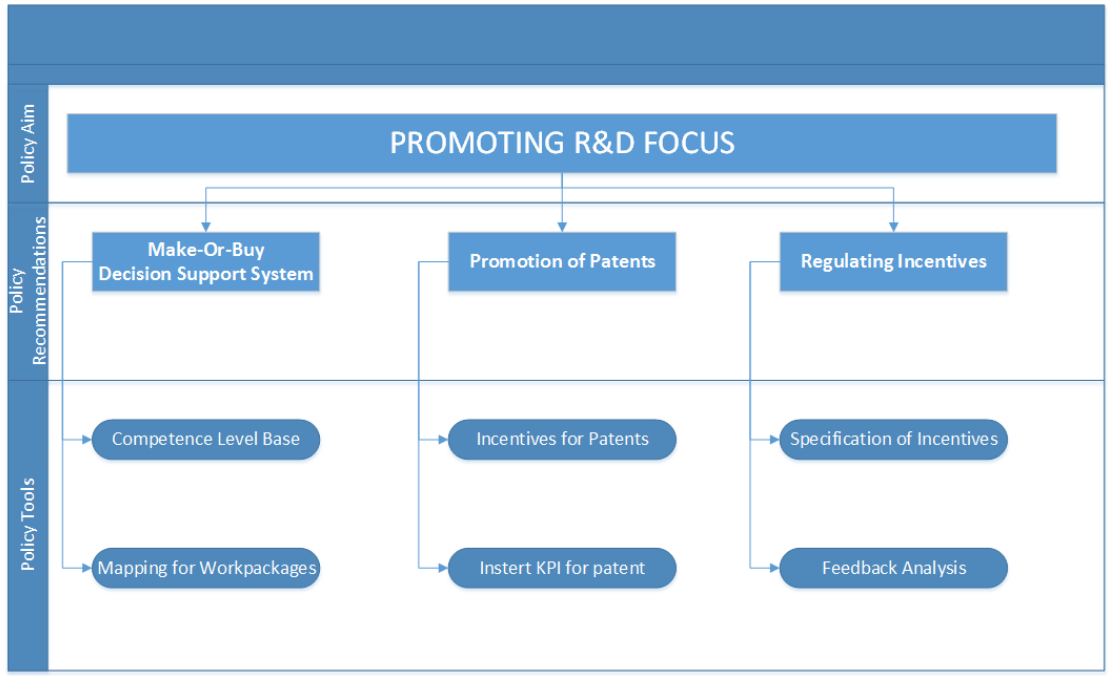


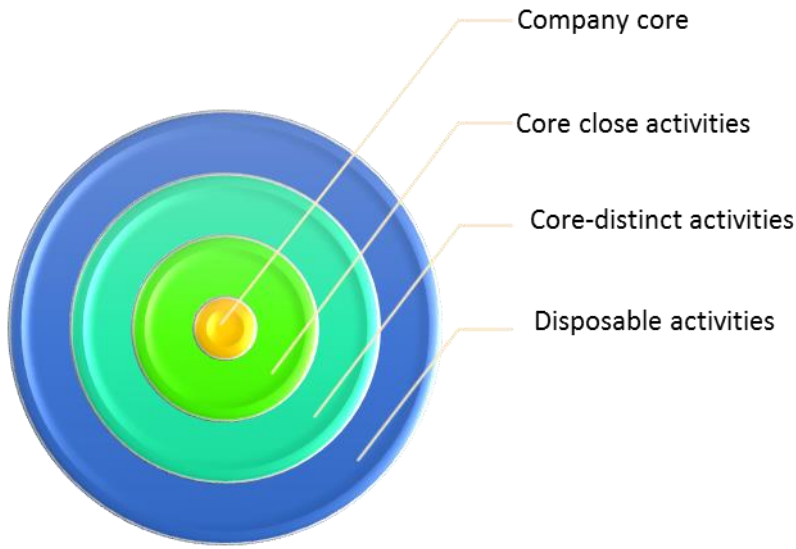
Figure 23 Methodology of 3rd Policy Aim: Promoting R&D Focus

In order to promote R&D focus we recommend make-or-buy decision support system, promotion of patents and regulating incentives. Besides for each recommendation we define policy tools to respond "how" policy aim can be succeeded.

6.3.1 Construction of Make-or-Buy Decision Support System

If we turn to our core aim of detecting the capability contribution of main defense industry firms on their supplier, main action lies beneath the make-or-buy decision of main defense industry firm. Outsourcing subject is the economic institution which plans to outsource (or not). The subject has to make the strategic outsourcing decision. Outsourcing objects are processes or process results which might be outsourced. This outsourcing decision determines the capability building of supplier firm.

With regard to the activities of a company activities distinguish between as shown in Figure 24; (1) the company core (all activities which are necessarily connected with a company's existence), (2) core-close activities (directly linked with core activities), (3) core-distinct activities (supporting activities), and (4) disposable activities (activities with general availability). The core competencies approach tries to answer these questions.



Source: (Arnold, 2000)

Figure 24 Outsourcing Subject

Main idea is that only goods and services which are considered to be core competencies should be conducted internally (insourcing). In fact core competencies combine three elements:

- In the view of the customers their characteristics must be relevant. They differentiate between the company and its competitors.
- To gain competitive advantage, resources and know-how for the product must be unique over time. It must be possible to protect it against imitation by competitors over time. So a competitive advantage must be sustainable.
- Only if these resources are usable for multiple critical purposes, they are core competencies and should remain within a company.

A policy approach is suggested origin of which stems from the studies of Baykal and Aslan which is presented at Project Management Institute Global Congress (May 2017, Rome). This approach facilitates the make or buy decision process and provides a decision support system for main defense industry firms. In order to succeed this model two distinct policy tools are recommended; competence level base and mapping for work packages. These tools lead us how we realize the policy.

6.3.1.1 Competence Level Base

In order to construct effective make-or-buy analysis system competence level base is an important policy tool. Competency level of each activity is calculated based on the level of integrity with core competencies. In this tool, each activity is related with one or more core competencies of the firm or it could be out of core competencies or this relation could be partial. The method for calculation competency level is summarized in Table 13.

Table 13 Calculation of Competency Level

PROJECT	Core Competency#1	Core Competency#2	Out of Core Competence	
Work Packages	Level of competence	Level of competence	0	Competency Level
WP1	Weight of Relation (wp1c1)	wp1c2	Wp1c0	CL1

where;

WP1: Work Package 1

Wp1c1: weight of relation work package 1 with core competency 1.

LC1: Level of competence for core competency 1.

CL1: competency level of work package one.

Then, for work package 1 competency level can be calculated with formula below.

$$CL1=(wp1c1*LC1)+(wp1c2*LC2)+..... (wp1cn*LCn)+(0*wp1c0) \quad \textbf{(3)}$$

where,

$0<Wpici<1$ and

Wp1c1 + Wp2c2 + ….+ Wpncn + Wp1c0 = 1 and
i is 1,2,3……n.

Weight of relation is a number between 0 and 1 and total of all weights should be 1. By utilizing this methodology competency level of each work package is calculated. After computing competence levels next step would be inserting work packages on analytical plane based on cost and competency level as it is focused at the next section.

6.3.1.2 Mapping for Packages

Another important tool how we realize make-or-buy decision support system is mapping work packages. After calculating competency levels, depending on competency level and cost each activity is reflected on analytical plane and by moving on the plane depending on the resource or other constraints outsourcing decision can be conducted. Figure 25 shows a decision support problem just based on single parameter, resource allocation.

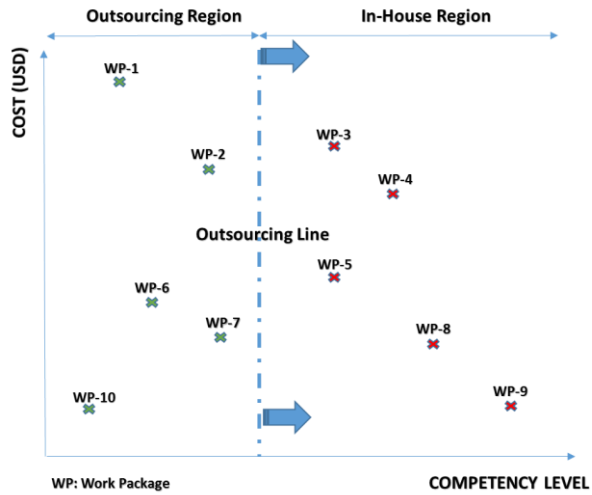


Figure 25 Make or Buy Decision Support System (Simple Constrained)

Main idea behind this mapping model is that as line moves in the plane each activity faced deploy the resources and once allocated resources finished the line stops and outsourcing and in-house regions are decided. However, resource is not the single

constraint there might be other resources. As the complex case, offset obligation is added as constraint, which is the most important obligation for defense industry projects while making outsourcing decision.

As an example focusing on a defense project which has seven work packages with offset obligation, there would be two lines moving in order to decide outsourcing decision. Firm has to conform both resource and offset constraints. Line movement in Figure 26 indicates that WP-3 and WP-6 should be outsourced to keep core competencies and complying the offset constraints.

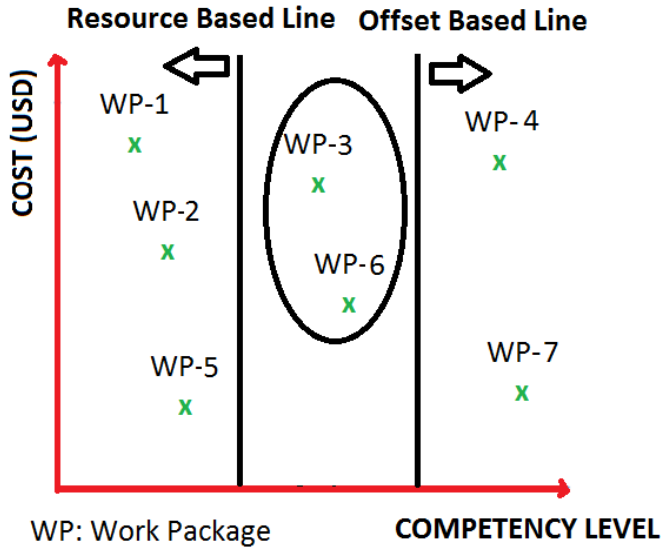


Figure 26 Make or Buy Decision Support System (Multiple Constrained)

This tool would make firm to have an analytical outsourcing decision support system. Main motivation of developing this tool is making main driving firms focus on their core competencies and outsourcing the items accordingly while complying constraints and obligations so that R&D focus could be obtained. By applying this tool, main defense industry firm could make outsourcing allocation with a systematic manner and focus on core R&D issues instead of sub work packages that do not add value to competency of the firm. Results of these systematic would increase R&D both at supplier level and at main defense industry level.

6.3.2 Promotion of Patents

As we analyzed in the literature section, patent application is a useful parameter for capability assessment. Even if we neglect patent issue in our analysis, in the literature studies indicate that patent focus has positive effect on all dynamic capability parameters. On the other hand, during pilot interviews among 18 firms we detected only 2 patent applications in total. A common answer for patent question is "confidentiality problem" or "keeping the product confidential". As a result, patent questions are omitted from our interview questions. During the interview with Airbus, which is the 7th biggest defense industry company in the World with 12 billion revenue in 2016, Airbus responsible states that patent is one of the most important performance parameters among different branches. Airbus claims that "patent is the sign of our innovativeness it is the most useful and traceable output of innovativeness". Besides the SMEs that are interviewed in China has at least over hundred approved patents and around same amount applications. These SMEs are the successful outlier SMEs that are selected from different Chinese firms. Below Figure 27 is obtained from one of these SMEs, and picture is more or less similar in all SMEs.

Figure 27 Patent Wall from a Chinese Defense SME

That means confidentiality should not be an excuse for patent application, which is quite important for R&D focus and for dynamic capability. Necessary policy tools suggested; incentives for patents and define patent as key performance index.

6.3.2.1 Incentives for Patents

For Turkish Defense Industry, in the last years, attempts for patent application started especially by main driven firms. Necessary policy steps should be implied, by giving incentives for patent application of defense companies in order to distribute this focus to supplier firms either. Therefore, we decided our first policy tool related with patent as incentives. As given in Appendix A, in 2014 TUBITAK started 1602 Patent Support Program, besides KOSGEB Techno market and Techno investment programs in spite of not giving direct support provides priorities to patent applications. On the other hand, these incentives do not respond to the requirements of firms. During interviews firms state that there is no point in applying for patent because it does not add value to business besides it causes technology leaks to outside and it costs to the firm. As a policy tool we suggest two distinct incentive mechanisms. First of all,

successful patent application in defense could be honored by SSM by defining price for each patent. How it is going to be achieved? We suggest an iterative structure for this. First of all each successful patent application for Turkish Patent Institute (TPE) can be defined a price. Besides, extra incentives could be defined for; World Intellectual Property Organization (WIPO), European Patent Office (EPO) or United States Patent Office (USPTO) by SSM. In this approach main driven firm take responsibility and support supplier firm. Secondly, patent application process is tedious and costs to the firm. SSM could support firms by meeting patent application costs and by providing trainings related with patent applications. Supporting patent could not be enough it should also be inserted as performance parameter for defense firms as explained in the next section.

6.3.2.2 Define Patent as Key Performance Index (KPI)

We suggest another tool for promoting patent as "defining patent as KPI". As already focused firms are reluctant to apply for patent since the effort given seems to be worthless. In order to encourage firms to apply, patent application should be inserted as KPI in the vertical integration. Major roles belong to SSM and main driven industry firms. From the SSM side weight of EYDEP already includes patent questions but its weight could be increased. Besides, main defense industry firms could insert patent questions to their supplier evaluation criteria.

To sum up, patent policy is directly related with the vertical integration characteristics of defense industry, if it is adopted by SSM and main defense industry firms, captive suppliers certainly contribute the process. Focusing on patent will contribute to the R&D focus and dynamic capabilities of firms with all three aspects.

6.3.3 Regulating Incentives

During the interviews with KOSGEB, they complained about the effect of incentives. Main problem behind this complaint is that KOSGEB used to give incentives both for

restaurant and high-tech industries with the same manner, there was a lack of specification of incentives. Moreover, interviews with firms also reveal that they could not make use of incentives from R&D perspective. We have defined two policy tools that focus around specification of incentives and feedback analysis.

6.3.3.1 Specification of Incentives

Based on our interview results we have seen that one of the major tools to regulate incentives in order to promote R&D focus is specification of incentives. If incentives are classified and provided with suitable firms, effectiveness would be better. For instance, there is not a direct incentive for defense, rather as can be seen in Appendix A there are lots of incentives that a defense industry can utilize from general set. While reviewing the incentives in related chapters of Appendix A, it can be observed that "who can apply" section is usually crowded and not specific. Without specification it could not be possible to detect the real incentive area.

Currently KOSGEB is working on specific incentives for high-tech incentives. In order to increase dynamic capabilities of firms, KOSGEB should focus the incentives and suggest even defense specific R&D based solutions. Same situation is also valid for other incentives; TUBITAK or other government incentives need to focus the incentive area for R&D in order to make contributions for the dynamic capabilities of the defense industry supplier firms. So that R&D focus and dynamic capabilities of firms could increase and this can be strengthen by feedback analysis.

6.3.3.2 Incentive Feedback Analysis

Another critical tool for incentives is feedback analysis of previous incentives. Feedback analysis includes analyzing the effects of previous incentives by comparing the outputs with desired outcomes. Interviews with KOSGEB revealed that such an analysis is not conducted for KOSGEB incentives, this situation is same with other stakeholders.

By utilizing feedback analysis effectiveness of incentives can be increased. Major role for conducting impact analysis is the owner of incentive; KOSGEB, TUBITAK or related ministry etc. By feedback analysis required feedbacks can be obtained and incentives can be designed accordingly.

Main tool for inserting feedback analysis is the instructions of the related organizations that describe incentives. Inserting feedback analysis will provide a comprehensive feedback related with effects and benefit of incentives. Having such knowledge could increase the effects of future incentives.

Applying these policy tools would increase the effectiveness of incentives so that incentives can be utilized better for promoting R&D.

In summary having found as the most effective parameter on competitive advantage for defense industry firms, we define promoting R&D focus as third policy aim. For this policy aim firstly make-or-buy decision support system is suggested for main-defense industry firms in order to increased not only R&D focus of supplier firms but also main defense industry firms. Next, we focus on patents as another tool that should be focused in order to increase R&D focus. Finally, we present incentives as another mechanism that should be regulated to increase R&D focus. By applying this policy aim, we expect R&D focus to increase, which is the most effective parameter of dynamic capability that contributes to competitive advantage.

In this policy part we have defined; 3 policy aims, 8 policy recommendations and 17 policy tools in order to increase the dynamic capabilities of suppliers. Below Table 14 summarizes whole policy aims, recommendations and tools together. Besides, coordinator of policy tool is also inserted into this table.

