

REPUBLIC OF TURKEY
ANKARA UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES

**DEPARTMENT OF INTELLECTUAL PROPERTY, TECHNOLOGY
POLICIES AND INNOVATION MANAGEMENT**

**THE ROLE OF INTELLECTUAL PROPERTY RIGHTS
PROTECTION IN DEFENSE INDUSTRY**

Master's Thesis

Hilal ASLAN

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DECLARATION
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To the Directorship of Graduate School of Social Sciences

I hereby, declare that all information in my master's thesis named "The Role of Intellectual Property Rights Protection in Defense Industry (Ankara, 2021)" which has been prepared under the supervision of Assist. Prof. Dr. Zehra ÖZKAN ÜNER has been gathered and submitted in compliance with academic rules and ethical conduct principles and as required by these rules and principles, I have fully indicated and cited all sources that are not original to this work. I also declare that, I have acted according to scientific research and ethical rules during the study process and if it is proven otherwise, I will accept all legal consequences.

Date:

Hilal Aslan

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ABBREVIATIONS

WTO	World Trade Organisation
WIPO	World Intellectual Property Rights Organisation
ibid.	In The Same Source
PCT	Patent Cooperation Treaty
EPC	European Patent Convention
FAR	Federal Acquisition Regulation
DEFAR	Defense Federal Acquisition Regulation
U.S.	United States
UK	United Kingdom
ECJ	European Court Of Justice
EPO	European Patent Office
etc.	Etcetera
UKPTO	United Kingdom Patent And Trademark Office
USPTO	United States Patent And Trademark Office
p.	Page
ed.	Edition
TRIPS	Trade-Related Aspects Of Intellectual Property Rights
DIB	Defense Industrial Base
IP	Intellectual Property
IPR	Intellectual Property Right
TLOs	Technology Licensing Offices
TTOs	Technology Transfer Offices
TMOs	Technology Management Offices
DFARS	Defense Federal Acquisition Regulation Supplement

EU	European Union
vol.	Volume
MOD	Minister Of Defense
DOD	Department Of Defense
R&D	Research And Development
R&T	Research And Technology
DEFCON	Defense Conditions
NCW	Network Centric Warfare
COTS	Commercial Of The Shelf
TPTO	Turkish Patent And Trademark Office
TAF	Turkish Air Force
RFP	Request For Proposal
L&R	License and Review

INTRODUCTION

The defense industry is a complex and technology-based industry which consists of the sum of industrial assets that provide basic elements to national security and military power. The defense industry includes country's defense-related value, employment and the sum of its technology-creating manufacturers or the entire companies that provides defense or defense-related dual use equipment to the public defense authorities. Technology and innovation are momentous for a military to remain and consolidate their strategic superiority. The role of companies and research and development (R&D) centres which are directly working with the public defense authorities being the sole remedy for critical technological and industrial base for the development of military programs dwindled as they do not typify the whole network of competences necessary for increasing military capabilities. The technologies which are generated within the commercial sphere and applicable to defense industry, namely dual use technologies such as artificial intelligence, machine learning, robotics, data fusion and many other digital and information technologies emerge outside the boundaries of defense industrial base (DIB). They are developed under a novel industry ecosystems and by start-ups aroused in these systems. Under such a circumstance, structuring and maintaining independent and superior military capabilities necessitates a transition to a new industry ecosystem through the channels of open innovation, increasing the quantity of the actors in the commercial market and promoting R&D activities conducted for the development of emerging dual use technologies.

The IPR policies of governments plays a highly critical role in defense acquisition and maintenance of the state-of-art technologies and the advancement of the defense capabilities. Enabling the commercialization of the valuable IPRs in the civilian

sector facilitates engaging in open innovation, attracts commercial business towards the defense industrial base and in this way increases the application of civil high technologies within the defense industry. The IPRs are also proved to be the main impulsion of the dissemination of information and technological diffusion because it incentivises the technology producers and leads a competitive market environment. Such an impact of IPRs promotes productivity and increases the cumulative technological assets which are sought by the defense applicability as well as their quality and cost-efficiency. Each category of intellectual property rights has separate aspects for innovation and technology diffusion and eventually for the civil-military integration. IPRs which have the most value for defense technologies are patents, copyrights, trademarks and trade secrets. In order to accomplish the objective of this study in which the epicentrum subject is the intellectual property aspect of defense industry, these relevant branches under intellectual property protection will be separately analysed.

On the other hand, there is a unique parameter of defense industry, that does not exist in other industries: "national security". For security reasons, governments do not want the technologies developed by themselves to be learned by their adversaries, or even heard most of the time. The need for innovation and national security objectives to be accomplished together without being detrimental towards each other would only be satisfied through implementing a well-structured IPRs management which is strengthened by a detailed IPRs law such as the most elaborated body of law of the U.S. This study analyses such role of IPRs protection and management in defense industries and present exemplary IPRs implications in technology acquisitions of the public defense authorities around the world.

The first chapter of the study provides an overview of IPRs relevant to the defense industry technology acquisition transactions in the consideration of international agreements.

The second chapter details the characteristics of defense industry and explains why the IPRs protection matters for the technological development in the defense industry.

Lastly, the third chapter illustrates the IPRs management under governments technology acquisition contracts and pinpoints the IPRs policies and laws of U.S., UK and Turkey in regards to defense industry.

CHAPTER ONE

OVERVIEW OF IPRs RELEVANT TO DEFENSE INDUSTRY

I. The Concept of Intellectual Property and Intellectual Property Rights

The concept of intellectual property, created by the human mind; inventions, literary and artistic works, symbols, names, shapes and designs used for commercial purposes. The concept of intellectual property is defined as a product of the human mind, whereas the intellectual property rights (IPR) can be defined as rights which can be enforced on products created by the human mind¹. Intellectual property rights have an independent existence and legal value separate from the article in which they are embodied. Intellectual property rights are absolute legal rights, that is, they can be asserted against everyone².

The phrase “Intellectual Property” comprehends two branches, (i) industrial property, (ii) copyright³.

Pursuant to the Article 2 of the Convention Establishing the World Intellectual Property Organization (signed at Stockholm on July 14, 1967), intellectual property shall include the rights relating to:

- “- literary, artistic and scientific works,*
- performances of performing artists, phonograms, and broadcasts,*
- inventions in all fields of human endeavor,*
- scientific discoveries,*
- industrial designs,*

¹**Dijk**, Theon Van, “The Economic Theory Of Patents: A Survey”, Maastricht Economic Research Institute on Innovation and Technology (MERIT) Research Memorandum, 2/94-017, p.6

²**Turan**, Metin, “Freedom of Thought throughout the Ages: Evaluation of Historical Progress of Copyright in Turkey and the World”, Türk Kütüphaneciliği, vol.30, 2016, p.212

³**WIPO**, “Intellectual Property Handbook”, WIPO Publication, 2nd ed., 2008, p.3 (WIPO IP Handbook).

- *trademarks, service marks, and commercial names and designations,*
- *protection against unfair competition,*

and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields”⁴.

Industrial property branch of the intellectual property consists of “*inventions, industrial designs, trademarks, service marks, commercial names and designations*” and it is also in correlation with the protection against unfair competition. The first item on the list “*literary, artistic and scientific works*” represents copyright material.

According to Paris Convention, “*patents, utility models, industrial designs, trademarks, service marks, trade names, indications of source or appellations of origin, and the repression of unfair competition*” are listed as the objects of industrial property protection.

Under The Trade Related Aspects of Intellectual Property (“TRIPS”) Agreement (came into effect on 1 January 1995) which is a multilateral agreement administered by the World Trade Organisation (“WTO”) the intellectual property rights are separated into two groups: (i) copyright and copyright related rights (including but not limited to computer software) is the first group covered under the agreement where the right holder is provided in title the right to authorize or to prohibit the commercial rental to the public of originals or copies of their copyright works⁵ and the rights of the authors of literary or artistic works are protected by copyright for a period of at least 50 years after the author dies⁶. (ii) The second group, consists of industrial property rights which are subcategorised into two areas. The first area is the preservation of distinctive marks, such as geographical indications and trademarks. Other types of industrial property aim to provide of first priority on the protection for the creation of technology, design and technological innovation. This category includes patents, industrial designs and trade secrets.

⁴ Convention Establishing the World Intellectual Property Organization (signed at Stockholm on July 14, 1967), Article 2.

⁵ The Trade-Related Aspects of Intellectual Property Agreement (“TRIPS”), Article 11.

⁶ TRIPS, Article 12.

Intellectual property law, is the body of rules governing both the individual and organisational rights to command the exploitation and dissemination of knowledge. World Intellectual Property Organisation (WIPO) defines such law as the rules of “safeguarding creators and other producers of intellectual goods and services by granting them certain time-limited rights to control the use made of those products” by emphasizing that these rights are not granted for the physical configurations where the creation may be embodied but rather for intellectual creation as such⁷.

Traditionally, under legal systems, such control is empowered by similar protections. Patent law confer upon the inventors of novel products and processes to exclude others from producing, using or selling their inventions. The creators of original forms of expression such as, Works of arts movies, books and musical compositions are entitled to have exclusive rights to reproduce, adapt and publicly perform their work under copyright law. Trademark law enables the application of distinctive words or symbols to the products to exclude the competitors of the trademark owner from using the exact or confusingly similar sign or expression. Lastly trade-secret laws regulates the restrictions on the competitors in terms of the unjust exploitation of confidential information which contains commercially valuable information⁸.

II. Protection of Intellectual Property Rights and The World Intellectual Property Organization (WIPO)

The World Intellectual Property Organization is the leading international organization created to create and manage a balanced and accessible intellectual property system in the world. It was founded on 14 July 1967 in Stockholm, Switzerland.

WIPO is based on the Paris Convention on the Protection of Industrial Property of 1883 and the Bern Convention on the Protection of Literary and Artistic Works of 1886. The Paris Convention, which came into force in 1883, marks an important milestone with its first treaty on the international regulation of IPRs and guides the subsequent arrangements. In the period from the Paris Convention to the present day,

⁷WIPO, IP Handbook, p.3

⁸Fisher, William Weston. "Intellectual-property law". Encyclopaedia Britannica, 11 March 2021, <https://www.britannica.com/topic/intellectual-property-law> , accessed 12 May 2021.

many international agreements and institutional arrangements have been made in the world regarding the regulation of IPRs. Globally, since 1883, many steps have been taken to develop IPRs and some regulations and agreements have been put forward to harmonize patent application and registration procedures and formalities between countries within a legal system. One of the most important of these regulations is the establishment of the World Intellectual Property Rights (WIPO). The WIPO Treaty, signed in 1967, came into force in 1970 and was revised in 1979. WIPO, an intergovernmental organization, has been one of the specialized organizations within the United Nations agency system since 1974. WIPO's main goal is set to expand IPR protection worldwide. For this purpose, WIPO helps countries in the regulation and updating of national laws by preparing international agreements and conventions⁹.

The International Offices created by the Paris and Bern Agreements were merged in 1893 and named the United International Bureau for the Protection of Intellectual Property (BIRPI). In 1970, the U.S. was replaced by WIPO. In 1996, WIPO signed a cooperation agreement with the World Trade Organization, emphasizing the importance of intellectual property rights in global trade and expanding its role in this field¹⁰.

The main purpose of WIPO is to work towards the effective protection of intellectual property rights all over the world and to ensure administrative cooperation between intellectual property associations established in accordance with agreements governed by WIPO. In this context, WIPO cooperates with countries and international organizations, prepares agreements on such rights and ensures their entry into force. As of today, WIPO is responsible for coordinating and executing a total of 25 agreements with the Organization's Founding Convention, including seventeen industrial property and eight copyright agreements. For these purposes, WIPO also carries out activities such as law studies, assistance to countries in legal and technical matters, encouraging the preparation of international agreements aimed at improving intellectual property

⁹**Gökovalı, Ummuhan &Bozkurt, Kurtuluş**,“Patents as being one form of Intellectual Property Rights: Historical Overview of Worldwide and Turkish Evidence”, Muğla Üniversitesi Sosyal Bilimler Enstitüsü Magazine (İLKE), vol. 17, 2006, p. 139

¹⁰**WIPO**, A Brief History, <https://www.wipo.int/about-wipo/en/history.html> , accessed 12 May 2021.

protection, collecting and publishing all information related to this field, international classification, standardization and registration activities¹¹.

WIPO ascertain that, there are two fundamental ground for countries to regulate intellectual property: first is *“to give statutory expression to the rights of creators and innovators in their creations and innovations, balanced against the public interest in accessing creations and innovations”* and second is *“to promote creativity and innovation, so contributing to economic and social development”*¹². Similarly, The TRIPS Agreement emphasises the importance of the protection and enforcement of intellectual property rights for the contribution and promotion of *“technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations”*¹³.

III. Objective of The Intellectual Property Rights Protection

The social purpose of these rights is to ensure that the outcomes of the investments in developing new technology shall be protected for the benefit of the actors in such investments and thus provide incentives and instruments to finance R&D activities. According to the TRIPS agreement, *“developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base”* as it encourages technology transfer and set the rules to assist a well-functioning intellectual property regime in order to facilitate technology transfer in the form of licensing, partnership and direct investment¹⁴.

IV. Intellectual Property Rights and Defense Industry

All kinds of IPR protections are critical because they provide motivation to those who create new inventions and ideas. If there are no such motivation mechanisms,

¹¹WIPO, Inside WIPO, <https://www.wipo.int/about-wipo/en/>, accessed 12 May 2021.

¹²WIPO, “Understanding the Industrial Property”, 2nd ed., WIPO Publication, Geneva, 2016, p.5

¹³TRIPS, Article 7.

¹⁴ TRIPS, Article 66.

it will not be attractive for people to create new inventions and thoughts. Today, the increase of knowledge-based activities, the development of economic activities and international trade globally also increases the demand for IPR protections. One of the most technology centred and knowledge-based area is defense industry. IPR protection laws immensely are applied within the sector since it embraces technological activities and processes. IPR policies of governments and companies plays a highly critical role in defense acquisition and the advancement of the defense capabilities. The section two of this study is devoted to reveal IPR's such vitality in an industrial system which has unique dynamics.

In order to provide the objective of this study in which the epicentrum subject is the intellectual property aspect of defense industry, the most relevant branches under intellectual property protection namely, patents, copyrights, trademarks and tradesecrets will be sorted out and analysed henceforth.

V. Types of Intellectual Property Rights Protection Relevant to Defense Industry

A. Patents

Patents that are one of the intellectual and industrial property rights; they are tools that provide institutional or individual protection to inventions developed by companies and individuals in legal sense. Patents are possible for any invention in product or production methods in all technology fields. Patents can be used for ground breaking breakthroughs in human life (penicillin), as well as for small technological improvements or changes.

1. Definition

A patent is defined as a *“document issued upon application by a government office (or a regional acting for several countries) which describes an invention and creates a legal situation in which the patented invention can normally only be exploited (manufactured, used, sold, imported) with the authorisation of the owner of the*

patent”¹⁵. The invention is the key element in patent protection¹⁶. At its simplest, “invention” means “*a solution to a specific problem in the field of technology*”¹⁷. It may be relate to a product or process¹⁸. The letter or the document of patent is provided by the authorised patent office of a country to the owner of such invention as a remuneration for his/her intellectual effort. However, this privilege conferred by the patent is subject to a limited period of time, 20 years in most countries.

Bogsch, (Former Director General of the World Intellectual Property Organization) intelligently summarizes the concept of patents: “*The patent confers the right to protection on the inventor or the employer of the inventor (if the inventor is an employee and has made the invention in the performance of his duties as an employee) or on the party to whom the inventor or the employer has transferred the right ("assignee"). The holder of the right is called the patentee or the owner of the patent. The extent of the protection is defined in the patent law of each country. The protection is effective on the territory of the country whose patent office granted the patent and not outside that country. The essence of the protection is that if any person other than the owner of the patent uses ("exploits") the invention without the express permission ("authorization" or "license") of the owner of the patent, such person commits an illegal act which he has to stop, for which he has to pay damages to the owner of the patent, and for which he may be criminally punished. To "use" an invention characteristically means to make ("manufacture") articles ("products") in which the invention is incorporated or to use a process (for manufacturing a product or simply to obtain the processing of some materials) based on the invention*”¹⁹.

¹⁵WIPO, “IP Handbook”, p.17.

¹⁶Güneş, İlhami, “Sınai Mülkiyet Kanunu Işığında Uygulamalı Patent ve Faydalı Model Hukuku”, Seçkin Yayınevi, Ankara, 2017, p.27.

¹⁷Tekinalp, Ünal, “Fikri Mülkiyet Hukuku”, 5th ed., Vedat Kitapçılık, İstanbul, 2012, p.530.

¹⁸WIPO, IP Handbook, p.17.

¹⁹Bogsch, Arpad, “The First Hundred Years of the Paris Convention for The Protection of Industrial Property, WIPO Publication, Geneva, 1983, p.16.

The word “patent” is terminologically described as the limited monopoly right granted to the right holder in return for public disclosure of a technical information²⁰. Such monopoly does not represent an exclusivity granted for patent holder to acquire the right to make use or sell anything but rather means that the patented invention cannot be exploited by natural or legal persons without the permission of the right holder²¹.