Table 14 Policy Aims, Recommendations, Tools and Responsible Summary

Policy Aims	Policy Recommendations	Policy Tools	Main Coordinators
Regulating SME Supporting Structure	Configuring SME Constraint	Relaxing SME Constraint for High-Tech Ind.	Government - SSM
		Defense Specific SME Definition	Government - SSM
	Defining Panel Set	Utilizing Firm Classification	SSM-Main Defense Industry Firms
		Obligating Certain Assets	SSM-Main Defense Industry Firms
	Encouraging Spin-Off	Nursing Market	SSM
		Tax Incentives	Government – SSM, TUBITAK and KOSGEB
		Project-Base Spin-Offs	Main Defense Industry Firms
Promoting the Cluster Structure	Promoting Value Chain	Focusing on Path Dependency	SSM-Defense Clusters
		Knowledge Spillovers	Defense Clusters
	Establishing NIS-RIS Link	Feedback Mechanism	Government – SSM, Defense Clusters
		Capability Analysis	Government – SSM, Defense Clusters
Promoting R&D Focus	Make-or-Buy Decision Support System	Competence Level Base	Main Defense Industry Firms
		Mapping for Work Packages	Main Defense Industry Firms
	Promotion of Patents	Incentives for Patents	Government – SSM, TUBITAK and KOSGEB
		Insert KPI for Patent	SSM-Main Defense Industry Firms
	Regulating Incentives	Specification of Incentives	Government – SSM, TUBITAK and KOSGEB
		Impact Analysis	Government – SSM, TUBITAK and KOSGEB

By applying these policy tools; SME structure could be regulated, real cluster structure can be constructed and R&D focus can be promoted. All of these actions expected to have positive effect on dynamic capabilities, meaning competitive advantages of supplier firms. Having decided required policy tools in the next chapter we make the conclusion.

CHAPTER 7

CONCLUSION

7.1. Research Findings and Analysis of Results

Main goal of this thesis is to figure out the capability contribution of main defense industry firms on their captive suppliers, which means suppliers highly dependent on them due to vertical integration structure of defense industry. Novelty of the study comes from being one of the first capability assessment studies with a defense industry context. On the other hand, we have faced important difficulties throughout the study. At first, we try to contact directly with firms, but firms did not contribute to the study voluntarily especially due to confidentiality concern. Afterwards, we got the supports from stakeholders such as; SSM, SASAD, TSKGV, main defense industry firms and defense industry clusters and then obtain required data from supplier firms for their capability assessment.

While making the assessment dynamic capability is utilized. Because dynamic capability not only implies competitive advantage but also it enables a comprehensive capability analysis for high-tech industries which are quite crucial for defense industry.

Dynamic capability includes three distinct capabilities; absorptive capability, innovation capability and adaptive capability. There exist various studies related with these capabilities either distinctly or combination of them. Measurement structures and assessment methods already verified in different high-tech industries such as pharmaceutical, semi-conductor or computer industries. Based on these literature, measurement parameters are selected such that; R&D spending for absorptive

capability, new product ratio for innovative capability and exporting capability for adaptation, which are commonly studied previously.

First of all, we compared our thesis with the development of Turkish Defense Industry. In the scope of this development firstly, even during the recession times of new republic defense investments started around 1925 and some concrete results obtained at the beginning of 1940s. Then foreign aid based defense policy prevent Turkey from developing national defense industry and this situation continued until Cyprus Problem. During Cyprus Problem Turkey could not use foreign weapons and hit own ship with own plane due to communication problem and these situations had made Turkey to develop own defense industry. Firstly ASELSAN constructed and then at 1985 SSM has been constructed. SSM focused on localization issues and through 2000s lots of projects conducted with main defense industry firms. Beginning with 2000s SSM focus start to shift suppliers and focus on constructing strong supplier ecosystem. Current situation of these developments are industrialization triangle and EYDEP which are supplier capability based. Therefore, with its supplier capability focus our thesis just confronts with developments of Turkish Defense Industry.

As explained before dynamic capability perspective is applied to detect contribution on the supplier firms with its comprehensive structure. Another important issue is tailoring capability assessment to measureable parameters. In order to do so, we link our questions with related literature. Based on the literature we have used R&D spending for detecting absorptive capability, we utilized new product development for detecting innovation capability and we link adaptive capability questions to export values to measure capabilities. In addition to this, we have analyzed capability issue with an evolutionary manner from data, information and knowledge to capability and from the capability perspective from RBV (Penrose 1959) to dynamic capabilities (Teece 1997). Moreover, we divide literature in two parts and while focusing abovementioned issues in the theoretical part we focus on empirical studies related with dynamic capability at the empirical literature.

Having decided parameters next step is constructing methodology. Since dealing with defense industry, one of the main concerns is keeping confidentiality that is why we used one-to-one interview method for gathering information. Based on the methodology followed; first issue is the design of interviews questions and then we focus on the selection of firms for interview. After selecting firms, pilot interviews conducted and afterwards field interviews, which we collect the data, are conducted. We progress our analysis by face to face meetings with the firms. Beside firms we also conduct semi-structured interviews with other actors such as; main defense industry firms, SSM, KOSGEB, defense industry clusters; OSSA, SAHA, ESAC, TSSK, Konya Defense Cluster and BASDEC.

Afterwards, before producing results we analyze data from validity and reliability perspective and verified that quantitative data is valid and reliable. Then, we check for the supports related with hypothesis. First of all, we look for the interviews of supplier firms, in which we conduct meeting with the high-level managers of the firm. Results from these interviews indicate that according to firms working with defense industry certainly contributes to their all absorptive capability, adaptive capability and innovation capability parameters. Then we utilize comparative graph, and correlation table analysis. These results also indicate that working with defense industry is correlated with the capability development. Finally, we conduct regression analysis in order to verify our findings. Obtained results indicate that all dynamic capability parameters are effective and most effective parameter is R&D spending. In summary, both obtained results and regression analysis indicate that those firms with higher defense have higher dynamic capabilities than those dealing with civil business. Because results indicate that working with defense has positive effects on all parameters of dynamic capability; absorptive capability, adaptive capability and innovation capability.

When compared with the literature our findings are compatible with Wang and Ahmed (2007) findings. Besides compared to another similar study Saulina et al.

(2014) in which innovation capability is stated effective for high-tech industries also verified. Besides our study verifies all single dimension absorptive capability, innovation capability or adaptive capability contributions conducted for high-tech industries also for defense industry. Generally in the literature there were not opponents rather neutrals or undetermined studies like Calantone et al. (2002). They stay neutral in the debate and indicate that innovation capability might have positive or negative effect on firm performance. Because innovation may be source of cash flow of firms, on the other hand innovation means heavy investments and might take long time to realize the return and reach up to breakeven. Our findings approves the latter part of this argument. In fact, we find that innovation investment worth to it specifically for defense industry. From the view of dynamic capability and competitive advantage relation our findings are also similar with Teece et al. (1997) in which it is stated that firms with high R&D and new product are more compatible. Besides, defense industry working ratio and revenue based competitiveness regression analysis results verify the Figure 14 of Wang and Ahmed (2007).

Detecting the contribution of main defense industry is an important aspect, but we also focus on the policy implications in order to increase dynamic capabilities of the firms based on interview findings. During policy implication besides structured interviews we also make use of semi-structured interviews with; main defense industry firms, SSM defense industry clusters and KOSGEB.

First of all, our findings from semi-structured interviews indicate that there exist problems in SME supporting structure starting from the definition, besides firms complain about RBV view of tenders and finally new constructed firms cannot join the market and constructing spin-off keeps problems in it. That means SME supporting structure should be regulated. Based on these findings we suggest a policy aim “Regulating SME Supporting Structure”. With this policy aim we expect SME structure is regulated with suitable SME definition for sector, incapable firms are omitted from tenders and capable firms are focused, besides, spin-offs are encouraged. These actions would enable to construct related capability based

industrialization triangle, capable firms would sustain in the market and enables capable spin-offs arouse in the market.

Besides, our interview findings with firms and semi-structured interview findings with defense industry clusters and main defense industry firms designate that defense industry clusters are not utilized with their real value rather an agglomeration structure is valid. Besides, RIS of these clusters are independently designed and has no link with NIS. That means cluster structure is neglected and it should be promoted its real structure. Thus, we suggest the policy aim as "Promoting the Cluster Structure". We support this policy aim with value chain based approach method and establishing NIS-RIS link. This policy aim is designed to promote real cluster with; past interactions, mutual learning, and mutual R&D and production concept in the sector. Hence we expect a synergy occurrence and mutual capability development for supplier firms.

Finally, results indicate that R&D spending is the most effective parameter for dynamic capability building of firms and correlations also verified this finding. Besides, there is an important focus for R&D by SSM. Therefore, R&D focus should be promoted. Main parameters for this promotion is decided as; constructing make-or buy decision system for main defense industry firms, promotion of patents and regulating incentives in such a way to promote R&D. By applying this policy aim, we expect R&D focus and dynamic capability of the firms are increased.

In summary, with this thesis we find important evidences to support the capability contribution of main defense industry firms on their suppliers. Besides, interviews and semi-structured interviews enable important platform to gather information from all the stakeholders and enable us to find important results that lead us to the policy recommendations.

As a final sentence we can say that "main defense industry firms contribute to the capabilities of their suppliers, but it could be made better".

7.2. Directions for Future Studies

This thesis generates important feedbacks related with the capability contribution of main defense industry companies on their suppliers by taking into consideration whole stakeholders in the sector. By conducting interviews with these distinct actors important results obtained and important policy recommendations are inferred. We have shown that main defense industry has significant contributions on dynamic capabilities of supplier firms with all three aspects; absorptive capability, innovative capability and adaptive capability. On the other hand, there still exist tools in order to increase this contribution, which we indicate as policy tools.

There is no such comprehensive study in the literature that examines the Turkish Defense Industry from that capability contribution perspective. Besides, by conducting interviews instead of survey important data gathered from stakeholders which are normally quite hard for defense industry. Validation and reliability of data analysis designate the quality of interview data.

In addition to these contributions, this thesis opens new ways for future researches. First of all, for the defense industry perspective, since dealing with dynamic environment and since lots of incentive mechanism, EYDEP or industrialization triangle at their design stages their effect could change the results in the near future. Therefore, we suggest that same analysis might be conducted after a few years and results can be compared with this study. This effort will not only measure the capability but also will provide feedbacks related with the effects of these actions. Moreover, we conduct the research by considering main defense industry firms as a whole, whereas capability contribution of each firm could be differentiated by gathering data by firm discrimination, so that, effects of firms on supplier capability can be compared with each other.

Furthermore, as we conducted research for Turkish Defense Industry same analysis can be conducted for other industries either. For instance, it can be done for automotive industry and it can be analyzed that whether main automotive firms contribute to their suppliers or not. Another sector could be home electronics, in which again there exist main firms and their suppliers. Another output of these studies might be comparison of sectors with each other and compare the policies, such that; checking the effect of offset policies.

REFERENCES

Alvarez V.S., Merino T.G., The history of organizational renewal: evolutionary models of Spanish savings and loans institutions. Organization Studies, 24(9), 1437-1461, (2003)

Amit R., Schoemaker P.J.H., Strategic assets and organizational rent. Strategic Management Journal, 14(1), 33-46, (1993)

Arnold U., New dimensions of outsourcing: a combination of transaction cost economics and the core competencies concept, European Journal of Purchasing & Supply Management, 6(1), 23-29, (2000)

Barney J.B., Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120, (1991)

Barton D.L., Wellsprings of Knowledge. Boston, MA: Harvard Business Press, (1992)

Basberg B., Patents and the Measurement of Technological Change: A Survey of the Literature, Research Policy, 16 (2-4), 131-141, (1987)

Baykal S., Aslan M., Make-or-Buy Decision Support System for Defense Industry, Presented: PMI EMEA Congress, 01-03 May 2017

Brian A.W., "The nature of Technology", New York: Free Press, p.28 ISBN: 978-1-4165-4405-0.

Calantone R.J., Cavusgil S.T., Zhao Y., Learning orientation, firm innovation capability, and firm performance, Industrial Marketting Management, 31(6), 515-524, (2002)

Carlsson B., Internationalization of Innovation Systems: a Survey of the Literature. Research Policy, 35, 56-67, (2006).

Chakravarthy B.S., Adaptation: a promising metaphor for strategic management. Academy of Management Review, 7(1), 35–44, (1982)

Chang K.C., Chen D.Z., Huang M.H., The relationships between the patent performance and corporation performance, Journal of Informetrics, 6(1), 131-139, (2012)

Clauss T., Spieth P., Treat your suppliers right! Aligning strategic innovation orientation in captive supplier relationships with relational and transactional governance mechanisms, R&D Management, 46(S3), 1044-1061, (2016)

Cockburn I., Henderson R., Stern S., Untangling the origins of competitive advantage. Strategic Management Journal, 21, 1123–1145, (2000)

Cohen W.M., Levinthal D.A., Absorptive Capacity: A New Perspective on Learning and Innovation, Administrative Science Quarterly, 35(1), 128-152, (1990)

Cronbach, L. J., Coefficient alpha and the internal structure of tests, Psychometrika, 16 (1), 297-334, (1951)

Deeds D.L., DeCarolis D., Coombs J., Dynamic capabilities and new product development in high tech ventures: an empirical analysis of new biotechnology firms. Journal of Business Venturing, 15, 211-229, (1999)

D'este P., The distinctive pattern of capabilities accumulation and inter-firm heterogeneity: the case of the Spanish pharmaceutical industry, Industrial and Corporate Change, 11, 847-874, (2002)

Dosi G., Nelson R.R., Handbook of the Economics of Innovation, 51-127, (2010)

Gibson C.B., Birkinshaw J., The antecedents, consequences, and mediating role of organizational ambidexterity. Academy of Management Journal, 47(2), 209–226, (2004)

Eisenhardt K., Martin J., Dynamic capabilities: What are they?, Strategic Management Journal, 21(10-11), 1105-1121, (2000)

Forbes N., Wield D., From Followers to Leaders Managing Technology and Innovation in Newly Industrializing Countries, Routledge, (2003)

Griliches Z., Patent statistics as economic indicators: A survey, J.Econ. Lit., 28, 1661-1707, (1990)

Helfat C.E., Know-how and asset complementary and dynamic capability accumulation: the case of R&D. Strategic management journal, 18, 339-360, (1997)

Inan G., Bitici G., Understanding Organizational Capabilities and Dynamic Capabilities in the Context of Micro Enterprises: A Research Agenda, Procedia – Social and Behavioral Sciences, 210, 310-319, (2015)

Kaiser, H. F., An index of factorial simplicity, Psychometrika, 39 (1), 31–36. (1974)

Liew A., Understanding Data, Information, Knowledge and Their Inter-Relationships, Journal of Knowledge Management Practice, 8(2), (2007)

Lu Y., Zhou L., Bruton G., Li W., Capabilities as a Mediator Linking Resources and the International Performance of Entrepreneurial Firms in an Emerging Economy", Journal of International Business Studies, 41(3), 419-436, (2010)

Luo Y., Dynamic capabilities in international expansion. Journal of World Business, 35(4), 355-378, (2000)

Madhok A., Osegowitsch T., The international biotechnology industry: a dynamic capabilities perspective. Journal of International, Business Studies, 31(2), 325–335, (2000)

Majumdar S.K., Sluggish giants, sticky cultures, and dynamic capability transformation. Journal of Business Venturing, 15 (1), 59-78, (1999)

Merriam-Webster Dictionary, "Definition of Technology", Retrieved 15 March 2016

Merriam-Webster Dictionary, "Definition of Success", Retrieved 12 January 2017

Metcalfe S., Technology Systems and Technology Policy in an Evolutionary Framework.in: Archibugi, D., Michie, J. (Eds.), Technology, Globalization and Economic Performance. Cambridge University Press, 268–296, (1997)

Narin F., Noma E., Perry R., Patents as indicators of corporate technological strength, Research Policy, 16, 143–155, (1987)

Oktemgil M., Gordon G., Consequences of high and low adaptive capability in UK companies. European Journal of Marketing, vol. 31(7), 445–466, (1997)

Ozman M., Inter-Firm Networks and Innovation: a Survey of Literature, Economics of Innovation and New Technology, 18(1), 39-67, (2009)

Pegels C., Thirumurthy M., The impact of technology strategy on firm performance, IEEE Trans. Eng. Manage., 43, 246–249, (1996)

Penrose, E. T., The Theory of the Growth of the Firm. New York: John Wiley, (1959)

Petroni A., The analysis of dynamic capabilities in a competence-oriented organization. Technovation, 18(3), 179–189, (1998)

Phan K., Innovation Measurement: A Decision Framework to Determine Innovativeness of a Company, Dissertations and Theses, (2013)

Rugman, A. M., Verbeke, A., 'Edith Penrose's contribution to the resource-based view of strategic management'. Strategic Management Journal, 23(8), 769–780, (2002)

Porter M., Competitive Advantage: Creating and Sustaining Superior Performance. New York: Free Press, (1985)

Porter M., The Competitive Advantage of Nations. Free Press, New York, (1998)

Potters L., "Innovation Input and Output: Differences Among Sectors," Communities, 10, 38, (2009)

Rindova V.P., Kotha S., Continuous 'morphing': competing through dynamic capabilities, form, and function. Academy of Management Journal, 44(6), 1263-1280, (2001)

Rowley J., The wisdom hierarchy: representations of the DIKW hierarchy, Journal of Information and Communication Science 33, 163-180, (2007)

Saulina M., Ukko J., A conceptual framework for the measurement of innovation capability and its effects, Baltic Journal of Management, 7 (4), 355-375, (2012)

Saulina M., Ukko J., Rantanen H., Does Innovation Capability Really Matter for the Profitability of SMEs?, Knowledge and Process Management, 21(2), 134-142, (2014)

Scherer F., The propensity to patent,"Int. J. Ind. Org., 1, 107–128, (1983)

Schoenecker T., Swanson L., Indicators of Firm Technological Capability: Validity and Performance Implications; IEEE Transactions on Engineering Management, 49(1), 36-44, (2002)

Schumpeter J.A., The Theory of Economic Development. Cambridge, MA: Harvard University Press, (1934)

Serfati C., The relationship between military and commercial technologies: an empirical and analytical perspective, The Genesis of Innovation: Part II Military Based Networks, 115-145, (2008)

Staber U., Sydow J., Organizational adaptive capacity: a structuration perspective. Journal of Management Inquiry, 11, 408-424, (2002)

Stockholm International Peace Research Institute (SIPRI) Year Book, (2016)

Teece D. J., Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance. Strategic Management Journal, 28, 1319–1350, (2007)

Teece D. J., Pisano G., Shuen A., Dynamic Capabilities and Strategic Management", Strategic Management Journal, 18(7), 509-533, (1997)

Undersecretariat for Defense Industries (SSM); Offset Guide Book (2011-2016), 2010

Undersecretariat for Defense Industries (SSM); Technology Management Strategies (2011-2016), 2010

Undersecretariat for Defense Industries (SSM); Strategic Plan (2007-2011), 2010

Undersecretariat for Defense Industries (SSM); Strategic Plan (2017-2021), 2016

Uzzi B., Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness, Administrative Science Quarterly, 42 (1), 35-67, (1997)

Vega-Jurado J., Gutierraz-Gracia A., Fernandez-de-Lucio I., Manjarres-Henriquez,L. The Effect of External and Internal Factors on Firms' Product Innovation, Research Policy, 37, 616-632, (2008)

Verona G., Ravasi D., Unbundling dynamic capabilities: an exploratory study of continuous product innovation. Industrial and Corporate Change, 12, 577–606, (2003)

Wall K., Successful Approach for Improving Innovation Management for SME's, Innovation Management, (2010)

Wang C.L., Ahmed P.K., The development and validation of the organizational innovativeness construct using confirmatory factor analysis. European Journal of Innovation Management, 7(4), 303–313, (2004)

Wang C.L., Ahmed P.K. Dynamic Capabilities, A review and research agenda, International Journal of Management Reviews, 9(1), 31-51, (2007)

Wei C.C., The Data-Information-Knowledge Continuum, Web Work: Information Seeking and Knowledge Work on the World Wide Web, (2000)

Wernerfelt B., A resource based view of the firm, Strategic Management Journal, 5(5), 171–180, (1984)

Zahra S., George G., Absorptive capacity: a review, reconceptualization, and extension. Academy of Management Review, 27(2), 185-203, (2002)

APPENDICIES

A. INCENTIVES FOR DEFENSE INDUSTRY

Ministry Of Transportation, Maritime Affairs and Communication R&D Project Support	***Support Name***	Supporting R & D Projects in Electronic, Communication, Aerospace and Aviation Sectors
	Type of Support	Grant
	Who Can Apply	University * Universities that carry out R & D projects in areas where MoTMAC is responsible * Associate's degree Private Sector * Companies that carry out R & D projects in areas where MoTMAC is responsible * Associate's degree
	Purpose and Scope	Supporting and monitoring R & D projects and training activities regarding domestic design and production on electronic communication, space and aviation area.
	Support Items	Material expenditures used in the project, Tools, machinery, equipment, software and hardware expenses, Fees paid to the project manager and staff Expenses for laboratory test and analysis Expenses for consultancy and training services.
	Support Duration	36 (+12) months
	Support Amount	No upper limit (75%)
	Application Period	By call

TÜBİTAK

SaSaD
Defence and Aerospace Industry Manufacturers Association

TÜBİTAK - 1003

Support Name	1003- Primary Subjects R&D Funding Program
Type of Support	Grant
Who Can Apply	University *The degree of PhD/ Expert in medicine. Private / Public Organizations *Bachelor's degree
Purpose and Scope	To support and coordinate national R & D projects which are result oriented, have traceable targets and observe the dynamics scientific and technological fields In medium and large scale projects university- industry cooperation is anticipated.
Support Items	Tools, machinery, equipment, software and broadcasting expenses, Material and consumables expenditures Expenses for consulting and service procurement Maintenance and repair expenses of the devices used in the project Travel expenses (domestic/international) Postal and transportation expenses Auxiliary staff expenses Scholarship expenses Project promotion bonus Institution share Dissemination Expenses Other costs directly or indirectly related to the project.
Support Duration	Up to 36 months
Support Amount	500.000 TL – 2.500.000 TL
Application Period	By call Twice a year (in the last week of April and September each year)

TÜBİTAK - SAN-TEZ		
	Support Name	Industrial Thesis Program (SAN-TEZ)
	Type of Support	Grant
	Who Can Apply	Private Sector Customer Organization
	Purpose and Scope	To support projects that include graduate / doctoral dissertation studies in line with the needs of the industry for the development of new products / production methods that will increase the competitive power of our country and innovation in the current product / production method. Institutionalization of university industry cooperation. *(The implementation of SAN-TEZ Program has been transferred to TUBITAK from the MoSIT within the scope of Law No. 6676. The implementation and support features of the support may vary depending on the publication of the relevant directive.)
	Support Items	Tools, machinery, equipment, software and broadcasting expenses Material and consumables expenditures Expenses for consulting and service procurement Travel expenses (domestic/international) Staff expenses
	Support Duration	Up to 24 months
	Support Amount	No upper limit (Micro enterprise%85, Small enterprise %80, Medium Enterprise %75, Large enterprise %65)
	Application Period	Continuous

TÜBİTAK - 1507	**Support Name**	1507-SME RDI (Research, Development & Innovation) Grant Program
	Support Type	Grant + Award
	Who can apply?	Private Sector *SMEs' first five projects (at least 2 of them should be with partners)
	Purpose and Scope	To encourage SMEs for attempting research – technology development activities, for doing innovative projects to be more competitive, to develop high value added products, to have institutional research technology development culture and more active participation in national and international Support Names.
	Support Items	Staff expenses Travel expenses(domestic/international) Tools, machinery, equipment, software and broadcasting expenses, Material and consumables expenditures Expenses for consulting and service procurement R&D service procurement expenditures Project preparation and certified public accountant expenses Project expense support provided by Techno venture capital companies Encouragement award
	Support Duration	Up to 18 months
	Support Amount	500.000 TL (%75) Eligible project expenses 7.500 TL Encouragement award
	Application Period	Continuous

	Support Name	Cooperation and Collaboration Support
	Type of Support	Grant+ Refundable
	Who Can Apply	Private Sector *At least five (5) enterprises/SMEs (projects in Medium-High and High Technology Areas require at least three (3) enterprises)
	Purpose and Scope	To Support SMEs to cooperate co-procurement, co-design, co- marketing, joint laboratories, co-production, joint service provision and co-operation projects for co-production to be conducted in Medium-High and High Technology Areas.
	Support Items	Co-procurement in order to enable faster and cheaper raw materials, intermediate products, goods, logistics and other services Co-production and service provision in order to increase manufacturing and service capacity, variety and quality Co-marketing in order to increase product and service quality, increase national and international market share, establish brand image and meet the needs of the international market, Establish joint laboratories in order to improve product and service standards
	Support Duration	24 (+ 12) months
	Support Amount	300.000 TL Grant 700.000 TL Refundable Medium and high technology 1,200,000 TL Refundable
	Application Period	Continuous

KOSGEB R&D, Innovation Support Name		
	Support Name	R&D, Innovation Support Name R&D, Innovation and Industrial Application Support Name
	Type of Support	Grant+ Refundable
	Who Can Apply	Private Sector * SMEs, Entrepreneurs
	Purpose and Scope	Development of SME and entrepreneurs with new ideas and inventions in science and technology and Support of techno-entrepreneurs with technological ideas, Popularization of R&D awareness in SMEs and increase of R&D capacity, Improvement of existent R&D incentives. Support of innovative activities.
	Support Items	Workshop support, Rent expenses Machinery-Equipment, Hardware, Raw materials, Software and Service Procurement Cost (both Grant and loan) Staff expenses Project development costs (Consulting, training, Industrial and Intellectual Property Rights registration National - International Congress/Conference/Expo Visit /Technological Cooperation Visit, Testing, Analysis, Licensing expenses)
	Support Duration	24 (+ 12) months
	Support Amount	450.000 TL Grant, 300.000 TL Refundable, Start-up Capital 20.000 TL (%100), Support for other expenses %75
	Application Period	Continuous

KOSGEB Industrial Application Support Name		
	Support Name	Industrial Application Support Name R&D, Innovation and Industrial Application Support Name
	Type of Support	Grant+ Refundable
	Who Can Apply	Private Sector/ * SMEs, Entrepreneurs
	Purpose and Scope	Development of SME and entrepreneurs with new ideas and inventions in science and technology and Support of techno-entrepreneurs with technological ideas, Popularization of R&D awareness in SMEs and increase of R&D capacity, Improvement of existent R&D incentives. Support of innovative activities.
	Support Items	Workshop support, Rent expenses Machinery-Equipment, Hardware, Raw materials, Software and Service Procurement Cost Staff expenses Project development costs (Consulting, training, Industrial and Intellectual Property Rights registration National - International Congress/Conference/Expo Visit /Technological Cooperation Visit, Testing, Analysis, Licensing expenses)
	Support Duration	24 (+ 12) months
	Support Amount	450.000 TL Grant, 300.000 TL Refundable, Star-up capital 20.000 TL (%100) support for other expenses %75
	Application Period	Continuous

DEVELOPMENT AGENCY

Defence and Aerospace Industry Manufacturers Association

Development Agencies – Direct Financing Support		
	Support Name	Direct Financing Support
	Type of Support	Grant
	Who Can Apply	Private Sector *SMEs, Entrepreneurs
	Purpose and Scope	To increase innovation and R & D capacity in the sectors that stand out in the regions and to increase the competitive power of the regional economy in regional / national markets.
	Support Items	Determined by agency
	Support Duration	12 months
	Support Amount	Maximum 90% of eligible projects costs for priority areas
	Application Period	Continuous – may be announced

TUBİTAK - 1501	***Support Name***	1501 - Industrial R&D Project Grant Program
	Type of Support	Grant (+Award)
	Who Can Apply	Private Sector *Regardless of the sector and scale, all corporations established in Turkey and adding value on the company level
	Purpose and Scope	To support R&D projects regarding manufacturing a new product, improvement of an existent product, increasing product quality or standard or development of new techniques and new production technologies with decreased cost. There is a necessity of university - industry cooperation in projects with budget of 1 million TL or more; and in projects with a budget of 10 million TL or more, university -industry SME cooperation.
	Support Items	Staff expenses Travel expenses(domestic/international) Tools, machinery, equipment, software and broadcasting expenses, Material and consumables expenditures Expenses for consulting and service procurement R&D service procurement expenditures Certified public accountant expenses Techno award (for SMEs).
	Support Duration	Up to 36 months
	Support Amount	No upper limit (%40-60 of eligible project expenses)
	Application Period	Continuous

TÜBİTAK - 1511		
	Support Name	1511 - Research Technology Development and Innovation Projects in Priority Areas G. P.
	Type of Support	Grant
	Who Can Apply	Private Sector *Regardless of the sector and scale, all corporations established in Turkey and adding value on the company level
	Purpose and Scope	To support projects in the priority areas which are result oriented and have traceable targets
	Support Items	Staff expenses Travel expenses(domestic/international) Tools, machinery, equipment, software and broadcasting expenses, Material and consumables expenditures Expenses for consulting and service procurement R&D service procurement expenditures Project expense supports Certified public accountant expenses
	Support Amount	specified on the call (SMEs %75, Large companies %60, %10 general expense support)
	Support Duration	specified on the call
	Application Period	By call

TTGV - İTEP		
	Support Name	Advanced Technology Project Grants (İTEP)
	Type of Support	Refundable
	Who Can Apply	Private Sector *Industrial Organizations, Software companies (More than one organization / company may be found in the joint project application.)
	Purpose and Scope	To support the R&D and commercialization phases of process development practices and products in the areas of agriculture, education, health and environment that TTGV has identified as a priority area.
	Support Items	a) National or international license acquisition costs b) Concept development, technological / technical and economic feasibility studies, market research studies c) Prototype production / establishment of pilot plant / pilot production d) Design validation, industrial design, etc. improvement studies e) Investment projects for serial production f) Patent and licensing studies on business and technology knowledge g) Promotion and marketing activities related to the product
	Support Duration	Min 1 year – Max 3 years
	Support Amount	250 Thousand - 3 Million US Dollars (50%)
	Application Period	Continuous

TUBİTAK - 1509		
	Support Name	1509 - TÜBİTAK International Industrial R&D Projects Grant Program
	Type of Support	Grant
	Who Can Apply	Private Sector *Regardless of the sector and scale, all corporations established in Turkey and adding value on the company level
	Purpose and Scope	Supporting programs such as EUREKA, EUROSTARS, European Commission Framework Programs and similar international R & D projects
	Support Items	Staff expenses Travel expenses(domestic/international) Tools, machinery, equipment, software and broadcasting expenses, Material and consumables expenditures Expenses for consulting and service procurement R&D service procurement expenditures Project expense supports Certified public accountant expenses
	Support Duration	International project duration
	Support Amount	International project budget (SMEs%75, Large enterprises %60)
	Application Period	Continuous + By call

Pre-Competitive Cooperation Projects Support		
	Support Name	Pre-Competitive Cooperation Projects Support No. 5746 on the Support of R & D and Design Activities Law
	Type of Support	Tax credit
	Who Can Apply	Private Sector *Multiple organizations can collaborate.
	Purpose and Scope	To support the establishment of a platform for systems in advance of competition in order to increase efficiency by utilizing the scale economy of more than one organization and to provide higher added value compared to the current situation
	Support Items	R&D discount Income withholding tax incentive Insurance Premium support Stamp tax exemption
	Support Duration	36 (+6) months
	Support Amount	It depends on the type of eligible support.
	Application Period	By call

Ministry of Science, Industry and Technology **Techno-Initiative Capital Support Name**	***Support Name***	Techno-Initiative Capital Support Name Legislative Decree no.635
	Type of Support	Grant + Credit interest
	Who Can Apply	Private Sector Have successfully completed the R & D and innovation project domestically or abroad at most 5 years ago, Have 'Examined Patent Document' of the technological product which is generated by using domestic or foreign equities, Received positive reports that they have investment permit and / or technological product features in TGBs at most 12 months ago.
	Purpose and Scope	Commercialization of emerging products in R & D and innovation activities, creation of added value to the country's economy, pioneering of exports of technological products taking place in international markets, and supporting the investments of domestic enterprises in our country. -new /product diversification investments
	Support Items	Main machine equipment expenses Auxiliary machinery and equipment expenses Feasibility Report expenses Machinery, tools, materials and insurance expenses Assembly costs
	Support Duration	36 (+6) months
	Support Amount	SMEs 10 Million TL, Large Enterprises 2 Million TL SME Loan Interest Support, Small Firms Operating Expenses
	Application Period	By call

KOBIGEL - SME Development Support Name		
	Support Name	KOBIGEL- SME Development Support Name
	Type of Support	Grant + Refundable
	Who Can Apply	SMEs
	Purpose and Scope	Increase the share of small and medium-sized enterprises in the economy and their activities in line with the national and international targets of the country Supporting the projects conducted by SMEs to increase the competitiveness and provide added value of SMEs.
	Support Items	The project expenses to be supported in the scope of the program are determined by the Presidency during the Call for Proposals and the Board makes the last decision in accordance with the determined guidelines. However; real estate purchase, building construction, furbishing, vehicle purchase and rental, staff expenses unassociated with the project and other costs as well as taxes, duties and fees and social security contributions are not supported. - Staff expenses(net salary)
	Support Duration	6-36 (+ 6) Months
	Support Amount	300.000 TL Grant, 700.000 TL Refundable
	Application Period	Continuous

Ministry of Finance & www.ekonomi.gov.tr	***Support Name***	URGE (Product Development) Projects Support International Competitiveness Enhancement Support
	Type of Support	Grant
	Who Can Apply	Private Sector Cooperation Organizations Association established by TIM, TOBB, Foreign Economic Relations Board, Exporter Unions, II Chambers of Commerce and Industry, Organized Industrial Zones, Industrial Zones, Technology Development Zones, Sectoral Producer Associations, Employer Associations, Sectoral Foreign Trade Companies and Manufacturers , unions and cooperatives.
	Purpose and Scope	Expenditures related to project-based needs analysis, training, consultancy, foreign marketing, purchasing delegation activities that will increase the competitiveness and export capacity of the members of the cooperation institutions within the frame of training expenditures of our companies, clustering understanding and project approach.
	Support Items	a) Needs analysis, training and / or consultancy (400 thousand Dollars) b) Employment support, (2 expert staff) c) Project-based overseas marketing (150 thousand dollars per activity) or procurement delegation programs (100 thousand dollars per activity) d) Project-based individual counseling program (3 years)
	Support Duration	36 months.
	Application Period	--

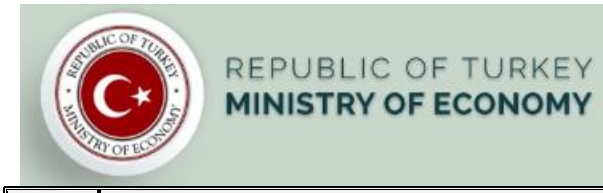
TÜBİTAK & www.tubitak.gov.tr	***Support Name***	1602 - Patent Support Program
	Type of Support	Grant (+ Reward)
	Who Can Apply	Private / Public Organizations Entrepreneur, Corporations, Public Institutions.
	Purpose and Scope	To increase the number of national and international patent applications originating from our country, to encourage real and legal persons to make patent applications and to increase the number of patents in our country.
	Support Items	a) TPE in national patent applications: • Research Report support, Examination Report support (National 600 Euros (Deposits: 250 TL), International: 34 thousand TL) • Proxy support for proxy applicants (• In the case of obtaining a patent, the patent registration and the patent registration of the application processes are granted the Patent Registration Award. b) In patent applications made to WIPO, EPO, USPTO, and JPO *: • Application or Research Report support, Review Report support • Patent Award (National, 3 thousand TL (Deposition: 2 thousand TL), International, 10 thousand (up to 30 thousand TL for 3 patents) in case of obtaining patent from EPO, USPTO or JPO.
	Support Duration	Changing depending on the process
	Application Period	Continuous

KOSGEB & ww2.kosgeb.gov.tr

Support Name	KOSGEB GENERAL SUPPORT PROGRAM
Type of Support	Grant
Who Can Apply	Small and Medium Sized SMEs
Purpose and Scope	Low project preparation capacity of SMEs should also benefit from existing KOSGEB support, ensuring that SMEs produce quality and efficient goods and services, encouraging general business development activities in order to increase the competitiveness and levels of SMEs and SMEs' is to support businesses for the purpose of promoting publicity and marketing activities to increase their share.
Support Items	
Support Duration	36 months.
Application Period	It can be done periodically or on a call basis.