Patents, which are one of the most important elements of IPRs, are tools that provide legal protection to inventions developed by companies or individuals. In other words, the patent is a legal document that provides temporary protection for an invention. When a patent is issued, the patent holder has special rights in the import, production, use and sale of product or process innovations. In theory, a patent right may cover any method, machinery and manufacturing activity²² because the invention may be a new product, or it may include process innovations that lay out new methods for making certain products, or technical analysis developed to solve a problem. The purpose of the patent is to create a form of protection to promote technological development²³.

In theory, patent provides exclusive rights to the inventor (when using the word inventor, it should be clarified that “*if the inventor is an employee and has made the invention in the performance of his duties as an employee or on the party to whom the inventor or the employer has transferred the right ("assignee")*”²⁴) as a result of the creation of the invention, as well as an incentive for the process of technological development and commercialization of this invention. In exchange for a patent, the inventor's public disclosure of the technical characteristics of the invention makes it possible for others to make different and new inventions based on the existing one. This

²⁰Güneş, p.21.

²¹WIPO, IP Hanbook, p.17.

²²Soyak, Alkan, “Fikri Ve Sinaî Mülkiyet Haklari: Tanimi, Tarihsel Gelişimi Ve Göü’ler Açısından Önemi”, Legal Fikri ve Sinaî Haklar Dergisi, vol.1, issue 8, 2005, p.11.

²³Gökova&Bozkurt, p. 136.

²⁴Bogsch, p.16.

implies the significance of the protection because it facilitates the technical progress of a country to be achieved through dissemination of economically valuable information.

The patent right is the strongest of the intellectual and industrial property rights, as it has long given the rightful owner the make, sale or use of the item which is subject to protection and exclude the competitors from such actions²⁵. However, they are not automatically enforced by the government and if the right holder claims an infringement on the foresaid rights, patentee should bring an action for a sanction to be empowered²⁶.

The effects of patent protection can be generalized in three groups: (i) Patent protection encourages research and development investment in terms of time, labour and money and consequently product and process innovations. Thus, it has an effect on increasing national and international trade along with economic growth. (ii) Secondly, patent protection prevents imitation and unjust exploitation of these innovations and provides motivation for those who are innovating. Thus, those who engaged in innovation activities are ensured to receive the reward for their investments in labor, money and time. (iii) The third effect of patent protection is to facilitate the transfer of (new) technologies to the economy and to encourage foreign direct capital. Strong patent protection provides motivation for companies that will bring (new) technology to the relevant country. In the absence of strong patent protection, firms do not transfer technology to that country for fear of counterfeiting and do not invest in foreign direct capital²⁷.

As previously discussed a patent is the most effective way to preserve an invention. However, in order to be patent protection, the inventor must reveal his invention to public. In some cases, companies or individuals may prefer to keep their inventions confidential as tradesecrets and do not disclose the technical information of the invention. This approach may be carried out especially if "know-how" is more important for invention.

²⁵Soyak, p.11.

²⁶WIPO, "IP Handbook", p.17.

²⁷Gökova, & Bozkurt, p. 137.

2. Historical Development of Patent Rights Globally and Core International Treaties on Patents

Developed societies have developed many regulations both legally and economically in order to increase the continuity and quality of intellectual and industrial inventions that constitute the most important dynamic of technological developments in the process that dates back to the 1400s and continues today, and they have felt the need to systematically make such arrangements both nationally and internationally within an institutional discipline.

The oldest application, officially known for the protection of intellectual and industrial inventions in the historical process, is the Venetian patent law²⁸.

The second legal practice for the protection of inventions in the world is the "British Monopoly Law" of 1623. With this law, the patent period was limited and this period was determined as a maximum of 14 years. With the Monopoly Law of 1623, the principle of property, that is, the principle that the law would apply only to that country²⁹.

The American patent system, which was heavily influenced by the British model, was also established in 1790. Immediately after gaining independence, the United States enacted its Constitution in 1787, *"to promote the development of useful technologies and sciences... parliament... to the innovers... shall give exclusive rights limited to a certain period of time"*, and in accordance with this provision, the "Patent Law" came into force in 1790³⁰.

²⁸**Sichelman, Ted&O'Connor**, "Sean, Patents as Promoters of Competition: The Guild Origins of Patent Law in the Venetian Republic", Faculty Publications at UW Law Digital Commons, 2012, p.1298.

²⁹Statute of Monopolies, England (1623)], see at <https://www.britannica.com/topic/Statute-of-Monopolies>, accessed 12 May 2021.

³⁰ **R. Beresford**, Brief History of The United States Patent Office From Its Foundation -1790 To 1886 - With An Outline Of Laws, Growth, Publications, Office Routine, Etc., 1886, see at <https://www.ipmall.info/content/patent-history-materials-index-brief-history-united-states-patent-office-its-foundation-1790> , accessed 12 May 2021.

The "French Patent Law", which came into force in 1791, was based on granting patents (invention certificates) without examining inventions³¹. The Patent Laws of Russia came into force in 1815, Italy in 1864 and Germany in 1877, which adopted the principle of patent issuance under review. In Japan, inventions were protected by the 1885 "Patent Monopoly Law" The "Ottoman Law on The Acquittal", which was translated from the French Patent Law at the time, came into force in 1879 and remained in force until 1995, provided that some minor changes were made³².

As demonstrated, the first step in the legalization, settlement and development of the patent system has been taken by the UK. Especially the economic, social and legal formations brought by the industrial revolution, made institutionalization mandatory and led one of the most important concepts in both the industrial and legal fields of ownership. With the industrial revolution, the effects of technological developments and inventions on economic and social life have gained a global dimension. Therefore, this globalized dimension has also made a global regulation mandatory. In this context, the first international convention on industrial property rights was the "Paris Convention for the Protection of Industrial Property", signed by 11 countries in 1883. Another important regulation is the Patent Cooperation Treaty signed in 1970³³.

However, there are also cases when the patent is issued by regional patent offices. Examples include the European Patent Office (EPO), the Industrial Property Organization of the African Region (ARIPO) and the African Intellectual Property Organization (OAPI or AIPO). In these systems, the regional patent office accepts the regional patent application and gives patents in member states. The TRIPS (Trade Related Aspects of Intellectual Property Rights) Agreement governed by the World Trade Organization (WTO), IPR-related rules including patents, have been regulated. Patent protection periods have been standardized and determined as 20 years all over the world. However, underdeveloped and developing countries have been granted

³¹Neumeyer, Fredrik, "Contribution to The History of Modern Patent Legislation in The United States and In France", Scandinavian Economic History Review, 1956, vol.4, issue 2, p.150.

³²Gökova, & Bozkurt, p. 139.

³³Ibid. p. 139.

transition periods for patents related to pharmaceutical products and procedural methods, and these countries have been obliged to grant patents only after the transition period has matured. The TRIPS agreement is the most comprehensive agreement on IPRs since the Paris Convention, in terms of the surplus of member states and the introduction of a wide range of IPR-related regulations.

a. Paris Convention for the Protection of Industrial Property

i. The Background of the Paris Convention

Before the existence of any international treaty in the intellectual property field, it was difficult to obtain protection for industrial property rights in the various countries of the world because of the diversity of the laws. Moreover, patent applications had to be made roughly at the same time in all countries in order to avoid a publication in the country destroying the novelty of the invention in the other countries. These practical problems created a strong desire to overcome such difficulties.

A diplomatic conference convened in Paris in 1883 ended with final approval and signature of the Paris Convention. It came into effect on July 7, 1884 and has been revised from time to time after its signature³⁴. The Paris Convention was revised six times in the period leading up to the 1979 renewal in Paris (1900 Brussels, 1911 Washington, 1925 La Haye, 1934 London, 1958 Lisbon, 1967 Stockholm and 1979 Paris)³⁵. The Paris Convention is administered by the WIPO. It contains the basic principles of the protection of IPRs which are still valid today and on which all subsequent international treaties are based.

ii. The Scope and the Main Principles of the Paris Convention

³⁴Bogsch, p.23

³⁵Gökova, & Bozkurt, p. 139.

The treaty applies to patents, utility models, industrial designs, trademarks and service marks, geographical indications, trade names and the repression of unfair competition³⁶.

The provisions of the Paris Convention may be subdivided into four main categories:

(1) First category contains rules of substantive law which guarantee a basic right to national treatment in each of the member state. This essential principle is guaranteed by the convention by the following terms: *“The subjects or citizens of each contracting State shall, as regards patents, industrial designs, trademarks and trade names, enjoy the advantages that their respective laws now grant, or may hereafter grant, to nationals. Consequently, they shall have the same protection as the latter and the same legal remedies against any infringement of their rights, provided they observe the formalities and conditions imposed upon nationals by the domestic legislation of each State”*³⁷. In accordance with the Principle of Equality (National Treatment), each member state that is a party to the convention must provide the citizens of other member states with the same industrial property protection that it provides to its own citizens. Citizens of countries that are not members of the Paris Convention benefit from this treatment provided that they reside in one of the member states or have a real and effective industrial or commercial entity.