			Destek Oranları (%)		
	GENEL DESTEK PROGRAMI DESTEKLERİ	**DESTEK ÜST LİMİTİ (TL)**	1.Bölg	2., 3., 4. Bölg	5.Bölg.
1	Yurt İçi Fuar Desteği	45.000			
2	Yurt Dışı İş Gezisi Desteği	20.000*			
3	Tanıtım Desteği	25.000			
4	Eşleştirme Desteği	30.000			
5	Nitelikli Eleman İstihdam	50.000			
6	Danışmanlık Desteği	22.500			
7	Eğitim Desteği	20.000			
8	Enerji Verimliliği Desteği	75.000	%50	%60	%70
9	Tasarım Desteği	22.500			
10	Sınai Mülkiyet Hakları Des.	30.000**			
11	Belgelendirme Desteği	30.000**			
12	Test, Analiz ve Kalibrasyon	30.000			
13	Bağımsız Denetim Desteği	15.000			
14	Gönüllü Uzmanlık Desteği	15.000			
15	Lojistik Desteği	40.000			

KOSGEB & ww2.kosgeb.gov.tr	***Support Name***	Technological Product Promotion and Marketing Support Program (TeknoPazar)
	Type of Support	Grant
	Who Can Apply	Private Sector Companies with technological products or prototypes that have emerged as a result of successfully completed projects supported by public resources, innovation or design projects, protected by patent documents, or received a Certificate of Experience (TÜR).
	Purpose and Scope	To increase the competitive power of the industry in international markets and to ensure a more dynamic structure. NOTE: As of March 2016, the implementation of the TeknoPark Program has been transferred to KOSGEB by the Ministry of Science, Industry and Technology within the scope of Law No. 6676.
	Support Items	a) Printed or electronic promotional materials, b) Participation in fairs, c) Customs processing expenses at foreign fairs, d) Membership fees for e-commerce (e-commerce) e) Expenses related to the introduction of the technological product or prototype in the written media f) Accommodation and transportation expenses of up to two employees of the operator on travels related to promotion and marketing activities. Support Amount: Domestic 50 thousand TL, Abroad 100 thousand TL
	Support Duration	12 months.
	Application Period	Continuous.

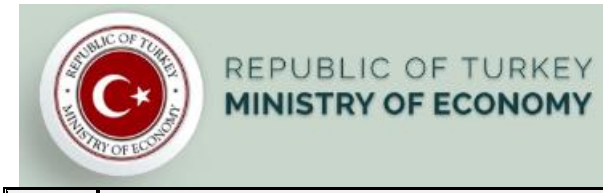


SaSaD
Defence and Aerospace Industry
Manufacturers Association

Ministry of Finance & www.ekonomi.gov.tr	***Support Name***	Support of Foreign Unit, Brand and Promotion Activities
	Type of Support	Grant
	Who Can Apply	Private Sector / Cooperation Organizations industrial and / or commercial activities, cooperation with organizations showing companies in Turkey.
	Purpose and Scope	Turkey's industrial and / or commercial entities operating in co-operation Organizations publicity carried out abroad of its members, with trademark registration fees and property rents for the units opened abroad in order to trade Supporting a portion of the expenses related to Turkey Trade Centers and Price Stabilization Fund to meet.
	Support Items	a) Unit rental expenses (120 thousand dollars) b) Foreign trademark registration activities (50 thousand Dollars) c) Promotion activities (250 thousand Dollars)
	Support Duration	48 months (Rent Support)
	Application Period	Continuous.

Ministry of Finance & www.ekonomi.gov.tr	***Support Name***	Design Support
	Type of Support	Grant
	Who Can Apply	Private sector Design companies, design offices, companies deemed suitable for design and product development projects
	Purpose and Scope	Establishment of design and innovation culture in Turkey and disseminate provide designers Companies / design offices and publicity will perform the cooperative enterprise, advertising, marketing, employment counseling expenses, the design will be pursued in order to develop high value-added products for the company with expenses related to the unit will abroad overseas markets and expenses for product development projects from the Support and Price Stability Fund.
	Support Items	a) Installation / decoration expenses b) Lease expenses c) Expenses related to the registration of intellectual, industrial and industrial rights, expenses related to the registration and protection of trademarks abroad, d) Salaries of the employed designers and modelists e) Consultancy expenses, f) Promotion, advertising and marketing expenditures, g) Designers' education expenses abroad, h) salaries of designers, modelists and engineers to be employed,
	Support Duration	--
	Application Period	Continuous.

Ministry of Finance & www.ekonomi.gov.tr	***Support Name***	Overseas Market Research Support Market Research and Market Entry Support
	Type of Support	Grant
	Who Can Apply	Private sector Companies engaged in industrial and commercial activities
	Purpose and Scope	Supporting overseas market research visits for exports to companies engaged in industrial and / or commercial activities
	Support Items	Expenditures for research abroad. Support Amount: 5 thousand Dollars / trip (70%)
	Support Duration	--
	Application Period	Continuous.



SaSaD
Defence and Aerospace Industry
Manufacturers Association

Ministry of Finance & www.ekonomi.gov.tr	***Support Name***	Support for the purchase of non-resident companies with advanced technology Market Research and Pazaar Entry Support
	Type of Support	Grant + Loan Interest + Consultancy
	Who Can Apply	Private Sector / Cooperation Organizations Companies and Cooperation Organizations.
	Purpose and Scope	To support financial and legal consultancy expenses for the purchase of foreign companies with advanced technology and technology transfer and to support the interest expenses of the loans used for the purchase.
	Support Items	a) Consultancy fee (500 thousand Dollars) b) Interest deduction (5 TL for TL loans, 3 million USD not exceeding 2 points for foreign currency credits)
	Support Duration	5 year (without interest payment)
	Application Period	Continuous.

Defence and Aerospace Industry Manufacturers Association

Ministry of Science, Industry and Technology & www.btgm.sanayi.gov.tr		
	Support Name	Design Registration Support No. 5746 on the Support of R & D and Design Activities Law
	Type of Support	Grant
	Who Can Apply	Private sector Ownership of designs exhibited in design competitions
	Purpose and Scope	To support and encourage the designs displayed in the design competitions having the criteria set by the Ministry of Science, Industry and Technology in line with the proposal of the Design Advisory Council.
	Support Items	Design registration expenses.
	Support Duration	--
	Application Period	--

Defence and Aerospace Industry Manufacturers Association

Ministry of Science, Industry and Technology & www.btgm.sanayi.gov.tr

Support Name	TECHNOLOGICAL PRODUCT EXPERIENCE DOCUMENT Public Procurement Law No. 4734
Type of Support	Award (Document)
Who Can Apply	Private / Public Organizations R & D projects developed with projects and own funds made by utilizing R & D and innovation projects supported by international funds, as well as pre-competition cooperation and technological funding, by technology foundations, R & D centers, TGBs, foundations established by law with public institutions and organizations companies with goods and services resulting from
Purpose and Scope	R & D companies that cannot submit a work completion certificate to public tenders shall be allowed to participate in public tenders
Support Items	Participation right in Public Events
Support Duration	-
Application Period	-

Supporting Institution	T.C. Ministry of Science, Industry and Technology
Support Name	Law No. 4691 on Technology Development Areas (TGB)
Purpose and Scope	Type of support for providing cooperation between universities, research institutions and production sectors, providing international competitiveness of the country's industry and producing export-oriented technological information. It is aimed to increase the product quality and to commercialize technological knowledge, thereby reducing the product costs. Entrepreneurs and SMEs are supported. Employment and the development of technological infrastructure are also supportive.
Support Items	• Earnings from software, design or R & D activities have income / corporate tax exemption. • R & D, design and support personnel who work on software, design and R & D activities are exempted from all kinds of fees. • Half of the employer's share of the insurance premium calculated on the exemptions from the income tax of the R & D, design and support personnel is covered by the appropriation to be placed in the Ministry of Finance budget. • It can work continuously or semi-timely in the region's activities with the permission of public institutions and organizations and university staff organizations. • The revenues that the university members who take part-time jobs will receive these services are not covered by the university's revolving fund. • Deliveries and services in the form of software developed in the areas indicated in the law are exempt from value added tax. • The capital support provided by income and taxpayer taxpayers for use in financing the projects of the companies in the region may be subject to a deduction in determining the corporate income so that it does not exceed 10% of the declared income or corporate income and 20% of the own capital.
Who Can Apply	Companies, entrepreneurs and instructors who want to be involved in R & D, Software and Design activities
Support Amount	As long as the R & D and Design activities are carried out, support can be made at the rates specified in the legislation.
Support Duration	Until 31.12.2023
Application Period	Any time during the year.

Supporting Institution	T.C. Ministry of Science, Industry and Technology
Support Name	Law No. 5746 on Supporting Research and Development Activities
Purpose and Scope	Supporting companies and entrepreneurs for R & D and design activities and increasing entrepreneurial activities, achieving high quality work and increasing competition and providing suitable conditions for Internationalization.
Support Items	All of the R & D and innovation expenditures and all of the design expenditures covered by the R & D and innovation and design projects stated to be supported by the law are calculated according to the 10th article of the Corporate Tax Law No. 5520 dated 13/6/2006 and the corporate income and dated 31/12/1960 and in accordance with Article 89 of the Income Tax Law no. 193, a discount is given to the determination of commercial income. • Fees for the design and support personnel worked on Software, R & D, design (90% for graduate and undergraduate in basic science: 95% for graduate and at least graduate in basic science); others: 85%) are all kinds of taxable income. • Half of the employer's share of the insurance premium calculated on the exemptions from the income tax of the R & D, design and support personnel is covered by the appropriation to be placed in the Ministry of Finance budget. • Papers related to R & D and innovation activities and design activities are exempt from stamp tax. • R & D centers with R & D and innovation activities carried out on an order basis in the contractual framework and Design center with design activities carried out on an order basis in the contractual framework can benefit from discounts, exceptions, supports and incentives specified in the law. • R & D centers employing R & D personnel with at least undergraduate degrees in the field of basic sciences are paid from the appropriation to be paid to the Ministry budget for two years for the monthly salary paid for the salary paid by the salaried staff.
Who Can Apply	Companies that are interested in R & D and Design activities.
Support Amount	As long as the R & D and Design activities are carried out, support can be made at the rates specified in the legislation.
Support Duration	Until 31.12.2023
Application Period	At any time, application can be made to the Ministry of Science, Industry and Technology.

Supporting Institution	Ministry of Finance
Purpose and Scope	Income Tax and Corporate Tax Support Income Tax Law No. 193 and Law No. 5520 on Corporate Income Tax
Purpose and Scope	To be able to benefit from the R & D deduction which will be calculated on the basis of R & D expenditures for the purpose of searching for new technology and information exclusively for the income tax and corporate taxpayer.
Support Items	R & D reduction for income tax and corporation taxpayers.
Who Can Apply	To income tax and corporate taxpayers.
Support Amount	100% R & D reduction from R & D expenditures.
Support Duration	Until 31.12.2023
Application Period	At any time, application can be made to the Ministry of Science, Industry and Technology.

B. INTERVIEW QUESTIONS

SAVUNMA SANAYİ FİRMALARI ANKETİ
1. FİRMAYA AİT BİLGİLER

Adınız, Soyadınız: _____
Firmadaki konumunuz : 1( ) Sahibi / Ortağı / YK üyesi 2( ) Üst düzey yöneticisi 3( ) İşyeri Yetkilisi
Telefonu: _____ **E – Postası**:
_____@_____
Firmanın Adı : .....
Firmanın Adresi : .....
Firmanın büyüklüğü
Kapalı alan ……m2 Açık alan ……m2 Toplam alan ……m2
Firmanın Kuruluş Yılı : .....
Firmanın Türü: 1( ) Şahıs 2( ) Anonim 3( ) Limited Şti. 4( ) Holding 5( ) Çok Ortaklı
6( )Yabancı Ortaklı 7( )Diğer: _____

2. İŞLETME BÜYÜKLÜĞÜ BİLGİLERİ

MADDE	2014	2015	2016
Son 3 yılda cironuzdaki % değişim			
Son 3 yılda savunma sanayi cironuzdaki % değişim			
Son 3 yılda Ar-Ge Çalışan Sayısı			

3. PERSONEL YAPISI

	Doktora ve yüksek lisans	*Lisans*	*Teknik/ Meslek (Yüksekokul-Lise)*	*Diğer*
2016				
2015				
2014				

4. YENİLİK&FARKINDALIK

Bir yenilik, işletme içi uygulamalarda, işyeri organizasyonunda veya dıiş ilişkilerde yeni veya önemli derecede iyileştirilmiş bir ürün (mal veya hizmet), veya süreç, yeni bir pazarlama yöntemi ya da yeni bir organizasyonel yöntemin gerçekleştirilmesidir.

4.1. Şirketin Yenilik Stratejisi Bulunmakta Mıdır?

1. ( ) Evet 2. ( ) Hayır

4.2. Şirketin bütçesinden yeniliğe tahsis edilen özel bir harcama var mıdır?

1. ( ) Evet 2. ( ) Hayır

4.3. Yeni Ürünlerden Elde Edilen Cironun Toplam Ciroya Oranı

Yıllar	Yeni Ürün Ciro Oranı
2016	
2015	
2014	

4.4. Son beş yılda firmanızda aşağıdaki konularda yapılan yenilik adetleri

Yenilik Alanları	Ürün ya da Hizmet	Üretim Süreci	Üretim Organizasyonu
2016			
2015			
2014			

4.5. Yenilikleri Aşağıdaki Gruplara göre ayırabilir misiniz? (Son 3 yıl için)

	Yenilik Adedi
Şirket İçin Yenilik Adedi	
Ülke İçin Yenilik Adedi	
Küresel Çapta Yenilik Adedi	

4.6. Firmanız çalışanlarının teknolojik gelişmelerin farkında olmaları için ne gibi olanaklardan yararlanıyorsunuz? Firmanız için önemlerini belirtiniz.

	çok önemsiz				çok önemli
Firma içi bilgi kaynakları ve bilgi akışı	1( )	2( )	3( )	4( )	5( )
Firma içi eğitim	1( )	2( )	3( )	4( )	5( )
Firma dışı bilgi kaynakları ve bilgi akışı	1( )	2( )	3( )	4( )	5( )
Firma dışı eğitim	1( )	2( )	3( )	4( )	5( )
Teknik danışmanlık hizmeti alımı	1( )	2( )	3( )	4( )	5( )
Pazara yeni çıkan ürünleri ve teknolojileri izleyen görevlilerin varlığı	1( )	2( )	3( )	4( )	5( )
Başka kuruluşlarla teknolojik işbirliği	1( )	2( )	3( )	4( )	5( )
Çalışanların teknolojik gelişmeler konusunda farkındalık düzeylerinin düzenli olarak ölçülmesi ve artırılması	1( )	2( )	3( )	4( )	5( )
Diğer/Açıklama					

5. SAVUNMA SANAYİ ANA YÜKLENİCİ FİRMALARI ile ÇALIŞMALAR

5.a. Savunma Sanayi Ana yükleniciler yapılan faaliyetlerin ciroya oranı

Yıllar	Savunma Sanayi Firmaları ile Yapılan Satışların Toplam Ciroya Oranı (%)
2016	
2015	
2014	

5.b. Ana yükleniciler için/adına yaptığınız faaliyetleri cironun yüzdesi olarak belirtiniz.