(2) The second category of rules establishes another basic right known as the right of priority. Bogsch, explain the meaning of this principle as, *“on the basis of the first application filed in one (usually, the applicant's own, home) country party to the Paris Convention, the applicant may, within a period of 12 months, apply for a patent in any of the other countries party to the Paris Convention, and these later-filed applications of his will then be regarded as if they had been - herein consists the fiction - filed on the same day as that on which the first application was filed”*. In other words, *“these later-filed applications of his will have priority-hence the expression "right of*

³⁶WIPO, Summary of the Paris Convention for the Protection of Industrial Property (1883), see at https://www.wipo.int/treaties/en/ip/paris/summary_paris.html, accessed 12 May 2021.

³⁷ Paris Convention (1883), Article 2.

*priority" over applications which may have been filed during the said 12 month period by other persons for the same invention. Moreover, the said later-filed applications, being based on the first application, are not affected by any event that may have taken place in the interval, such as any publication or other public disclosure of the solution, whether by the applicant himself or by others"*³⁸. It is a right applied to inventions, useful models, brands and industrial designs³⁹. In order to benefit from the right, the applicant must apply for protection in any of the other member states within a certain period of time (12 months for patents and utility models; 6 months for industrial designs and trademarks). In this case, the date of the next application is considered the date on which the first application was made. If the right of priority is exercised within the periods specified above, applications to be made by third parties between the first application and the subsequent application dates made in other member countries cannot be shown as an opposing reference⁴⁰.

(3) The third category of the rules defines a certain number of common rules in the field of substantive law which contain either rules establishing right and obligations of the natural persons and legal entities, or rules requiring or permitting the member countries to enact legislation following those rules.

(4) The fourth category deals with the administrative framework which has been set up to implement the convention and includes the final clauses of the convention.

b. Agreement on the Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement)

i. The Background of the TRIPS Agreement

³⁸Bogsch, p.31

³⁹Gökova, & Bozkurt, p. 139.

⁴⁰ Paris Convention (1883), Article 4.

Since the last quarter of the 20th century, especially the practices of developing Far Eastern countries were contrary to the principles of intellectual property law and their attitudes towards counterfeiting have caused significant commercial damage to developed countries especially America being in the first place⁴¹. Developed countries that want to prevent this situation have argued that a minimum standard of intellectual property should be provided all over the world. For this purpose, the TRIPS Agreement, the most widely attended and effective document, in which all countries that are the members of the WTO, parties, came into force.

The TRIPS Agreement emerged as a result of the Uruguay Round negotiations of the General Agreement on Tariffs and Trade (GATT), which was completed on 15.04.1994 after a 7 year period and was signed by 114 countries and the European Union as of 01.01.1995. The TRIPS agreement, which is appended 1C of the Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, in 1994⁴², produced more advanced results than initially expected as a result of the negotiations. With this agreement, industrial and intellectual property distinction was eliminated and the definition of intellectual property was expanded by combining the two concepts under the name of intellectual property⁴³.

ii. The Objective of the TRIPS Agreement

Establishing minimum standards for intellectual property rights and establishing an institutional structure to oversee the practices of states in this area has been one of the only objectives to be achieved through TRIPS⁴⁴. In this context, the aim of the TRIPS Agreement is not to create a standalone international protection system,

⁴¹ Ali **Pash**, “Uluslararası Antlaşmaların Türk Marka Hukukunun Esasına İlişkin Etkileri”, 1st ed. Vedat Kitapçılık, İstanbul, 2014, p.74.

⁴² TRIPS Agreement, https://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm

⁴³ Mehmet **Bağır**, Trips Anlaşması Kapsamında Marka Hakkının Korunması, Unpublished Master Theses, Türk Patent Enstitüsü Markalar Dairesi Başkanlığı Ankara, 2015, p.40.

⁴⁴ **Pash**, p.75.

but to ensure that the national legal regulations of the states are compatible with each other and provide minimum standards.

The most important difference of the TRIPS Agreement from other international agreements is that it commits WTO member states to the protection of the rights specified in the agreement and that punishing mechanisms are envisaged if these commitments are not fulfilled. On the other hand, it is possible for non-WTO states that do not take the necessary measures to protect intellectual property rights to be forced to take the necessary measures with the threat of difficulties in international trade. In this way, it will be possible to achieve a minimum level of harmony between the internal laws of the states⁴⁵.

iii. The Scope and the Main Principles of the TRIPS Agreement

The TRIPS Agreement sets minimum standards of protection in seven areas, including computer programs and software, copyrights, patents, trademarks, geographical indications, industrial designs, integrated circuits and the protection of undisclosed information (tradesecrets). The agreement allows member states to provide a higher level of protection than stipulated in the agreement, whereas a lower standard of protection will not be accepted. TRIPS has expanded the scope of the concept by defining all seven areas mentioned above within the concept of "intellectual property" and the extent of the subjects has gone beyond the Paris Convention⁴⁶.

Some of the further most important features of the TRIPS Agreement are the national treatment, which forbids discrimination between a member's own national and the nationals of other member states, the most favoured nation treatment, which forbids the discrimination between the nationals of other member states as well as provisions on enforcement and dispute settlement.

The TRIPS Agreement represents a very important development in terms of the protection of intellectual and industrial property rights. Although, contracts such as the

⁴⁵Ateş, Mustafa "Fikir ve Sanat Eserleri Üzerindeki Hakların Kapsamı ve Sınırlandırılması", Seçkin Yayıncılık, Ankara, 2003, p.49.

⁴⁶Pash, p.81.

Paris and Bern Conventions prior to TRIPS set very important standards during their period, the lack of mechanisms to make these provisions obligatory for the contracting states was a major deficiency and led to the effectiveness of the contracts being lower than expected⁴⁷.

For the countries that are parties to TRIPS, it is obligatory to integrate the standards and imperative provisions established by the Agreement into the national law. Serious sanctions are envisaged against countries that do not comply with the provisions of the agreement. TRIPS mandated a detailed set of enforcement procedures that is to say rules for judicial and administrative conduct for all states including a duty to reject counterfeit trademarked and pirated copyright goods at the borders of all member states. Within the WIPO framework, the Agreement also introduced a time effective and well organised dispute resolution mechanism which enables the possibility of cross collateral trade sanctions for a breach of the agreed standards of intellectual property rights protection⁴⁸.

c. Patent Cooperation Treaty (PCT)

Patent Cooperation Treaty (PCT) is signed and came into force in 1970. The PCT system allows the inventors to apply for patents internationally with an international patent application to any national patent office that is a party to PCT for their inventions. Thus, the costs of individual applications for each country are eliminated and the burden of national patent offices decreases. In addition, the confusions that may be caused by differences in national regulations are also addressed.

The aim of PCT is to increase co-operation between member states on application, research, publication and review of the international application. Within PCT, international patent applications to national patent offices can only be made by citizens of that country or residents of the member state. On the other hand, the application can be made directly to WIPO as well as to national patent offices. The PCT system does not give a worldwide patent, only accepts international applications,

⁴⁷**Reichman**, Jerome H., "The TRIPS Agreement Comes of Age: Conflict or Cooperation With the Developing Countries?", Case Western Reserve Journal Of International Law, vol.32, issue 3, 2000, p.457, **Bağırilar**, p.30.

⁴⁸**H. Reichman**, p.443-444.

conducts international research and submits the application to the countries specified in the application. Offices in the relevant country decide whether to issue a patent application.

WIPO detailed the advantages of the PCT system in terms of patent offices, applicants, and the public:

“(i) applicants have up to 18 months more than if they had not used the PCT to reflect on the desirability of seeking protection in foreign countries, appoint local patent agents in each foreign country, prepare the necessary translations and pay national fees;

(ii) applicants can rest assured that, if their international application is in the form prescribed by the PCT, it cannot be rejected on formal grounds by any designated office during the national phase;

(iii) on the basis of the international search report and the written opinion, applicants can evaluate with reasonable probability the chances of their invention being patented;

(iv) applicants have the possibility, during the optional international preliminary examination, to amend the international application and thus put it in order before processing by the various patent offices;

(v) the search and examination work of patent offices can be considerably reduced or eliminated thanks to the international search report, the written opinion and, where applicable, the international preliminary report on patentability which are communicated to designated offices together with the international application;

(vi) applicants are able to access fast-track examination procedures in the national phase in Contracting States that have PCT-Patent Prosecution Highway (PCT-PPH) agreements or similar arrangements;

(vii) since each international application is published with an international search report, third parties are in a better position to formulate a well-founded opinion about the potential patentability of the claimed invention; and

(viii) for applicants, international publication on PATENTSCOPE puts the world on notice of their applications, which can be an effective means of advertising and looking for potential licensees”⁴⁹.