	Ana yükleniciler için yapılan faaliyetlerin ciro içerisindeki dağılımı %
ASELSAN	
HAVELSAN	
ROKETSAN	
TUSAŞ-TAİ	
FNSS	
OTOKAR	
Diğer Savunma Sanayi İçi	
Diğer Savunma Sanayi Harici	

6. AR-GE

Son 3 yıldaki AR&GE harcamaları %'de değişimi

Yıllar	Ar-Ge Harcaması %'de değişimi
2016	
2015	
2014	

7. İHRACAT

7.1. İhracat yapıyor musunuz?

1( ) Evet 2( ) Hayır

7.2. Firmanızın son beş yılda ihracatın yüzde değişimi.

Yıllar	İhracat Değişimi%	İhracat Yapılan Ülkeler
2016		
2015		
2014		

8. İTHALAT

8.1. İthalat yapıyor musunuz?

1( ) Evet 2( ) Hayır

8.2. Firmanızın son beş yılda ithalat yüzde değişimi.

Yıllar	İthalat Değişimi%	İthalat Yapılan Ülkeler
2016		
2015		
2014		

9. KÜMELENME

9.1. Savunma ve Havacılık Sanayi Kümelenmesi Üyesi misiniz?

1( ) Evet 2( ) Hayır

9.2. Küme üyesi iseniz aşağıdaki ifadelere katılma derecenizi belirtiniz.

	hiç katılmıyorum				tamamen katılıyorum
Küme içerisinde yer almak firmaların üretim ilişkileri açısından görünürlüğünü artırmaktadır	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmalar arasında dayanışma ilişkilerini artırmaktadır	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmaların ortak üretim faaliyetleri yapmasını kolaylaştırmaktadır	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmaların ortak pazarlama/tanıtım faaliyetlerini geliştirmektedir.	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmaların ortak eğitim faaliyetlerini geliştirmektedir.	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmaların ortak AR&GE faaliyetleri yapmasını kolaylaştırmaktadır	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak firmaların işgücüne erişimini artırmaktadır	1( )	2( )	3( )	4( )	5( )
Küme içerisinde yer almak altyapı/donanım imkanlarını artırmaktır	1( )	2( )	3( )	4( )	5( )

9.3. Küme içinde yer almak size size avantaj sağladı mı?

Hiç sağlamadı				Çok sağladı
1( )	2( )	3( )	4( )	5( )

10. ALTYÜKLENİCİ FİRMALAR

En sık çalıştığınız 5 altyüklenici firmayı belirtir misiniz?

1…….
2…….
3…….
4…….
5…….

11. ADAPTASYON YETENEĞİ

	Hiçbir zaman				Her zaman
Müşterinin ürün/hizmet modifikasyon taleplerine anında cevap verebilmekteyiz	1( )	2( )	3( )	4( )	5( )
Müşteri spesifik ihtiyaçlarına cevap verebilmekteyiz	1( )	2( )	3( )	4( )	5( )
Proje ya da ihale imkanlarından anında haberdar olabiliyoruz	1( )	2( )	3( )	4( )	5( )
Yatırımlarımızı yeni ürün geliştirmek doğrultusunda yapıyoruz	1( )	2( )	3( )	4( )	5( )

12. DİĞER KONULAR ve DEĞERLENDİRME

12.a. Savunma Sanayi Ana Yüklenici Firmalar ile Çalışma ile Çalışmadan Önceki Durumu değerlendirdiğinizde firmalar size performans/rekabet katkısı sağladı mı?

Hiç sağlamadı				Çok sağladı
1( )	2( )	3( )	4( )	5( )

12.b. Savunma Sanayi Ana Yüklenici Firmalar ile Çalışmak firmanıza Yurt İçi firmalar ile işbirliği imkanları sağladı mı?

Hiç sağlamadı				Çok sağladı
1( )	2( )	3( )	4( )	5( )

12.c. Savunma Sanayi Ana Yüklenici Firmalar ile Çalışmak firmanıza Yurt Dışı Küresel İşbirlği Çalışmaları için de fayda sağladı mı?

Hiç sağlamadı				Çok sağladı
1( )	2( )	3( )	4( )	5( )

12.d. Savunma Sanayi Ana Yüklenici Firmalar ile Çalışmanın şirketinizin Ar-Ge'sine etkisi nasıl oldu?

12.e. Savunma Sanayi Ana Yüklenici Firmalar ile Çalışmanın şirketinizin yeni ürün piyasaya sürme yeteneğine etkisi nasıl oldu?

12.f Savunma Sanayi Ana Yüklenici Firmalar ile Çalışmanın şirketinizin ihracat yeteneğine etkisi nasıl oldu?

12.g. Eklemek İstediğiniz Diğer Hususlar

TEŞEKKÜRLER

C. SEMI-STRUCTURED INTERVIEW QUESTIONS

Main Defense Industry Firms

1. How do you conduct your make-or-buy decisions in order to allocate work packages to supplier firms? Do you have a systematic decision support system for this decision?
2. How do you differentiate capability of your suppliers? How do you evaluate capability of your suppliers?
3. What do you think about off-set policies of SSM?
4. What is your opinion related with defense clusters?
5. Do you have supplier development policies? Please explain.
6. Do you have any other comments?

SSM

1. How can we locate Turkish Defense Industry with respect to global developments and what is the role of SSM on this?
2. What is the idea behind off-set policies?
3. How SSM take the capability of suppliers into consideration?
4. What do you think about defense industry clusters?
5. Could you share sales, export and R&D spending data for the specified firms that we provide? (This question asked iteratively first for 60 firms, than 50, and finally for 45 firms)
6. What are your expectations from the defense industry supplier firms?
7. Is there an action plan for increasing export in Turkish Defense Industry?
8. In both strategic documents localization is set as main goal what actions are taken to increase localization in the sector except for off-set policies?
9. Any other comments.

KOSGEB

1. Which types of incentives provided by KOSGEB especially for high tech industries?
2. Which incentives can be utilized by defense industry? Could you explain the process in detail?
3. What do you think about the SME constraint? Does this constraint cause problems for incentives?
4. How do you specify the incentives?
5. Is there feedback mechanism for given incentives? How do you analyze the effects of given incentives?
6. Is there a cooperation with other incentive providers (TUBITAK, SSM or Ministry of Science and Technology etc.)?
7. Any other comments

DEFENSE INDUSTRY CLUSTERS

1. What is the main motivation behind constructing this cluster?
2. Do you evaluate capabilities of your firms?
3. What actions you conduct to increase capabilities of your suppliers?
4. Could you explain your construction process?
5. Did you check the compatibility of the cluster with defined cluster in the literature?
6. Do you focus on the repeated interactions based on past relations?
7. What are your policies to construct the value chain with in the cluster?
8. Could you explain your RIS procedure? How did you design RIS? Does it linked with NIS?

AIRBUS

1. Could you explain Supply Chain Management Policy of Airbus?
2. How do AIRBUS evaluate the capabilities of the suppliers?
3. What actions are taken to increase the capabilities of suppliers?
4. Do you utilize patent as major KPI for evaluation? How?
5. How do you approach spin-offs firms? Do you encourage spin-off firms? How?
6. Any other comments

CHINESE SME FIRMS

1. How do you evaluate your capability? What actions are performed to increase this capability?
2. Could you explain incentives that can be utilized by your firm?
3. Could you explain your patent approach? Is there a patent specific incentive?
4. Could you explain your SME structure and related incentives?
5. Is there a cluster structure for your business?
6. How policies of government affects your business?
7. Any other comments

D. REGRESSION AND TEST RESULTS

TABLE 1 Output of 1st Regressıon Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.084461	0.052147	-1.619649	0.1132
R&D	0.546316	0.181985	3.001981	0.0046***
EX	0.381156	0.216493	1.760593	0.086**
NEWPRO	0.522702	0.230474	2.267946	0.0288**
P_R&D	0.018198	0.036115	0.503887	0.6171
R-squared	0.69628	Mean dependent var		0.320291
Adjusted R-squared	0.665908	S.D. dependent var		0.26686
S.E. of regression	0.154247			
Sum squared resid	0.951685			
Log likelihood	22.9119			
F-statistic	22.92505			
Prob(F-statistic)	0.00000***			

*** shows significant level of 1%, ** shows significant level of 5%
*shows significant level of 10 %

LSE Tests for the 1st Regression

Firstly, multicollinearity is checked which especially might spoil the model. Because in the case of multicollinearity, effect of each variable could not be observed exactly. The fundamental aim of analysis is seeing effect of each variable one by one. In order to check multicollinearity generally variables of variance inflation factor (VIF) is used.

TABLE 2 Multicollinearity Test of 1st Model

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.002719	5.143348	NA
R&D	0.033119	7.775843	2.556155
EX	0.046869	5.743171	1.641207
NEWPRO	0.053118	11.55748	2.555608
P_R&D	1.30E-03	1.596965	1.0466

As it can be seen in Table 2 uncentered and centered VIF values are not higher than 10. Just one of them greater than 10 but it is very close to 10. Therefore, it can be concluded that there is no multicollinearity for this model.

Next, stability of residuals' variance is tested by White Test. Hypothesis of heteroscedasticity test are;

H_0: There is no heteroscedasticity among residuals.

H_a: There is heteroscedasticity among residuals.

TABLE 3 Heteroscedasticity Test of 1st Model

Heteroscedasticity Test: White			
F-statistic	1.0068	Prob. F(14,30)	0.4719
Obs*R-squared	14.3844	Prob. Chi-Square(14)	0.4215
Scaled explained SS	9.39788	Prob. Chi-Square(14)	0.8047

As it can be seen from the Table 3 White Test's results indicate that H_0 cannot be rejected. It means that heteroscedasticity assumption is also satisfied.

Next, for normality test Jargue Berra Test is used. Hypothesis of normality are given below;

H_0: Residuals are normally distributed.

H_a: Residuals are not normally distributed.

Since p value is equal to 0.741, which is greater than 0.05, H_0 cannot be rejected. It can be said that distribution of residuals are normal (Figure 1).

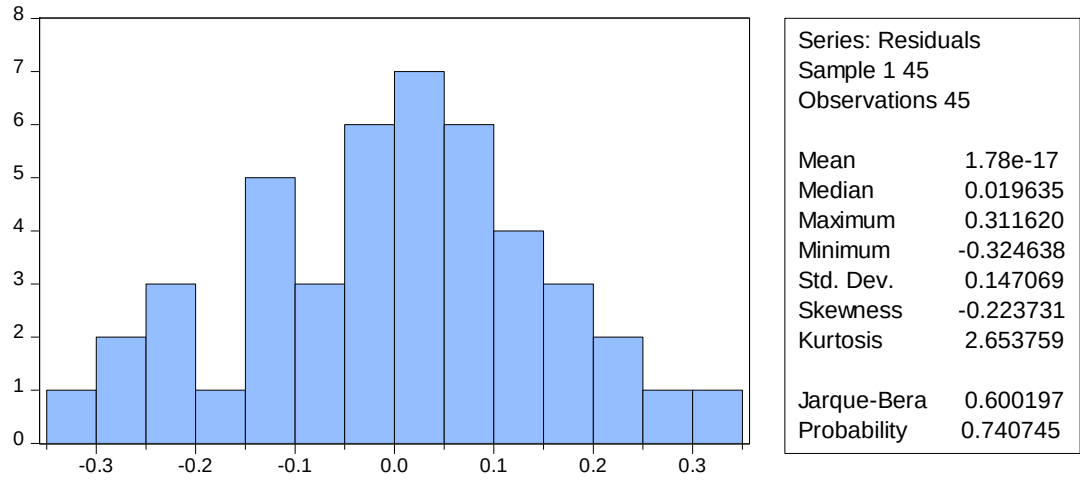


FIGURE 1 Normality Test of 1st Model

Finally, mean of residual is checked. Mean of residual equal to 7.66E-17 which is very close to zero. Therefore, it can be said that mean of residuals is zero.

TABLE 4 Output of 2nd Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.128378	0.048901	-2.625247	0.0122**
R&D	0.601895	0.170656	3.52694	0.0011***
EX	0.44326	0.203016	2.183376	0.0349**
NEWPRO	0.553225	0.216127	2.559724	0.0144**
P_R&D	0.053578	0.033867	1.582012	0.1215
R-squared	0.767199	Mean dependent var		0.331624
Adjusted R-squared	0.743918	S.D. dependent var		0.285834
S.E. of regression	0.144645			
Sum squared resid	0.836887			
Log likelihood	25.80417			
F-statistic	32.95506			
Prob(F-statistic)	0.0000***			

*** shows significant level of 1%, ** shows significant level of 5%
*shows significant level of 10 %

LSE Tests for 2nd Regression

For second regression equation, assumptions of least squares have to be satisfied too. For this regression model again it is started by checking multicollinearity. Uncentered

and centered VIF values which are less than 10 (Table 5). Just one of them greater than 10 but it is quite close to 10. Therefore, it can be inferred that there is no multicollinearity for this model.

TABLE 5 Multicollinearity Test of 2nd Model

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.002719	5.143348	NA
R&D	0.033119	7.775843	2.556155
EX	0.046869	5.743171	1.641207
NEWPRO	0.053118	11.55748	2.555608
P_R&D	1.30E-03	1.596965	1.0466

Next, heteroscedasticity is tested by White Test. According to the White test results, H_0, indicating that there is no heteroscedasticity among residuals, is rejected. That is why, heteroscedasticity does not exist (Table 6).

TABLE 6 Heteroscedasticity Test of 2nd Model

Heteroscedasticity Test: White			
F-statistic	0.76007	Prob. F(14,30)	0.7005
Obs*R-squared	11.7823	Prob. Chi-Square(14)	0.6238
Scaled explained SS	6.82647	Prob. Chi-Square(14)	0.9412

By analyzing Jargue Berra Test, it can be observed that residuals are normally distributed (Figure 2).

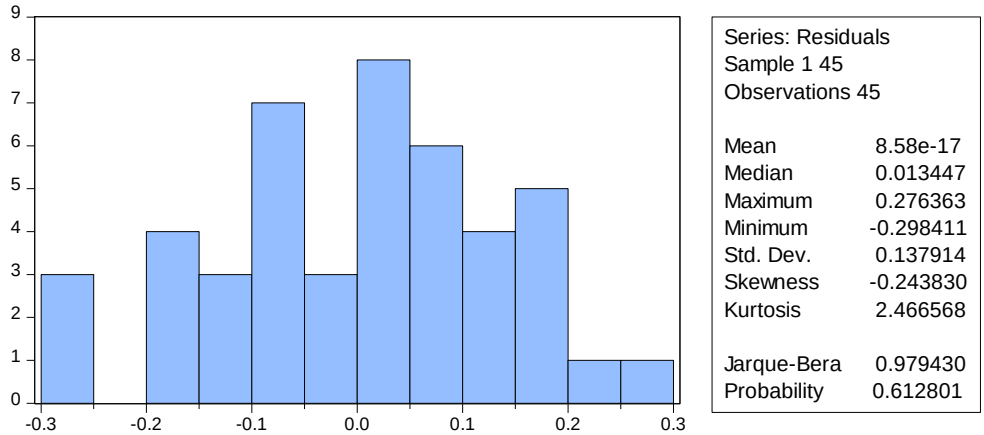


FIGURE 2 Normality Test of 2nd Model

E. TURKISH SUMMARY/TÜRKÇE ÖZET

GİRİŞ

Son yıllarda firma yetenek ölçüm çalışmalarına önem verilmiş, bu ölçümler birçok sektörde çalışılmış ve gelecekte de bu çalışmaların artacağı beklenmektedir. Literatürde; ilaç, kimya ve yarı-iletken alanlarında yetenek ölçüm çalışmaları bulunmaktadır. Bu çalışmalarda firmaların yetenek ölçümleri için farklı indikatörler kullanılmaktadır. Bu tezde, Türkiye için ekonomik ve teknolojik anlamda yüksek potansiyel taşıyan sektörlerinden biri olan ve dikey entegre bir yapıya sahip olan savunma sanayi için yetenek ölçümü konusuna odaklanılmıştır.