⁴⁹WIPO, Summary of the Patent Cooperation Treaty (PCT) (1970), see at https://www.wipo.int/treaties/en/registration/pct/summary_pct.html , accessed May 12 2021.

3. Patentability Conditions

Patent registration document is the document provided in recognition to an invention which carries eligibility criteria and filled in with monopolist character rights⁵⁰.

TRIPS Agreement stimulates that *“patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application”*⁵¹.

For an invention to be eligible for patent protection which is granted by the competent authority through legitimate registration, it needs to meet several conditions: (a) *“the invention must consist of patentable subject matter”*, (b) *“the invention must be industrially applicable”*, (c) *“it must be novel”*, (d) *“it must exhibit a sufficient inventive step (non-obviousness)”* and (e) *“the disclosure of the invention in the patent application must meet certain standards”*⁵².

a. Patentable Subject Matter

Subject matter of the invention to be patentable is one of the fundamental requirement as to substance. In general statuses of the states establishes the eligible subject matter through excluding the ones deemed contrary to morality or public order to prevent for example, significant prejudice to environment or to conserve human health or lives of animals and plants.

The Article 27.3 of the Agreement illustrates the exemplary subject matters which may be excluded by the member states from the scope of patentability:

“(a)diagnostic, therapeutic and surgical methods for the treatment of humans or animals;

⁵⁰Güneş,p.30.

⁵¹ TRIPS, Article 27.1.

⁵²WIPO, “IP Handbook”, p.17.

(b)plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement.”

b. Industrial Applicability

In order an Invention to be eligible for patent protection, it shall not be theoretical, it must be susceptible of industrial application. Which means that it should be an industrial product or a part of the product or used in the industry (if it is a process for example.). Industrial applicability represents manufacturing, using and carrying out in practice.

In accordance with this principle identified by TRIPS Agreement, the work of medical practitioners is not considered to be patentable in a decision ordered by the Board of Appeal of the European Patent Office⁵³. It is found to be lack of industrial application as it is not fall into scope of the Article 57 of the European Patent Convention (EPC)⁵⁴. In another case, the court ordered that the processes or the products contrary to the “rules of physics” are lacking industrial application as in the case of perpetual motion machine⁵⁵.

c. Novelty

⁵³**Legal Research Service of Boards of Appeal**, “Case Law of the Boards of Appeal of the European Patent Office”, 8th Ed, EPO Publication, Germany, 2016, p.254.

⁵⁴ EPC Article 57, “An invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture”.

⁵⁵The Decision of the Board of Appeal of the European Patent Office, Case No: T 0541/96, Date: 7.3.2001

Novelty is a critical prerequisite for the patentability. If the invention falls into prior art, it shall not be deemed new, on the other hand, if it differs from the prior art, it is new. Prior art represents all the data entity made available to the public whether it is done by written or oral disclosure or even publicly used which exists prior to the filling date or the priority date of the patent application⁵⁶.

An invention cannot be patentable if the absence of its novelty is proved. The TRIPS Agreement stimulates this issue by following provisions:

“Therefore, Members shall provide, in at least one of the following circumstances, that any identical product when produced without the consent of the patent owner shall, in the absence of proof to the contrary, be deemed to have been obtained by the patented process:

(a) if the product obtained by the patented process is new; ... ”⁵⁷

As to understand, it is not something that can be evidenced and the proven fact can only be the absence of it.

“Prior Art” or the “background art” as expressed by the Board of Appeal of the EPO⁵⁸, represents all the data entity made available to the public whether it is done by written or oral disclosure or even publicly used. As defined by WIPO, an invention to take place under the prior art, the disclosure of it may be in three form:

(1) “by a description of the invention in a published writing or publication in other form.”

(2) “by a description of the invention in spoken words uttered in public, such a disclosure being called an oral disclosure.”

(3) “by the use of invention in public or by putting the public in a position that enables any member of the public to use it, such a disclosure being a disclosure by use.”⁵⁹

With all said, it is argued whether a solution to a technical problem which is recognised and used in one technological area accepted as an invention when it is

⁵⁶Legal Research Service of Boards of Appeal, p.69.

⁵⁷TRIPS, Article 34.

⁵⁸ The Decision of the Board of Appeal of the European Patent Office, Case No: T 654/92

⁵⁹WIPO, “IP Handbook”, p.19.

transferred to another technological area to be used for a different technical necessity apart from its original technical purpose. In general, the criteria here is to decide if the technical solution has a surprise effects as it provides technical and economical advantages and relief for the technical adversities. If it is a yes, than the invention is regarded as novela⁶⁰. The case of Swiss Federal Court on this issue seems to be a great illustration of this complicated decision process. In the case, a patented lac used for the furniture polishing is required to be transferred to another sector for the purpose of coating tin cans through a patent application for such usage. This issue became a matter of dispute when objected by the right holder of the initial invention. The Swiss Federal Court ruled that the request is legitimate on the basis that the technical solution has a surprise effects as it provides technical and economical advantages and relief for the technical adversities in a different field of technology⁶¹.

d. Inventive Step-Non Obviousness

Inventive Step or the Non Obviousness condition for the patentability is accepted to be the most difficult criteria to determine in the evaluation as to substance in the patentability examination. At its simplest, it is the decision of an invention “*would have been obvious to a person having ordinary skill in the art*”⁶².

It should be emphasized that the principle of non-obviousness and the novelty are different from each other. An invention is accepted as novel if there is a difference between the prior art and itself. The question whether the invention exceed inventive step is a further question to be examined upon the decision of acceptance of novelty. The criteria of Non Obviousness is met under two circumstance:

(1) The art of the inventor must be the outcome of a creative idea, that is “inventive” and

⁶⁰**Tekinalp**, p.535.

⁶¹Schweizerisches Bundesgericht (BGE) 92 II 48.

⁶²**WIPO**, “IP Handbook”, p.20,**Legal Research Service of Boards of Appeal**, p.160, EPC, Article 56.

(2) It must be noticeable to a person having ordinary skill in the art⁶³.

In the course of deciding the criteria of inventive step is met assessed through “problem and solution approach” in most cases. The EPO has intelligently displays the aspect of this mechanism:

- (a) *identifying the closest prior art*
- (b) *assessing the technical results achieved by the claimed invention when compared with the closest state of art established*
- (c) *defining the technical problem to be solved as the object of the invention to achieve the results, and*
- (d) *examining whether or not a skilled person, having regard to the closest state of art would have suggested the claimed technical features in order to obtain the results achieved by the claimed invention”*⁶⁴.

e. Disclosure of the Invention

An additional but one of the important criteria of the patentability is the invention to be sufficiently disclosed within the application in such a way that it is fully understood by a person skilled in the art⁶⁵.

4. Patent Application and Examination

In general, the patent is granted to the first applicant. That's why the file date on the patent application is so important. In the patent application, information is given about the title, description, invention owner and the person who made the invention. The patent right is granted in exchange for the inventor to make his invention public in the patent application. Worldwide, the rapidly increasing need for patenting has required the creation of a global patent system based on a clear and understandable

⁶³WIPO, “IP Handbook”, p.20.

⁶⁴Legal Research Service of Boards of Appeal,.161.

⁶⁵WIPO, “IP Handbook”, p.21.

standard. In many countries, various standards and stages have been developed to ensure patent protection. Within these stages, in order for an invention to have patent protection, first; the inventor must pay the required fee for the application within the legal periods and apply to the patent office of the relevant country⁶⁶.

The applicant can be any person or any institution or company. In the second stage; After the application date is finalized, the office examines whether the application complies with the requirements as stipulated in the relevant law and regulation, whether the application in question falls within the scope of issues and inventions that cannot be protected by patenting, and whether it is applicable to the industry. As a result of the review, if the relevant office finds deficiencies related to the application, the inventor shall notify the owner of such deficiencies on the grounds of the deficiencies and ask him to correct the deficiencies within the period specified by the law⁶⁷.

B. Trademarks

1. Definition and the Types of Trademarks

The expressions of mark and trademark initially occurred in the original text of 1883 Paris Convention and the expression of service mark is introduced by the 1958 Lisbon Act of the Paris Convention.⁶⁸

A trademark is *“a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises”*. A service marks represent the signs which enable distinguishing the services of different people or enterprises and in nature they

⁶⁶ibid., p.24.

⁶⁷WIPO, “IP Handbook”, p.26.

⁶⁸ *“Although in contemporary usage “mark” is generally understood as including both trademarks and service marks, this is not, or not always, the case, when the Paris Convention uses the expression “mark”: in most of the provisions of the Paris Convention that use the expression “mark,” probably only trademarks are meant”*. Bogsch, p.40.

are same as trademarks and subject to the provisions on the protection of trademarks where only slight amendments are applied to the existing trademark law⁶⁹.

Under TRIPS Agreement Article 15, trademark has defined as *“Any sign, or any combination of signs, capable of distinguishing the goods or services of one undertaking from those of other undertakings, shall be capable of constituting a trademark. Such signs, in particular words including personal names, letters, numerals, figurative elements and combinations of colours as well as any combination of such signs, shall be eligible for registration as trademarks. Where signs are not inherently capable of distinguishing the relevant goods or services, Members may make registrability depend on distinctiveness acquired through use. Members may require, as a condition of registration, that signs be visually perceptible”*.

The article clarifies the types of signs which can be considered as trademarks or service marks. Accordingly, a sign may be words such as personal names, numerals, letters, combinations of colours or figurative elements provided that they are eligible for the registration and visually perceptible. The fundamental characteristic of a trademark is “distinctiveness”. However, the article makes it convenient to register the trademarks which are not inherently capable of distinguishing the relevant goods or services as long as it acquired distinctiveness through use.

Although trademarks traditionally attributed to individual enterprises as the origin of trademarked goods (or services), many states enable the registration of certification or collective marks.

Article 7bis of the Paris Convention regulates collective marks: *“(1) The countries of the Union undertake to accept for filing and to protect collective marks belonging to associations the existence of which is not contrary to the law of the country of origin, even if such associations do not possess an industrial or commercial establishment. (2) Each country shall be the judge of the particular conditions under which a collective mark shall be protected and may refuse protection if the mark is contrary to the public interest. (3) Nevertheless, the protection of these marks shall not be refused to any association the existence of which is not contrary to the law of the country of origin, on the ground that such association is not established in the country*

⁶⁹WIPO, “IP Handbook”, p.68.

where protection is sought or is not constituted according to the law of the latter country”.

The notion of the collective marks are not mentioned in the Article, but it is generally perceived to mean that a trademark which is controlled by the right holders as being several people or enterprises of manufacturing or trading the goods or performing services which have identical characteristics such as coming from the same location (country of region) or being made of the same material such as pure linen or wool⁷⁰.

2. Trademark Protection

According to the TRIPS Agreement Article 16, once the Trademark is registered, the right holder acquires *“the exclusive right to prevent all third parties not having the owner’s consent from using in the course of trade identical or similar signs for goods or services which are identical or similar to those in respect of which the trademark is registered where such use would result in a likelihood of confusion”* and *“in case of the use of an identical sign for identical goods or services, a likelihood of confusion shall be presumed.”*

3. Criteria of Trademark Protection

The conditions which a mark must comply with in order to be registerable as trademark are reasonably almost uniform through out the world. In general, there are two kinds of the criteria to be distinguished which exist in every typical national trademark laws.

a. Distinctiveness

⁷⁰Bogsch, p.51.

The basic function of a trademark is distinctiveness which is the ability to distinguish the goods or services of an enterprise from the goods or services of different enterprises⁷¹. A sign may be distinctive at its creation or may obtain distinctive through use. The distinctiveness qualification of trademarks is acquired by the sign being used in a convenient amount of time where it is presented to the attention of public through newspapers, TV's or other advertisement instruments to an extent that is familiarized⁷².

In order for trademark to perform its distinctive function, it does not necessarily have to appeal to the sense of vision with visual expressions on it. For example, a different and original perfume bottle, even if it does not have a word or emblem on it; distinguish the product in it from other perfumes. Similarly, a short melody or sound heard may help us distinguish a product or service from its peers⁷³.

Article 6quinquies B of the Paris Agreement stipulates the loss of distinctiveness function of a trademark as a reason for either denial of registration or invalidation⁷⁴.

Should a sign is generic, descriptive or is a reference to its origin are not eligible for registration as they are not distinctive in nature⁷⁵.

⁷¹WIPO, "IP Handbook", p.71

⁷²Tekinalp, p.365.

⁷³Bağırlar, p.37.

⁷⁴Article 6quinquies B of the Paris Agreement : *"Trademarks covered by this Article may be neither denied registration nor invalidated except in the following cases:(i) when they are of such a nature as to infringe rights acquired by third parties in the country where protection is claimed;(ii) when they are devoid of any distinctive character, or consist exclusively of signs or indications which may serve, in trade, to designate the kind, quality, quantity, intended purpose, value, place of origin, of the goods, or the time of production, or have become customary in the current language or in the bona fide and established practices of the trade of the country where protection is claimed; (iii) when they are contrary to morality or public order and, in particular, of such a nature as to deceive the public. It is understood that a mark may not be considered contrary to public order for the sole reason that it does not conform to a provision of the legislation on marks, except if such provision itself relates to public order"*.

⁷⁵WIPO, "IP Handbook", p.73-74

b. Compliance with Morality and Public Order

Article 6quinquies B(iii) of the Paris Agreement, a trademark may be denied from registration or invalidated if it fails to “comply with morality or public order” and, in particular, if it is contrary to those, of such a nature deceiving the public. On the other hand, a trademark cannot be regarded as in breach of public order if the sole reason is that *“it does not conform to a provision of the legislation on marks, except if such provision itself relates to public order”*.

4. Historical Development of Trademark Rights globally and Core International Treaties on Trademarks

Trade guilds in the 12th century, bell producers in the 13th century and merchants in the 14th century used trademarks to claim products seized by pirates. In fact, in the 13th century the perception towards trademarks has reached such a level in the Renaissance that when any injustice against a trademark occurred, those responsible were punished by the King.

The signs and symbols which express, show and emphasize the trademarks, have undergone a rapid change in the Renaissance. Until this period, trademark was used to protect both the products, the manufacturers and the consumers, to enable the products and/or manufacturers look different from the others and to ensure the sustainability of the products/manufacturers.

Medieval Europe was enlightened by the Renaissance after its dark period and this enlightenment was not only in the field of science and art⁷⁶. The processes related to trade are also have taken a new form with the Renaissance. This progress gained momentum in the 1820s when the trademark names and shapes used by manufacturers in France, and eventually, the Manufacture and Goods Mark Act, which was accepted as the first trademark law in history, was adopted in France in 1857⁷⁷.

After the enactment of the first trademark law, Federal Trade Mark Act on July 8, 1870, in America, "Averill Paints Company of Newburgh, Ohio" became the first trademark to be registered. The same law came into force in various countries of Europe, creating a legal awareness for the protection of trademarks. These countries and the dates on which the law comes into force are as follows; United Kingdom in 1875 (Trade Marks Act), Australia in 1905 and.⁷⁸

The concept of trademark rights and the other intellectual property rights had become more important with the legal regulations made by European states in this field and the increasing globalization of trade. Therefore, a global legal standards were sought by the states. With this understanding, on 20 March 1883, the Paris Convention for the Protection of Industrial Property was signed in Paris to ensure the protection of industrial property rights between 11 countries.

This agreement is of great importance in terms of covering international regulations related to trademark law. The member states of the agreement committed to restrict reproduction, partial or complete imitation, and registration of counterfeit

⁷⁶ **Sağlam**, Mürsel Ferhat, "Markanın Tarihi Ve Dünden Bugüne Marka Kavramı", 5 February 2019, see at <https://www.brandingturkiye.com/markanin-tarihi-ve-dunden-bugune-marka-kavrami/> accessed 12 May 2021

⁷⁷ **Manley**, Catherine, "The Trademark Paradox: Trademarks and Their Conflicting Legal and Commercial Boundaries", 20thed., Academic Research Publication, Marburg, 2015.

⁷⁸ **Saravanan A., Filma V.**, "First Amongst Equals: Review Of The Historical Perspectives Of The Trademark Legislation And Registration", see at <https://www.altacit.com/resources/trademark/first-amongst-equals-review-of-the-historical-perspectives-of-the-trademark-legislation-and-registration/> , accessed on 12 May 2021.

trademarks in a way that may cause confusion for the same or similar trademarks registered in any member state⁷⁹.

The TRIPS agreement is the most comprehensive agreement on IPRs since the Paris Convention, in terms of the surplus of member states and the introduction of a wide range of IPR-related regulations. The TRIPS Agreement emerged as a result of the Uruguay Round negotiations of the General Agreement on Tariffs and Trade (GATT), which was completed on 15.04.1994 after a 7 year period and was signed by 114 countries and the European Union as of 01.01.1995⁸⁰. The TRIPS agreement, which is appeared 1C of the Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, in 1994⁸¹, produced more advanced results than initially expected as a result of the negotiations. With this agreement, industrial and intellectual property distinction was eliminated and the definition of intellectual property was expanded by combining the two concepts under the name of intellectual property⁸².

a. Paris Convention

Within the scope of the Paris Agreement, it is stipulated that trademark applications and registrations will be determined according to the domestic law of each country, and no common standards have been established. As a result, a trademark registered in one member state may not be registered in another country.⁸³ Likewise, voiding the brand in the country of origin will not require it to be voided in other member states.

Basic principles concerning the right to trademark in the Paris Convention are the principle of national treatment and the principle of the right of priority. According to

⁷⁹**Sağlam**, “Markanın Tarihi Ve Düünden Bugüne Marka Kavramı”

⁸⁰**WIPO**, “IP Handbook”, p.345

⁸¹ TRIPS Agreement, https://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm

⁸²**Bağırar**, p.40.

⁸³ TRIPS Agreement, Article 6quinquies.1.

the principle of national treatment, citizens of member states will be entitled to the same rights that other member states provide to their own citizens.⁸⁴ The right to recourse is only foreseen for patents, industrial design, utility models and trademarks.⁸⁵ According to this principle, when a citizen of a member state of the union applies for a trademark in a country within the union, he/she will have a 6-month period to apply to other member states for the same trademark application. During this time, even if a third party has applied for the same trademark in the same country, the right holder will get ahead of him.⁸⁶

Article 6bis of the Paris Convention imposes an obligation on member states to prevent the registration of well-known trademarks on behalf of someone else. Article stipulates that

“The countries of the Union undertake, ex officio if their legislation so permits, or at the request of an interested party, to refuse or to cancel the registration, and to prohibit the use, of a trademark which constitutes a reproduction, an imitation, or a translation, liable to create confusion, of a mark considered by the competent authority of the country of registration or use to be well known in that country as being already the mark of a person entitled to the benefits of this Convention and used for identical or similar goods. These provisions shall also apply when the essential part of the mark constitutes a reproduction of any such well-known mark or an imitation liable to create confusion therewith”.

It should be noted that the trademark must be recognized in the relevant country in order to ensure such protection.

The provision that trademark applications containing the emblems of member states such as flags and pennants will be rejected is also included in the Paris Agreement. *“The countries of the Union agree to refuse or to invalidate the registration, and to prohibit by appropriate measures the use, without authorization by the competent authorities, either as trademarks or as elements of trademarks, of armorial bearings, flags, and other State emblems, of the countries of the Union, official*

⁸⁴ TRIPS Agreement, Article 6.1.

⁸⁵ TRIPS Agreement, Article 4.1.

⁸⁶ TRIPS Agreement, Article 4/C.1.

*signs and hallmarks indicating control and warranty adopted by them, and any imitation from a heraldic point of view*⁸⁷.

b. The Madrid Agreement

The international system of registration of Trademarks is governed by two agreements, (a) The Madrid Agreement Concerning the International Registration of Marks which is signed in 1891 and (b) the Protocol Relating to that Agreement which came into operation in 1996. The International Bureau of the WIPO is the administrative body of the Madrid system. It manages the international registration process and provide publications under the Gazette of International Marks⁸⁸.

The Article 1 of the Madrid Agreement sets the objective of the system: *“Nationals of any of the contracting countries may, in all the other countries party to this Agreement, secure protection for their marks applicable to goods or services, registered in the country of origin, by filing the said marks at the International Bureau of Intellectual Property (hereinafter designated as “the International Bureau”) referred to in the Convention establishing the World Intellectual Property Organization (hereinafter designated as “the Organization”), through the intermediary of the Office of the said country of origin”*. The Madrid System is a centralised system which provides time and cost effective solution for managing the registration of trademarks for those who wants to register, renew or expand their trademarks. Applicants may file one application for the protection in all 124 states paying a single set of fees⁸⁹. Such a fee must be in accordance with the Article 8 of the Agreement which states that *“The Office of the country of origin may fix, at its own discretion, and collect, for its own benefit, a national fee which it may require from the proprietor of the mark in respect of which international registration or renewal is applied for”*.

⁸⁷ TRIPS Agreement, Article 6ter.1

⁸⁸WIPO, Madrid – The International Trademark System, see at <https://www.wipo.int/madrid/en/> , accessed on 12 May 2021.

⁸⁹WIPO, Madrid – The International Trademark System, see at <https://www.wipo.int/madrid/en/> , accessed on 12 May 2021, **Tekinalp**, p.80.

c. Nice Agreement

The Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of the Registration of Marks, concluded at Nice in 1957. In order for registering marks (trademarks and service marks), a unified system of classification for the goods and services is established by the Nice Agreement⁹⁰. For a valid registration of a mark, the trademark offices must illustrate in the documents and the publications (if the mark is registered), the numbers of the classes where the applied mark falls into in accordance with the Nice Classification⁹¹.

The classification system of the Nice Agreement is a dynamic structure that is updated according to current developments and changing conditions. The Committee of Experts, which consists of representatives of member states, ensures that the classification list remains up-to-date to meet the needs. The Nice Agreement brings great convenience to applicants who want to register their mark in different countries. In this way, the obligation to apply by researching the classification system of each country individually is eliminated, and the researches of the country's offices are facilitated. In addition, it becomes more important to establish a common classification system in terms of goods and services, considering that the protection provided by the brand is limited to the goods and/or services in which the brand is registered. All member states have the right to apply the Nice classification at a portion of their discretion. The parties are free to use the Nice classification as a fundamental or secondary system⁹².

d. Trademark Law Treaty

⁹⁰Tekinalp, p.79

⁹¹WIPO, “IP Handbook”, p.308

⁹²Bağırar, p.40.

The Trademark Law Treaty was signed on 27.10.1994 as a result of a diplomatic conference attended in Geneva, Switzerland and entered into force in 1996⁹³. The purpose of the Agreement is to simplify the process and ensure monolithicity between the practices of the parties by eliminating unnecessary formalities in national and regional registration procedures of Trademarks⁹⁴. The Trademark Law Treaty does not include provisions as to substance of trademark law⁹⁵.

The treaty applies to marks relating to goods (trademarks) or services (service marks). According to the Article 1 of the Treaty, the marks may only consist of “visible signs” whereas olfactory marks and sound marks are explicitly excluded from the trademark protection due to their invisible nature under this treaty. Certification marks, collective marks guarantee marks and hologram marks are also excluded from the scope of protection of the Treaty.

In order to achieve its objectives, the maximum number of documents that offices can request in applications and registrations of trademarks, name and address changes, transfers and renewals relevant to the trademark. In addition, the Treaty has prepared standard forms for modifications to power of attorney, address, name and title for applications, and does not require signature or notary approval other than the signatures for waivers and transfers of trademark registration⁹⁶.

e. TRIPS Agreement and the Relationship Between TRIPS and Other Core International Treaties on Trademarks

The TRIPS Agreement represents a very important development in terms of the protection of intellectual and industrial property rights. Although contracts such as the

⁹³Tekinalp, p.80.

⁹⁴WIPO, Summary of the Trademark Law Treaty (TLT) (1994), see at https://www.wipo.int/treaties/en/ip/tlt/summary_tlt.html , accessed on 12 May 2021.

⁹⁵WIPO, “IP Handbook”, p.297

⁹⁶Bağırlar, p.24.

Paris and Bern Conventions prior to TRIPS set very important standards during their period, the lack of mechanisms to make these provisions obligatory for the contracting states was a major deficiency and led to the effectiveness of the contracts being lower than expected⁹⁷.

For the countries that are parties to TRIPS, it is obligatory to integrate the standards and imperative provisions established by the Agreement into the national law. Serious sanctions are envisaged against countries that do not comply with the provisions of the agreement. TRIPS mandated a detailed set of enforcement procedures that is to say rules for judicial and administrative conduct for all states including a duty to reject counterfeit trademarked and pirated copyright goods at the borders of all member states. Within the WIPO framework, the Agreement also introduced a time effective and well organised dispute resolution mechanism which enables the possibility of cross collateral trade sanctions for a breach of the agreed standards of intellectual property rights protection⁹⁸.

Trips Agreement and Madrid Agreement have made regulations on different issues from each other. TRIPS aims to provide minimum standards for the protection of intellectual property rights internationally, but has not been interested in the international registration procedure of rights and has left this area to the Madrid Agreement. In this respect, the two agreements operate in completely independent areas.

The TLT Agreement with TRIPS mainly regulates different issues. However, regulations under TLT and the TRIPS Agreement are parallel to each other in terms of simplifying the process by eliminating unnecessary formalities in the national and regional registration procedures and ensuring uniformity between the practices of the party member states to eliminate unnecessary procedures in transactions related to intellectual property rights⁹⁹.

⁹⁷H. Reichman,p.457,Bağırlar, p.30.

⁹⁸H. Reichman, p.443-444.

⁹⁹TRIPS Agreement Article 62: *“Members may require, as a condition of the acquisition or maintenance of the intellectual property rights provided for under Sections 2 through 6 of Part II, compliance with reasonable procedures and formalities. Such procedures and formalities shall be consistent with the provisions of this Agreement”*.