Türkiye'de savunma sanayi 2016 yılı itibari ile 6 Milyar Dolara ulaşan cirosu, ihracatta altından sonraki en değerli ürünleri bünyesinde barındırması ve yüksek teknoloji odağı ile geliştirilen bir çok sivil teknolojinin mimarı olması nedeni ile ülkenin en önde gelen sektörlerinden biridir. Sektörde bilinen ana yüklenici; ASELSAN, ROKETSAN, TAI, HAVELSAN ve FNSS gibi firmalar sektörün lokomotifi olsa da toplam firmaların yaklaşık %98'ini oluşturan savunma sanayi KOBİ'leri de sektörde önemli yer tutmaktadır. Çalışmamızın temelini de bu iki aktar arası ilişki oluşturmaktadır. Ancak bu ilişki sektördeki diğer paydaşlardan bağımsız olarak yürümemektedir. Politika yapıcı olarak SSM, sektörde önemi günden güne artan savunma sanayi kümelenmeleri; OSSA, SAHA, TSSK, BASDEC, ESAC ve Konya Savunma Kümesi, sektördeki teşviklerin ana koordinatörü KOSGEB ve savunma sanayi için çok kritik bir sivil toplum kuruluşu olan SASAD gibi aktörler de bu ilişki üzerinde etkilidir. Bu nedenle çalışmanın kapsamı tüm bu aktörleri kapsayacak şekilde belirlenmiştir.

Çalışmanın özgünlüğü savunma sanayinde ana yüklenici firmaların altyüklenici firmalara yetenek katkısı perspektifi ile araştırıldığı bilinen ilk çalışma olmasından kaynaklanmaktadır. Bu çalışmayı yürütürken temel amacımız Türk Savunma Sanayinde anayüklenici ve altyüklenici yetenek aktarımı konusuna katkı sağlamaktır.

Bu tez çalışması ana savunma sanayi firmaları ile yan sanayi firmalar arasındaki ilişki üzerine yoğunlaşmaktadır. Savunma sanayi dikey entegre ve yüksek teknoloji bir sektör olduğundan firmaların performansı birbirleri ile çok ilintilidir. Bu tez çalışmasında bu ilişkiden doğan yetenek artışı analiz edilecektir. Bunun için de dinamik yetenekler yaklaşımı kullanılacaktır. 2016 SIPRI yıllığına göre Dünya'da ülkeler yıllık GSMH'nin %2.2'sini savunmaya ayrılmakta ve miktarın büyük bölümü yeni teknolojiler geliştirmek için kullanılmaktadır ve Serfati (2008) tarafından da belirtildiği gibi sivil alanda kullandığımız teknolojilerin büyük bölümü savunma kökenlidir.

Türk Savunma Sanayinde yukarı belirtilen ana yüklenici firmalar proje üstlenme açısından etkin durumdadır. Devletin ana politika yapıcı olduğu bu sistemde siparişler büyük projeler halinde verilmekte ve bu siparişler bahsedilen büyük firmalar tarafından alınmaktadır. Sektördeki alt yüklenici firmalar ise hayatta kalabilmek için bu firmalar ile işbirliği yapması gerekmektedir. Bu işbirliğinin yapısı genel olarak ana yüklenici tarafından belirlenmekte ancak SSM de belirlediği politikalar ile bu işbirliğinin sağlıklı yürütülmesini sağlamaktadır. Bu çalışmada bu işbirliğinin firmalara sağladığı katkı ele alınırken, halihazırda kullanılan mekanizmalar (karar destek mekanizmaları gibi) incelenecek ve sektörde yer alan diğer paydaşlara da analizlerde yer verilecektir.

Bu tez çalışmasında temel hedefimiz yapılan iş birliğinin alt yüklenici firmalara getirdiği yetenek katkısını araştırmaktır. Bu katkı dinamik yetenekler ile ölçülmekte olup dinamik yeteneklerin 3 bileşenine; özümseme yeteneği, ihracat yeteneği ve yenilik yeteneği olan etkisi ayrı ayrı ele alınmaktadır. Bu bakışla hipotezler aşağıdaki gibi kurgulanmıştır:

> Hipotez 1: Alt yüklenici firmalar ile işbirliği arttıkça firmaların özümseme yeteneği artar,

Hipotez 2: Alt yüklenici firmalar ile işbirliği arttıkça firmaların yenilik yeteneği artar,

Hipotez 3: Alt yüklenici firmalar ile işbirliği arttıkça firmaların adaptasyon yeteneği artar,

Bu hipotezlere yönelik sonuçlar analiz edilerek destekleyici unsurlar araştırılacaktır. Sonrasında bu yeteneklerin arttırılması için gerekli politika önerileri belirlenecektir.

TÜRK SAVUNMA SANAYİNİN GELİŞİMİ

Türk Savunma Sanayisinin geçmişi Osmanlı İmparatorluğunun yükselme dönemine kadar dayanır. İlk kurulan "Tophanei- Humayun" silah imalat fabrikası o dönemin gelişmiş altyapısına sahipti. Fakat 18.yy'dan itibaren sanayi hareketleri sonucunda Avrupa'da teknolojik gelişim hızlandı ve savunma alanında da liderlik Avrupa'ya geçti. 1. Dünya savaşı sonrasında ise yeni kurulan Türkiye Cumhuriyeti'ne miras kalmamıştı.

Gerek ekonomik gerek teknolojik imkansızlıklara rağmen 1925 yılında Şakir Zümre ilk savunma firmasını kurdu. Bir kaç yıl sonra Nuri DEMİRAĞ uçak fabrikası kurdu yurt içi ve yurt dışından siparişler aldı. NuD isimli üretilen uçaklardan birisi test sırasında düşünce siparişler iptal edildi ve faaliyetler durdu. 1940 ve 1950'lerde ise yabancı desteklere ve hibelere dayalı bir savunma sanayi vardı ve bu hibeler Türk Savunma Sanayinin gelişimini engelledi. 1960-1970'lerde ise Kıbrıs problemi ülkeye uygulanan ambargo ve hibe silahların kullanılamaması ve son olarak haberleşme problemi ile kendi uçağımızın kendi gemimizi vurması ile yerli savunma sanayi bir zorunluluk olarak görülmeye başlandı. Önce ASELSAN kuruldu sonrasında ise 1985 yılında 3238 sayılı kanunla Savunma Sanayi Müsteşarlığı (SSM) kuruldu.

SSM'nin temel odağı uzun vadeli ve sürdürülebilir savunma politikaları oluşturmak iken SSM bu misyonu gerçekleştirmek için özerk bir yapı olarak tasarlandı. SSM'nin ana görevi Türkiye'de modern savunma sanayinin kurulması ve modernize edilmesi olarak belirlendi ve temel faaliyetleri aşağıdaki gibi belirlendi:

- Savunma Sanayi İstişare Kurulu kararlarını uygulamak.
- Savunma Sanayi ihtiyaçlarına göre sektöre yön vermek
- Kamu ve özel sektörde modern askeri ekipmanların üretimini planlamak
- Askeri projeler için araştırma geliştirme faaliyetlerini yürütmek
- Savunma Sanayi Ürünleri için off-set politikasını yönetmek

SSM'nin vizyonu ise Türkiye'yi Savunma ve Güvenlik teknolojilerinde süper güç haline getirmektir. SSM'nin öncelikleri ise;

- Savunma sanayinin sürdürülebilirliği
- Program Yönetiminde olgun seviyeye ulaşmak
- Teknolojik Yetenek Geliştirmek
- Değer yaratan firmalar ve teknolojiler

SSM diğer müsteşarlıklara nazaran farklı bir statüye sahiptir. Savunma Sanayi ihtiyaçlarına hızlı cevap verebilmek için kendi firmalarına sahiptir. Ayrıca bir çok firmada ortaklığı bulunmaktadır. 24 Aralık 2017'de yayınlanan 696 sayılı Kanun Hükmünde Kararname ile SSM Cumhurbaşkanlığı'na bağlanmış ve farklı bir statü kazanmıştır.

SSM'nin temel hedefi yerli bir savunma sanayi altyapısı oluşturmaktır. 1990'ların sonunda ve 2000'li yılların başında ASELSAN, HAVELSAN ve TAI bir çok yerli proje başlatılmıştır. Bu gelişime sonraki yıllarda savunma sanayi alt yüklenici firmalarının da ön plana alınması ile daha da hızlanmıştır. 2007-2011 Savunma Sanayi Sektörel Strateji Planı ile SSM altyüklenici odağını merkeze koymuştur. Sonrasında yayınlanan 2017-2021 Savunma Sanayi Sektörel Strateji Planı ile alt yüklenici vurgusu arttırılmıştır.

Savunma Sanayide Yetenek oluşumunu incelediğimiz tezimiz SSM'nin bu gelişimi ve gelecek vizyonu ile birebir örtüşmektedir. SSM altyüklenici vurgusunu artırsa da alt yüklenici firmalara ulaşan ilişki ağı ana yüklenici firmalar (ASELSAN,

HAVELSAN, TAI, FNSS ve ROKETSAN) üzerinden genellikle proje bazlı olarak ilerlemektedir. Büyük ihaleler şeklinde başlatılan projeler ana yüklenici firmalar tarafından alınarak alt yüklenici firmalara işler verilmektedir. Bu tez çalışmasında temel araştırdığımız konu verilen bu işlerin alt yüklenici firmalarda yetenek artışı sağlayıp sağlamadığını incelemektir. Tez çalışmamız bu şekilde bir yetenek analizinin savunma sanayinde ilk uygulaması olması yönü ile yeni bir çalışmadır.

SIPRI yıllığının 2016 verilerine göre Türkiye Gayri Safi Yurt İçi Hasılasının %2'sini savunma harcamalarına ayırmaktadır. %2.2 olan Dünya ortalamasının biraz altında yer almaktadır. Bu miktardaki ana hisse ana yüklenici firmalara tarafından alınmaktadır. Ana yüklenici firmalar kendi genellikle kendi karar mekanizmalarını kullanarak alınan bu projelerden alt yüklenici firmalara pay vermektedir. Tezin temel odağı alt yüklenici firmalara verilen bu işlerin bu firmalarda dinamik yetenek kazandırıp kazandırmadığını incelemektir.

Bu kazanım dinamik yetenekler açısından incelenecektir. Bu incelemede dinamik yeteneklerin alt bileşenler olan; yenilik yeteneği, özümseme yeteneği ve adaptasyon yeteneği analiz edilecektir. Bu analizde en önemli husus bu alt bileşenlerin nasıl ölçüleceği hususudur. Bu ölçüm için çalışmada her bir analiz ilgili literatüre bağlanmış ve buna göre analizler gerçekleştirilmiştir. Sonraki bölümde bu parametrelerin nasıl belirlendiği üzerine literatür çalışmaları incelenirken dinamik yetenekler gerek teorik gerek ampirik açıdan ele alınacaktır. Bu geçişte; veriden enformasyona, enformasyondan bilgi ve sonrasında yetenek ve dinamik yeteneklere giden yol aşamalı olarak ele alınacaktır. Ayrıca dinamik yetenekler ve onun alt bileşenleri konusunda gerçekleştirilmiş olan ampirik çalışmalar incelenecektir.

LİTERATÜR ARAŞTIRMASI

Merriam-Webster Sözlüğü başarıyı "istenen ve tercih edilen bir çıktı" olarak tanımlamaktadır. Bir öğrenci ya da işçi için başarı kriterleri olarak seçilecek çıktı kolayca tanımlanabilir ancak söz konusu bir firma olduğunda başarı kriterini

tamamlamak çok kolay olmayacaktır. Firmanın; cirosu, Ar-Ge harcaması, Pazar payı, marka değeri ya da personel tatmini kriterlerinden biri ya da bir kaçı başarı kriteri olarak seçilebilir. Son yıllarda bu başarı için öne çıkan tanım rekabet avantajı olarak öne çıkmaktadır. Başarı istenen bir sonuç iken potansiyel başarı olarak tanımlanan "yetenek" ayırt edilmesi daha zor bir terim olarak öne çıkmaktadır. Ancak firma için yetenek kavramı literatürde birçok kez ele alınmıştır.

Firma bazında yetenek ölçümleri teorik ve deneysel olarak bir çok kez çalışılmıştır. Teorik çalışmalar genelde firmanın varlıkları üzerine yoğunlaşırken dinamik pazar koşullarında deneysel çalışmalara daha öne çıkmıştır. Teorik bölümde evrimsel olarak veri, anlamlı veri ve bilgi dönüşümü ile bunun yeteneğe dönüşü ele alınmıştır. Sonrasında dinamik yetenekler üzerine odaklanılmıştır.

Verinin bilgi ve yeteneğe dönüşüm süreci bu bölümde ele alınmıştır. Sonrasında yetenekler özelinde dinamik yetenekler ve rekabet avantajı ile bağlantısı üzerinde durulmuştur.

Veri, Enformasyon, Bilgi ve Teknoloji

Veri tek başına anlam ifade etmez iken bilgi verinin anlam kazanmış hali olarak yorumlanabilir. Bilgi ise firmaların gelişmesi için kilit öğedir. Firmalarda dışardan bilgi alarak kendi bilgilerini artırabilirler. Forbes ve Wield (2003)'e göre bir firmada bilgi dışarında bilgi akışı ya da yaparak öğrenme ile arttırılabilir. Bilginin dışarıdan bilgi akışı daha karmaşık bir süreç olarak öne çıkmaktadır. Firma yeteneklerinin gelişmesi için de yaparak öğrenmeden çok firma dışından gelen bilgi önem arz etmektedir. Ancak firma da dışarıdaki bilgiyi kendi anlık bilgi seviyesine göre anlamlandırıp özümseyebilir.

Firmaların yetenek ölçümü konusu literatürde detaylı tartışılmıştır. Son yıllarda öne çıkan en önemli yetenek tespit aracı dinamik yetenekler olarak öne çıkmaktadır. Wang ve Ahmed (2007) dinamik yeteneklerin üç temel yetenekten oluştuğunu göstermiştir. Özümseme yeteneği, uyum yeteneği ve yenilik yeteneği.

Dinamik Yetenekler

Bu tezin ana amacı ana savunma sanayi firmaların kendi altyüklenicilerinde oluşturduğu yetenek katkısını araştırmak ve bunu artırmak için yapılabilecekleri ortaya koymaktır. Dinamik yeteneklerin en bilinen tanımı Teece ve arkadaşları (1997) tarafından yapılmıştır. Onlar dinamik yetenekleri "firmanın hızla değişen çevre koşullarına göre kendi iç ve dış süreçlerini konfigüre etme yeteneği" olarak tanımlamıştır. Lu ve arkadaşları (2010) dinamik yetenekleri yeni bir rekabet avantajı ölçüm aracı olarak tanımlamıştır.

Dinamik yeteneklere yaklaşımının temeli firmanın "varlıklar" odaklı olarak başlamıştır. Varlık olarak büyük olan firmaların daha az olan firmalardan daha yüksek başarı gösterdiği yaklaşımı hala kullanılmakla birlikte gelişen teknoloji ve artan pazar dinamizmi bu yaklaşımın etkisini azaltmıştır. Varlıklar yaklaşımını benimseyen çalışmalar Amit ve Schoemaker (1993) ve Barney (1991) firmaların sahip olduğu, firmalar gelir ve avantaj sağlayan ve firmalar arasında farklılık gösteren varlıklar firmaları ayırt edebilmek için önemli bir ayıraç görevi üstlenmektedir. Yetenek ölçümlerine ilk sistematik yaklaşım olarak kullanılsa da varlık yaklaşımı bugün özellikle yüksek teknoloji sektörler için uygulanabilir olmaktan çıkmıştır. Bu nedenle dinamik yetenekler son yaklaşımda firmaların çevre koşullarına göre evrimini de ekleyerek genişlemiştir.

Savunma sanayi gibi yüksek teknolojik bir alanda çalışma yaparken de dinamik yetenekler yaklaşımı kullanılabilecek en iyi yaklaşım olarak öne çıkmaktadır. Bu nedenle dinamik yaklaşımlar ve onun bileşenleri olan; özümseme yeteneği, uyum yeteneği ve yenilik yeteneği detaylı incelenmiştir.

Özümseme yeteneği için en bilinen çalışmalardan biri Cohen ve Levinthal (1990) çalışmasıdır. Onlar özümseme yeteneğini firmanın dışarıdaki değer katan yeni bilgiyi ayurt etme, firma bünyesinde emilimini sağlama olarak tanımlamıştır. Özümseme

yeteneğinin temel anlamı bu yetenek yükseldikçe firmaya dışarıdan bilginin girişinin kolaylaşmasıdır. Firmanın özümseme yeteneğini ölçmek için gerçekleştirilen çalışmalarda bu ölçümü gerçekleştirmek için farklı parametreler kullanılmıştır. Bu çalışmalarda en çok öne çıkan faktör Ar-Ge harcaması olarak öne çıkmaktadır. Bazı çalışmalarda patent sayısı ve Ar-Ge personel sayısı kullanılsa da çalışmalarda ortak olarak öne çıkan en belirgin faktör Ar-Ge harcaması olarak öne çıkmaktadır.

Yenilik yeteneği soruları için ise Cockborn ve arkadaşları (2000), Deeds ve arkadaşları (1999) ve Saulina ve arkadaşları (2014) çalışmaları temel alınmıştır. Bu çalışmalarda yenilik için temel ölçüm alanı yeni ürün ortaya koyma yeteneği ele alınmıştır.

Adaptasyon yeteneği için ise Alvarez ve Merino (2003) ile Rindova ve Kotha (2001) çalışmaları temel alınmıştır. Bu konuda öncü çalışma olan Chakravarthy (1982) çalışması da önemli yer teşkil etmektedir.

Bu çalışmaları bir araya getiren ve dinamik yetenekler altında birleştiren ise Wang ve Ahmed (2007) çalışmasıdır. Bu yöntem ile üç ayrı dinamik yetenek, birebir görüşmeler ile veri toplama yöntemi firmalardan elde edilen veriler, irdelenerek incelenmiş ve firmaların elde ettiği katkı araştırılmıştır. Bunun gerçekleştirme yöntemi ise çalışma metodu bölümünde ele alınmıştır.

ÇALIŞMA METODU

Tez çalışmanın en önemli aşamalarından birisi çalışma metodolojisinin oluşturulması idi. Savunma Sanayi yapısı gereği veri toplaması oldukça zor bir sektör olarak öne çıkmaktadır. Bu çalışmada da en önemli konu firmalardan bu verinin alınması idi. Bunun için gerekli aktörler ile de görüşmeler gerçekleştirilerek destekleri sağlandı. Bunun yanında görüşme sorularının belirlenmesi, görüşme için firma seçimi ve ikili görüşmeler metodolojinin özünü oluşturmaktadır.

Görüşme Sorularının Tasarımı

Firma görüşmelerinde sorulacak sorular için temel alınan nokta dinamik yeteneklerin her bir parametrenin sorgulanması idi, bunun yanında küme faaliyetleri, diğer işbirlikleri ve firma ile ilgili genel bilgilere de sorular arasında yer verildi. Özümseme yeteneği ile ilgili Ar-Ge tabanlı sorular, yenilik yeteneği ile ilgili yeni ürün ortaya çıkarma ile ilgili sorular ve son olarak, adaptasyon yeteneği için ihracat ile ilgili sorular ele alınmıştır. A-Ge soruları için Cohen ve Levinthal (1990), Schoenecker ve Swanson (2002) ve Zahra ve George (2002) çalışmaları esas alınmıştır. Yenilik yeteneği için, Cockborn ve arkadaşları (2000), Deeds ve arkadaşları (1999) ve Saulina ve arkadaşları (2014) çalışmaları temel alınmıştır. Bu çalışmaların tamamında yenilik yeteneği yeni ürün oranı ile ölçülmektedir. Adaptasyon yeteneği kapsamında ise Alvarez ve Merino (2003) tarafından ihracat yeteneği kullanılmıştır.

Firmalar ile gerçekleştirilen mülakatların yanı sıra SSM, Ana Savunma Sanayi Firmaları, Savunma Sanayi Kümelenmeleri, KOSGEB ve yabancı firmalar ile de yarı yapılandırılmış mülakatlar gerçekleştirilmiştir.

Firma Seçimi

Görüşülecek firmaların seçimi de çalışma için oldukça kritik bir aşamadır. Firmalarda pilot ve saha çalışması olmak üzere iki aşamada veri toplanmıştır. Pilot çalışmada 18 firma ile görüşme gerçekleştirilmiş ve bu firmalar SSM EYDEP Projesi kapsamında belirlenene firmalar arasından seçilmiştir. Saha çalışması için 76 firma ile görüşme gerçekleştirilmiştir. Bu firmalardan 26'sı gerekli veriyi sağlayamadığı için 50 firma kalmıştır. 50 firmadan 5'i vakıf ya da ana yüklenici firmalara ait olduğundan ve rekabet ortamında yer almadığından çalışmaya dahil edilmemiştir. Geri kalan 45 firma ile çalışmalar yürütülmüştür.

İkili Görüşmeler

Tez çalışmasının ana veri kaynağı ikili görüşmelere dayanmaktadır. İkili görüşmelerde firmaların yanı sıra savunma sanayinin diğer paydaşları; SASAD,

SSM, Savunma Sanayi Kümelenmeleri ve KOSGEB ile de görüşmeler sağlanmıştır. Firmalar için belirlenmiş soru setleri kullanılırken diğer mülakatlarda yarı yapılandırılmış mülakat soruları kullanılmıştır.

VERİ ANALİZİ

153 görüşmeyi tamamladıktan sonra artık elimizde Türk Savunma Sanayi adına çok kıymetli veriler mevcuttu. Bu bölümde elde ettiğimiz bu veriler analiz edilerek sonuçlar çıkarılmaktadır. Firmalar ve diğer paydaşlar ile yapılan görüşmeler sonucunda gerek sayısal gerek sözel detaylı veriler elde edilmiştir. Verilerden sonuca ulaşmadan önce verilen geçerliliği ve güvenilirliği sorgulanmıştır.

Verinin Geçerliliği ve Güvenilirliği

Firmalardan toplanan verilerin geçerliliğinin ölçümü için faktör analizi güvenilirliği için ise "Cronbach's alpha" metodu kullanılmıştır. Analiz edilen verilerin geçerli ve güvenilir olduğu ortaya konmuştur.

Sonuçlar

Anketlerden elde ettiğimiz sonuçları incelediğimizde savunma sanayi ile çalışmanın firmaların özümseme, uyum ve yenilik yeteneğine katkı yaptığını ortaya koymuştur. Böylece savunma sanayi ile çalışmanın firmanın dinamik yeteneklerine katkı sağladığı desteklenmiştir. Sayısal analizlerin yanı sıra firmalar ile yapılan görüşmelerde de bu sonucu destekler nitelikte veriler elde edilmiştir. Bunun yanında önemli bulgular elde edilmiştir; 6 firmada büyümenin 240-250 bandında yıllardır sabit kaldığı görülmüştür. Bunun yanında firmalar belirli varlıları eksik olan firmaların ihalelere girip iş aldığından yoğun bir şekilde şikayet etmiştir. 18 üretim ve tasarım firmasının 9'u sadece tasarım odağı ile sürece başlamış ancak sonrasında sadece tasarım faaliyetleri ile pazarda tutunmaları mümkün olmamıştır.

Bunun yanında diğer bir analizimiz savunma sanayi kümeleri ile ilgili olmuştur. Görüşülen 45 firmadan 42'si savunma sanayi kümesine üye durumdadır. Bunlar

arasında %88'i kümeleri faydalı bulmaktadır. Kümelerin neden faydalı bulunduğuna dair yaptığımız analizde firmalar daha çok "Küme içerisinde yer almak firmaların ortak eğitim faaliyetlerini geliştirmektedir." ve "Küme içerisinde yer almak firmaların ortak pazarlama/tanıtım faaliyetlerini geliştirmektedir" öğeleri üzerine yoğunlaşmış ve küme olmanın verdiği ana avantajlardan "ortak Ar-Ge", "ortak üretim" ya da "ortak yetenek havuzu" gibi kavramların yerleşmediği görülmüştür. Bunun yanında Ar-Ge harcamalarının firmaya önemli katma değer sağladığı yapılan analizlerde ortaya çıkmıştır.

Çalışmada diğer bir veri kaynağı sektördeki aktörler ile yürütülen yarı-yapılandırılmış mülakat analizleridir. SSM, ana yüklenici firmalar, savunma sanayi kümelenmeleri ve KOSGEB ile gerçekleştirilmiştir. Bu mülakatlarda; SSM, yetenek yaklaşımın sektördeki yeri ve gelecek vizyonu bunun en temel öğesi olan EYDEP Projesi ile ilgili bilgiler paylaşmıştır. Ana yüklenici firmaların bu konuda yaklaşımları ve bu yetenek katkısındaki farkındalıklarını görmek adına bu mülakatlar önemli geri bildirim sağlamış bu firmaların özellikle yap-satınal karar mekanizmasına ihtiyaç duydukları gözlenmiştir. KOSGEB ile savunma sanayinde verilen teşvikler değerlendirilmiş ve KOSGEB teşviklerinin odak ve uygulama açısından düzenlenmesi gerektiği sonucuna ulaşılmıştır. Bunun yanında savunma sanayi kümelenmeleri ile gerçekleştirilen görüşmeler kümelerin gerçek küme anlamından çok yığın gibi hareket ettiğini ve yetenek artışı sağlayabilmesi için yapının güncellenmesi gerekliliği sonucuna ulaşılmıştır. Bunun yanında savunma sanayi kümelenmeleri ile gerçekleştirilen görüşmeler firmalardan elde edilen bulguları desteklemiş ve bu küme yapılarının geçmiş ilişkilere dayanan doğal bir oluşum olmadığı ve Bölgesel Yenilik Sistemlerinin Ulusal Yenilik Sistemi ile bağlantılı olmadığı ortaya konmuştur.

POLİTİKA ÖNERİLERİ

Bu çalışmanın temel amacı ana savunma sanayi firmalarının savunma sanayi alt yüklenici firmalarında dinamik yetenekler oluşturup oluşturmadığını incelemek idi.

Çünkü savunma sanayinde bulunan altyüklenici firmalar sektörün dikey entegre karakteristiğinden ötürü gelişmek için ana yüklenici firmalara oldukça bağımlıdır. Çalışmanın önemi bu tarz bir yetenek ölçümü yaklaşımını savunma perspektifi ile uygulayan ilk bilinen çalışma olmasından kaynaklanmaktadır. Çalışmada firma yetenek ölçümü için bu şekilde bir yüksek teknoloji sektöre en iyi hitap eden yaklaşım olarak dinamik yetenekler yaklaşımı kullanılmıştır. Dinamik yeteneklerin üç ana bileşeni olan; özümseme yeteneği, uyum yeteneği ve yenilik yeteneği ayrı ayrı ele alınmıştır.

Elde ettiğimiz bulgular savunma sanayi ana yüklenici firmalar ile çalışmanın alt yüklenici firmalar ile çalışarak dinamik yeteneklerin her üç parametresinde de katkı sağladığına yönelik güçlü kanıtlar oluşturmuştur. Bu bulgular gerek sayısal gerek sözel kanıtlar ile desteklenmiştir.

Literatür ile karşılaştırdığımızda sonuçlarımızın öncelikle Wang ve Ahmed (2007) sonuçları ile uyumlu olduğu görülmektedir. Bunun yanı sıra özümseme yeteneği, uyum yeteneği ve yenilik yeteneği alanlarında ayrı ayrı gerçekleştirilen bir çok çalışma ile de yine uyumlu sonuçlar elde edilmiştir.

Bundan sonraki bölümde bu sonuçlar ve birebir yapılan röportajlarda elde edilen verilen ile oluşturulan politika önerileri ele alınacaktır.

Politika Önerileri

Gerçekleştirdiğimiz birebir görüşmeler ile savunma sanayi alanında kolay elde edilemeyecek bir veri ağına erişmiş olduk. Bu veriler ışığında gerçekleştirilen analizler ile gerek sayısal gerek sözel sonuçlar ortaya koyduk. Bu bölümde elde edilen bu veriler ışığında hali hazırda alt yüklenici firmalarına dinamik yetenek sağlayan ana savunma sanayi firmalarının bu firmalarda biriken yeteneği artırmak için ne gibi politikalar belirlenmesi gerektiği konusuna odaklandık. Politika

belirlemek için öncelikle sektörde bir haritalandırma analizi yapılması gerektiğinden gerçekleştirdiğimiz bu röportajlar ile sektörün haritasını ortaya koymuş olduk.

Politika belirlerken temel aldığımız yapı öncelikle politika amacı ortaya koyarak sonrasında politika önerileri belirlenmiş ve son olarak bu politika önerilerinin gerçekleşmesi için ortaya konması gereken araçlar ortaya konarak politikanın nasıl uygulanacağı konusuna cevap verilmiştir.

Gerçekleştirdiğimiz bu analizler sonucunda üç farklı politika amacı belirlenmiştir; KOBİ Destek Mekanizmalarının Düzenlenmesi, Savunma Sanayi Küme Yapısının Desteklenmesi ve Savunma Sanayi için Ar-Ge Odağının Desteklenmesi.

Politika Amacı: KOBİ Destek Mekanizmalarının Düzenlenmesi

Bilim, Teknoloji ve Sanayi Bakanlığının 03 Haziran 2011 tarih 635 sayılı ve 28. Maddesine göre KOBİ tanımı "personel sayısı 250 ve geliri 40 Milyon TL altında olan işletmeler". 2 yıl üst üste bu kriterleri sağlayamayan firma KOBİ statüsünü ve KOBİ firmalarına sağlanan teşvik avantajlarını kaybetmektedir. Gerçekleştirilen röportajlarda da bazı firmaların hızla büyüdükten sonra son birkaç yıl içerisinde 240-250 arasında tıkanıp kaldıkları ya da yapay firmalar kurarak KOBİ statülerini korumaya çalıştıkları gözlenmiştir. SSM Sanayileşme Piramidindeki sistem ya da alt sistem tasarlayıp üretebilecek firmaların ortaya çıkması mümkün olmamaktadır. Bununla birlikte KOSGEB ile gerçekleştirilen mülakatlarda Türkiye'de KOBİ'lerin ortalama yaşam süresi 18 yıla yakın iken Avrupa'da bu değerin 3,5-4 yıl olduğu gözlenmektedir.

Yine firmalar ile gerçekleştirilen mülakatlardaki diğer bir önemli gözlem firmalar savunma sanayinde tutunabilmek için önemli yatırımlar yaptıklarını direk ve dolaylı maliyetlerini arttırdıklarını buna rağmen "çantacı" diye tabir ettikleri yeni kurulan ve varlıklar açısından çok değersiz olan firmaların savunma sanayinde ihale aldıkları bir kısıt koyulmadığında da bu sürecin engellenemeyeceği belirtilmiştir.

Son olarak savunma sanayi yüksek teknolojik karakteristiği ile yeni kurulan firmalar için "hard to catch up" yakalanması güç sektörler arasındadır. Bu nedenle savunma sanayinin kendi bünyesinden çıkan ve sektörün dinamiklerini bilen firmaların savunma sanayine önemli katkı sağlayabileceği değerlendirilmektedir.

Bu bulgular bir araya geldiğinde KOBİ destekleme sisteminin düzenlenmesi gerektiği ortaya çıkmaktadır. Bu politika amacı için 3 politika önerisi getirilmiştir: KOBİ kısıtının düzenlenmesi, Panel ihale yapısının kurulması ve spin-off firmaların teşvik edilmesi.

KOBİ Kısıtının Düzenlenmesi

Daha önce de belirtildiği üzere KOBİ kısıtı savunma sanayinde güçlü 1. Seviye firmaların oluşturulması konusunda engel teşkil etmektedir. Bunun nasıl yapılacağı konusunda iki ayrı politika aracı önerilmiştir.

KOBİ Kısıtını Yüksek Teknoloji Sektörler için Rahatlatmak

19/10/2005 No.:2005/9617 kabine kararına atfen bir kanun değişikliği ile 03 Haziran 2011 tarih 635 sayılı ve 28.madde kapsamındaki KOBİ kısıtı yüksek teknoloji firmalar için rahatlatılabilir.

Savunma Spesifik KOBİ Tanımı

Politika önerisinin nasıl gerçekleştirileceğine yönelik diğer bir politika aracı KOBİ tanımını ayrıştırmak olabilir. Çin'de yerleşik KOBİ'ler ile gerçekleştirilen görüşmelerde Çin'deki KOBİ tanımının sabit olmadığı sektöre göre farklılık gösterdiği yapı benzeri bir statü kurulabilir. Bu politikalar uygulanıp KOBİ kısıtı rahatlatıldığında firmalar için büyüme engeli ortadan kalkacak ve savunma sanayi için birinci seviye alt yükleniciler yetiştirilebilecektir.

İhaleler için Panel Küme Oluşturulması

Firmalar mülakatlarda yaptıkları geribildirimlerde belli altyapıya sahip olmayan firmaların ihalelere kabul edilerek işler aldıklarını yatırım geri dönüşlerinde problem yaşadıklarını belirtmişlerdi. Bunun için ihalelerde panel kümesinin kurulmasının bu sorunu çözeceğini düşünüyoruz bunun nasıl yapılacağını belirleme için önerdiğimiz politika araçları; firma sınırlaması ve belli varlık kısıtlarının eklenmesidir.

Firma Sınıflandırılmasının Oluşturulması

EYDEP ile SSM'nin hâlihazırda savunma sanayide yetenek haritasını oluşturmayı amaçladığını belirtmiştik. Bu şekilde bir panel kümesi oluşturabilmek için bu yetenek haritası kullanılabilir. Ana savunma sanayi firmaların da kendi yetenek ölçüm metodu bulunmasına rağmen bu yaklaşım merkezi bakıştan uzaktır. SSM sözleşme metinlerine belirlenen sınıflardaki firmalara iş verilmesi şeklinde bir ekleme ile bu yapıyı kurabilir.

Varlık Kısıtının Eklenmesi

Varlık tabanlı yaklaşım dinamik yeteneklerin çıkış noktalarından birisi idi. Bu şekilde kamu ihale kanununda ve ana savunma sanayi firmaların satın alma yönergelerinde yapılacak değişiklik ile kısıt eklenebilir. Bu şekilde; belli altyapı, personel becerisi, test ortamı ya da finansal kısıt olarak eklenebilmesi mümkün olabilir.