Article 2.1 of TRIPS regulates the relations between TRIPS and the Paris Agreement. Accordingly, all member states are obliged to comply with Articles 1-12 and Article 19 of the Paris Convention (text of 1967). In addition, article 2.2 shows that the provisions contained in TRIPS do not violate the obligations undertaken by the member states under the Paris Agreement¹⁰⁰. Thus, TRIPS makes the provisions of the Paris Agreement binding on states that are not parties to this Agreement.

C. Copyrights

Under The TRIPS, the intellectual property rights are separated into two groups:

(a) Industrial property rights which are subcategorised into two areas. The first area is the preservation of distinctive marks, such as geographical indications and trademarks as previously summarised. Other types of industrial property aim to provide of first priority on the protection for the creation of technology, design and technological innovation. This category includes patents, industrial designs and tradeseecrets.

(b) The second group consists of copyright and copyright related rights (including but not limited to computer software) where the right holder is provided in title the right to authorize or to prohibit the commercial rental to the public of originals or copies of their copyrighted works.¹⁰¹

1. Definition

As with all field of intellectual property, copyright is concerned with protecting the work of the human intellect. The domain of the copyright is the protection of literary

¹⁰⁰TRIPS Agreement Article 2.2: *“Nothing in Parts I to IV of this Agreement shall derogate from existing obligations that Members may have to each other under the Paris Convention, the Berne Convention, the Rome Convention and the Treaty on Intellectual Property in Respect of Integrated Circuits”.*

¹⁰¹ TRIPS Agreement, Article 11.

and artistic works. These includes writings, music and works of fine arts such as paintings and sculptures, and technology based works such as electronic databases and computer programs.

According to WIPO description, “*copyright*” as a legal term represents “*the rights that creators have over their literary and artistic works*”. In general, there is no exhaustive list of works protected by copyrights. However, throughout the world, the most commonly works protected by copyrights includes:

“literary works such as novels, poems, plays, reference works, newspaper articles

computer programs, databases;

films, musical compositions, and choreography;

artistic works such as paintings, drawings, photographs, and sculpture;

architecture; and

advertisements, maps, and technical drawings”.

Protection of copyright is only granted for expressions, and not for ideas, methods, procedures, or mathematical concepts¹⁰².

There is a registration process for industrial property rights is a material condition for intellectual property protection. In this context, the right to patent is not used unless an invention is registered, and trademarks that are signs to distinguish the goods and services of an enterprise from the goods and services of another enterprise cannot benefit from trademark protection unless registered in accordance with their relevant regulations. In contrast, registration is not required for a work to benefit from copyright protection. Rights to ideas and works of art are born with the creation of the work and such intangible items created by the author with a mental effort secured by copyright protection upon its creation.

Another feature of copyrights is that the principle of nationality applies in this field of intellectual property. This means that if copyright protection is requested in a

¹⁰²WIPO, <https://www.wipo.int/copyright/en/> Accessed on 12 May 2021.

country, the conditions of protection are determined according to the national law of that country¹⁰³.

Another feature regarding copyrights relates to the period of copyright protection. Intellectual property rights do not have unlimited protection. They are protected for a certain period of time. This can usually be determined as throughout the life of the author plus 70, 50 years and after his death. The protection period is defined as +70 years under national legislations of Germany (Urheberrecht), Switzerland (Urheberrecht), Turkey (copyright), Spain (derechos de autor), France (droit d'auteur), United Kingdom (copyright) and USA (copyright).

2. Historical Development of Copyrights Globally and Core International Treaties on Copyrights

The Statute of Anne, known as a pioneer codification in the field of copyrights adopted by the British Parliament in 1709, as the first law to provide protection to the author and heirs of a book for a certain period of time from publication. This law is also the basis of U.S. copyright regulations, first enacted in the Copyright Act of 1790¹⁰⁴. Copyright law in the United States is almost identical to The Statute of Ann, as the Act is codified under the influence of the law of the United Kingdom.

The Bern Convention on the Protection of Literary and Artistic Works of 1886 was the first international regulation for the protection of copyrights¹⁰⁵, so it is also based on all subsequent conventions. The Bern Convention is a precursor as being the first internationally qualified and multilateral agreement to protect literary and artistic works with universal characteristics. The Bern Convention details what is included in

¹⁰³**Turan**, p.212.

¹⁰⁴**Deazley**, Ronan, "Commentary on the Statute of Anne 1710", in Primary Sources on Copyright" p.1450-1900, 2008 see at http://www.copyrighthistory.org/cam/tools/request/showRecord?id=commentary_uk_1710.

¹⁰⁵**R. Meek**, Marcellus, "International Copyright and Musical Compositions", DePaul L. Review, vol. 3, Issue 1, 1953, p.71

literature and art. In addition, the financial and moral rights of the authors/authors who created the work, the protection periods of these rights, as well as the conditions of use.

The United Kingdom, France, Germany and Spain were the pioneer countries for copyright protection under an international law by signing this convention on 9 September 1886 and put it into effect on the same date on 5 December 1887. As stated in Article 1 of the Bern Convention, the Bern Union, established in 1886 in order to joint and effective protection of the literary and artistic works within the contracting states which signed this convention. Bern Convention has been amended several times. The last changes were made in 1979, respectively in Paris, Berlin, Bern, Rome, Brussels, Stockholm and again Paris.

There are various Copyright related treaties besides Bern Convention. The Berne Convention, TRIPS Agreement and the WIPO Copyright Treaty (WCT), all together constitute a multilateral framework for the protection of copyrights.

The other most important ones may be pointed as the Beijing Treaty on Audiovisual Performances, the Berne Convention for the Protection of Literary and Artistic Works, the Brussels Convention Relating to the Distribution of Program-Carrying Signals Transmitted by Satellite, the Geneva Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of Their Phonograms, the Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, the Visually Impaired, or Otherwise Print Disabled, the Rome Convention for the Protection of Performers, the Producers of Phonograms and Broadcasting Organizations, the WIPO Performances and Phonograms Treaty (WPPT)

a. Bern Convention

Although Bern Convention does not describe the terminology of the “literary and artistic work” or “author of the work” it provided a non-exhaustive list of items which falls into the scope of work.

Accordingly, the expression of literary and artistic works shall include every production in the literary, scientific and artistic domain, whatever may be the form of its expression such as The expression “literary and artistic works” shall include every

production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as *“books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramatico-musical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of drawing, painting, architecture, sculpture, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science; ...translations, adaptations, arrangements of music and other alterations of a literary or artistic work; ...collections of literary or artistic works such as encyclopedias and anthologies which, by reason of the selection and arrangement of their contents, constitute intellectual creations shall be protected as such, without prejudice to the copyright in each of the works forming part of such collections”*¹⁰⁶.

The Berne Convention covers three fundamental principles, provides several conditions for determining the minimum amount of copyright protection to be eligible and specific articles attributed to developing countries which prefers to use them.

The foresaid principles are illustrated in the Article of the Convention as the following:

i. Principle of National Treatment

In Article 3 of the convention stipulates that *“ (a) authors who are nationals of one of the countries of the Union, for their works, whether published or not; (b) authors who are not nationals of one of the countries of the Union, for their works first published in one of those countries, or simultaneously in a country outside the Union and in a country of the Union”* may be enjoy the copyright protection provided that other conditions are met. Also, *“Authors who are not nationals of one of the countries of the Union but who have their habitual residence in one of them shall, for the purposes*

¹⁰⁶ Bern Convention, Article 2.

of this Convention, be assimilated to nationals of that country” and “A work shall be considered as having been published simultaneously in several countries if it has been published in two or more countries within thirty days of its first publication”.

As understood, the literary and artistic works which originated in the borders of a member state should be granted the same extent of protection in every other member state as the latter gives to the literary and artistic works of its own nationals.

ii. The Principle of Automatic Protection

The principle defined under Article 5.2 as “The enjoyment and the exercise of these rights shall not be subject to any formality; such enjoyment and such exercise shall be independent of the existence of protection in the country of origin of the work. Consequently, apart from the provisions of this Convention, the extent of protection, as well as the means of redress afforded to the author to protect his rights, shall be governed exclusively by the laws of the country where protection is claimed” suggests that the protection shouldn’t be dependent to any compliance with formalities.

iii. Principle of "Independence" of Protection

“Protection is independent of the existence of protection in the country of origin of the work If, however, a Contracting State provides for a longer term of protection than the minimum prescribed by the Convention and the work ceases to be protected in the country of origin, protection may be denied once protection in the country of origin ceases”¹⁰⁷

¹⁰⁷WIPO, Summary of the Berne Convention for the Protection of Literary and Artistic Works (1886), see