Spin-Off'ları Destekleme

Diğer bir politika önerisi ise spin off firmaların desteklenmesidir. Savunma sanayi firmalar sıfırdan zor yetiştiği için bu politika önerisi oldukça önemlidir. Gerekli politika araçları; destek Pazar, vergi teşvikleri ve proje bazlı spin-off oluşturma olarak belirlenmiştir.

Destek Pazar

Savunma Sanayinde genellikle projeler büyük olmakla birlikte adetler düşüktür. Kriterlerin üst seviyede olduğu da göz önüne alındığında spin-off için çok elverişli değildi. Mülakatta spin-off firmaların belirttiği en büyük problem kuruluştaki Pazar problemi idi. Bu konuda spin-off'lar için gerek SSM gerek ana yüklenici firmalar bu yapıyı kurabilir.

Vergi Teşvikleri

Yeni kurulan firmalar halihazırda bir çok teşvik bulunmaktadır ancak bunlar genellikle Ar-Ge odaklıdır. Bu kanun çerçevelerinin spin-off firmalar için Ar-Ge yapma zorunluluğundan muaf tutularak geliştirilmesi mümkün olabilir.

Proje Bazlı Spin-Off

Spin-off'lar için üçüncü politika aracı spin-offları direk proje odaklı iş paketleri üzerinden kurmak olabilir. Böylece ana yüklenici firma kendi çekirdek teknolojisine odaklanmış olur.

Özellikle uzun soluklu tank, gemi ve uçak projeleri altındaki belli geliştirme iş paketleri altyüklenici firmalara verilerek portföye yetenekli spin-offlar eklenebilir.

Bu öneriler birlikte KOBİ yapısı düzenlenmiş ve yetenekli KOBİ'ler için fırsat sağlandığı gibi yeni gelişen KOBİ'ler için de imkan oluşacaktır.

Politika Amacı: Savunma Sanayi Küme Yapısının Desteklenmesi

Yüksek teknoloji gereksinimi ile savunma sanayi bilgi akışının yoğun ve sürekli olduğu bir sektördür. Firmalara bir çok avantaj sağlayan küme yaklaşımının savunma sanayinde de desteklenmesi gerekir. Ancak gerçekleştirilen mülakatlar firmaların küme yaklaşımının gerçek faydasından habersiz olduğunu göstermiştir. Küme

yapısının desteklenmesi ile; ortak Ar-Ge, birlikte öğrenme, birlikte ihracat ve ortak personel havuzu gibi faydalar elde edilebilir. Küme yaklaşımı dinamik yeteneklerin tüm parametrelerine pozitif katkı yapabilecektir. Bu politika amacı için politika önerileri; değer zincirinin desteklenmesi ve Ulusal ve Bölgesel Yenilik Sistemi linkinin kurulması.

Değer Zincirinin Desteklenmesi

Kümeler ile ilgili en önemli konulardan biri kümeler geçmiş ilişkilere dayanan doğal oluşumlardır yapay olarak kurulamazlar. Değer zincirinin desteklenmesi için iki politika aracı; geçmiş ile bağlantı ve bilgi akışının sağlanmasıdır.

Geçmiş İlişkilere Odaklanmak

Türk savunma sanayi kümelenmelerinin bir çoğu geçmiş ilişkilere odaklanmaktan uzaktır. SSM halihazırda kümeleri desteklemektedir; eğitim, çalıştay ya da öncelikler tanımlayabilir. Ancak geçmiş ilişkilere yoğunlaşmak bilgi akışının durduğu lock-in ile sonuçlanmamalı bilgi akışının sürekliliği sağlanmalıdır.

Bilgi Akışının Desteklenmesi

Bölgesel yenilik sistemi yaklaşımı global değer zincirleri ile bağlantılı olmanın önemine odaklanır. Kümelenmenin lock-in'e girmemesi için sürekli bilgi akışı oluşması gerekmektedir. Bunun için de bilgi akış ağlarının kurulması gerekmektedir.

Ulusal Yenilik Sistemi ile Bölgesel Yenilik Sistemi Bağlantısı

Kümelenmenin başarılı olabilmesi için Bölgesel Yenilik Sisteminin (BYS) Ulusal Yenilik Sistemi ile bağlantılı olması gerekmektedir. Bu bağlantının sağlanması için iki politika aracı önerilmiştir; geribildirim mekanizmasının kurulması ve yetenek analizi.

Geribildirim Mekanizması

İlk adım UYS ile BYS bağlantısını güçlendirmek için iki yönlü geribildirim mekanizmasının kurulmasıdır. Burada SSM aracı rolü üstlenerek UYS ve BYS arası akışta aracı olarak görev alabilir.

Yetenek Analizi Altyapısı

Daha önce odaklanan yetenek analizi UYS-BYS bağlantısının kurulabilmesi için önemli bir araç olarak öne çıkmaktadır. Yetenekler ulusal yenilik seviyesinde nesnel olarak görülebilir ise UYS seviyesinde BYS beklentileri yansıtılabilir.

Bu politikanın uygulanması ile birlikte yüksek teknoloji karakteristiği ile birlikte çalışmanın çok önemli olduğu savunma sanayi için sinerji oluşturan altyapılar daha etkin kullanılabilecektir. Son politika önerimiz ise firma rekabet avantajına katkısı en yüksek parametre olan Ar-Ge odağının desteklenmesi olarak belirlenmiştir.

Politika Aracı: Ar-Ge Odağını Destekleme

Bulgularımız Ar-Ge harcamanın dinamik yetenekler üzerinde ve dolayısı ile rekabet avantajı üzerindeki en etkili parametre olarak belirledik. Fakat birebir görüşmelerde bir çok firmanın Ar-Ge odağı ile başlayıp buradan kendini finanse edemeyip üretime yöneldiğini gözlemledik. Ar-Ge odağı için ana yüklenici firmalar uygun karar destek sistemine sahip olurken, ihmal edilen patent konusun gündeme gelmesi gerekmektedir. Bunun yanında teşvik mekanizmasının da düzenlenmesi gerekmektedir. Bu konuda politika önerilerimiz; Yap-Satın Al Karar Destek Mekanizmasının Kurulması, patentin desteklenmesi ve teşvik mekanizmasının düzenlenmesi olarak belirlenmiştir.

Yap Satın-Al Karar Destek Sistemi Kurulması

Konunun özünde ana savunma sanayi firmalarının yan sanayi firmalarına yetenek aktarımını incelediğimizden, ana faaliyet ana yüklenicinin yap-satın al karar

mekanizmasında yer almaktadır. Ana savunma sanayi firmasının verdiği firma olanakları ile yap ya da dışarıdan satın al kararı burada belirleyici unsur olarak öne çıkmaktadır.

Ana savunma sanayi firmalarının aktiviteleri

1- Firma çekirdek aktiviteleri (firmanın var olma nedeni olan aktiviteler)
2- Çekirdek aktivitelere yakın aktiviteler (çekirdek aktivitelere direk bağlantılı)
3- Çekirdek aktivitelere uzak aktiviteler (destek aktiviteleri)
4- Vazgeçilebilir aktiviteler (genel faaliyetler)

Ana fikir sadece şirketin çekirdek aktivitelerini içerde yapmak üzerine yoğunlaşmaktadır. Çekirdek aktiviteler üçe ayrılmaktadır.

- Müşterilerin gözünde firmayı rakiplerinden ayıran aktiviteler
- Firmaya rekabet gücü, kaynak ve özel yetenek kazandıran aktiviteler. Bu güç ile rakiplerden sürdürülebilir şekilde önde olmak ve imitasyon riskinden uzaklaşmak
- Birden fazla kritik amaca hizmet eden faaliyetler.

Bu özelliklere sahip faaliyetlerin firma içerisinde gerçekleştirilmesi gerekmektedir.

Baykal ve Aslan'ın Proje Yönetim Enstitüsünün Mayıs 2017 Roma Kongresinde sunduğu yaklaşımı burada politika önerisi olarak kullanılmaktadır. Baykal ve Aslan tarafından geliştirilen yöntem firmaların yap-satın al kararı için bir karar destek mekanizması olarak görev yapmakta ve firmaların bu kararı vermesini kolaylaştırmaktadır. Bu yaklaşımın uygulanabilmesi için iki politika aracı önerilmiştir. Yetenek temelli yaklaşım ve iş paketlerini analitik düzleme yansıtma.

Yetenek Temelli Yaklaşım

Etkili bir yap-satın al karar destek sistemi kurabilmek için ilk önemli araç yetenek bazlı yaklaşımdır. Bu yaklaşım ile firmada gerçekleştirilen her aktivite firmanın çekirdek yetenekleri ile karşılaştırılarak her aktivitenin yetenek değeri hesaplanır. Bu

yaklaşımda ele alınan her faaliyet firmanın bir ya da birden fazla çekirdek yeteneğine temas edebilir ya da bunların tamamından uzak olabilir.

İş Paketlerini Analitik Düzleme Yansıtma

Yap-Satın Al kararı için bir diğer önemli araç iş paketlerini analitik düzlem üzerine yansıtmaktır. Yetenek değeri hesaplanmasından sonra her bir faaliyet maliyeti de ele alınarak aşağıdaki gibi analitik düzleme yansıtılır. Sonrasında analitik düzlem üzerinde kısıtlar göz önüne alınarak yapılan analiz ile içeride yapılması gereken ve alt yüklenici firmaya verilmesi gereken işler belirlenir.

Patentlerin Desteklenmesi

Literatürde özümseme yeteneğinin en önemli bileşenlerinden olan patent Türk savunma sanayinde oldukça ihmal edilmiştir. Pilot görüşmelerde görüşülen 18 firmada sadece 2 adet patent başvurusu görüldüğünden önemli bir bileşen olmasına rağmen saha araştırmasından listeden çıkarılmıştır. Patentin desteklenmesi için önerdiğimiz politika araçları; patent için teşviklerin tanımlanması ve patentin bir performans göstergesi olarak eklenmesi

Patent İçin Teşvik Mekanizması

Halihazırda patent başvuruları için tanımlanmış KOSGEB ve TÜBİTAK teşvikleri bulunsa da başvuru sürecine yönelik bir teşvik mekanizması bulunmamaktadır. Patentler için net teşvik mekanizmaları tanımlanmalıdır. SSM'nin bu konuda devreye girmesi ve teşvik mekanizmaları tanımlaması gerekmektedir. Bunun için de yerli teşvikler ve yabancı teşvikler için kademeli teşvikler sağlanabilir.

Patentin Performans Göstergesi Olarak Eklenmesi

Firmalar için patent başvurusu genellikle gereksiz bir çaba olarak değerlendirilmektedir. SSM ve ana yüklenici firmalar tarafından değerlendirme kriterlerine patent başvurusu ağırlıkları arttırılabilir.

Teşviklerin Düzenlenmesi

Birebir görüşmelerde teşvikler ile ilgili temel şikayet noktalarından birisi teşviklerin odak eksiği olarak öne çıkmaktadır. Bunun yanında verilen teşviklere yönelik etki analizinde ise ciddi eksiklikler bulunmaktadır.

Teşviklerin Odaklanması

Eğer teşvikler doğru odaklanır ise Ar-Ge odağı da arttırılabilir. Özellikle yüksek teknoloji teşviklerinin ayrıştırılması gerekmektedir. Bu konuda son dönemde KOSGEB yüksek teknoloji odaklı teşvikler başlatmıştır.

Geri Bildirim Analizi

Önceki verilen teşvikler için etki analizi yapılarak sonraki verilecek teşvikler ile ilgili geribildirimler toplanabilir. Bu şekilde yeni verilecek teşviklerin daha etkili kullanılabilmesi sağlanabilir.

Bu politika amacı ile firma rekabet avantajında en etkin parametre olarak belirlenen Ar-Ge odağı arttırılacak ve firmaların dinamik yeteneklerine katkı sağlanacaktır.

Sonuç olarak elde edilen sonuçlara bağlı olarak üç farklı politika amacı belirlenmiştir; KOBİ Destek Mekanizmalarının Düzenlenmesi, Savunma Sanayi Küme Yapısının Desteklenmesi ve Savunma Sanayi için Ar-Ge Odağının Desteklenmesi. Her bir politika amacı için ilgili politika önerisi ve bu öneriyi gerçekleştirebilmek için politika aracı belirlenmiştir. Bu politikaların uygulanması ile halihazırda firmaların gelişimine katkıda bulunduğu tespit edilen savunma sanayi işbirliğinin katkısının arttırılacağı değerlendirilmektedir. Sonraki bölümde elde edilen bulgular özetlenecektir.

ÖZET

Türkiye Savunma Sanayinde ana yüklenici firmaların alt yüklenici firmalara yetenek katkısını incelediğimiz bu tezimizde öncelikle kritik konu bu yetenek ölçümü için kriteri belirlemek idi. Bunun için kapsamı ve yüksek teknoloji odağı ile dinamik yetenekler yaklaşımı kullanılmıştır. Dinamik yetenekler rekabet avantajı yerine kullanılmaktadır. Bu yaklaşım ile savunma sanayinde ilişkiler incelenmiştir. Bunun yanında savunma sanayindeki ilgili paydaşların etkileri de incelenmiştir. Bu inceleme sırasında Wang ve Ahmed (2004)'in önerdiği Dinamik yetenekleri 3 ayrı kolu olan; özümseme yeteneği, adaptasyon yeteneği ve yenilik yeteneği analiz edilmiştir.

Tez çalışması savunma sanayinin gelişimi ile birebir uyumlu görünmektedir. Savunma Sanayinde 2000'li yıllardan itibaren alt yüklenici odağı arttırılmış ve özellikle son yıllarda sanayileşme üçgeni yapısı ve EYDEP Projesi ile bu odak yükselmiş ve gelecek planları arasına da yerleşmiştir.

Literatürde yer alan deneysel çalışmalarda kullanılan parametreler; özümseme yeteneği için Ar-Ge harcaması, yenilik yeteneği için yeni ürün oranı ve uyum yeteneği için firmanın ihracat yapacak seviyeye ulaşması anlamına gelen ihracat yeteneği kullanılarak analizler gerçekleştirilmiştir.

Yapılan analizlerde savunma sanayi ile çalışmanın firmaların bu üç yeteneğine de katkı yaptığına dair destekleyici veriler ortaya konmuştur. Sonrasında yapılan regresyon analizi ile bu yeteneklerin firmanın rekabetçi avantajına katkı sağladığı görülmüştür. Elde edilen bulgular literatürdeki benzer çalışmalar ile karşılaştırıldığında her üç yetenek için de literatürde bu katkıyı analiz eden çalışmaları destekleyici sonuçlar elde edilmiştir.

Birebir görüşmelerden alınan cevaplar firmaların yetenek gelişimi için yapılacak faaliyetler hakkında önemli geri bildirim sağlamıştır. Bu konuda elde edilen bulgular ile 3 ana politika amacı belirlenmiştir; KOBİ Destek Mekanizmalarının

Düzenlenmesi, Savunma Sanayi Küme Yapısının Desteklenmesi ve Savunma Sanayi için Ar-Ge Odağının Desteklenmesi. Bu politika amaçlarının her biri için politika önerileri ve politika araçları oluşturulmuştur. Önerilen bu politikaların alt yüklenici firmaların dinamik yeteneklerine önemli katkılar yapacağı değerlendirilmektedir.

Sonuç olarak tezdeki temel bulgumuz savunma sanayi ile çalışmak firmaların dinamik yeteneklerine önemli katkılar sağlamakta olup gerekli politika araçları ile bu katkının arttırılabileceği değerlendirilmektedir.

Gelecek çalışma önerimizi ise hızla değişen dinamik bir sektör olduğu için benzer bir çalışmanın birkaç yıl sonra tekrar gerçekleştirilmesidir. Böylece hali hazırda uygulanan politikaların da etkinliği ölçülmüş olacaktır. Diğer bir önerimiz benzer çalışmaların diğer sektörlere de uygulanması ve diğer sektörlerde bu katkının analiz edilmesidir.

F. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: ASLAN, Murat
Nationality: Turkish (TC)
Date and Place of Birth: 11 Jan 1983, Malatya
Marital Status: Married
Phone: +90 505 668 08 61
email: maslan@aselsan.com.tr

EDUCATION

Degree	Institution	Year of Graduation
MS	METU Industrial Engineering	2008
BS	METU Industrial Engineering	2005
High School	Malatya Science High School	2000

WORK EXPERIENCE

Year	Place	Enrollment
2015- Present	ASELSAN, ANKARA	Supply Chain Manager
2006-2015	ASELSAN, ANKARA	Project Manager
2005-2006	OTOKAR, SAKARYA	Procurement Engineer

FOREIGN LANGUAGES

Advanced English, Intermediate German

PUBLICATIONS

1. Aslan M., Isik H. "Green Energy For the Battlefield", International Journal of Green Energy, 14(12), 1020-1026, (2017).

HOBBIES

Computer Technologies, Movies, Football

G. TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : Aslan
Adı : Murat
Bölümü : Bilim ve Teknoloji Politika Çalışmaları

TEZİN ADI (İngilizce) : The Capability Contribution Of Main Defense Industry Firms To Their Suppliers: A Dynamic Capabilities View

TEZİN TÜRÜ : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: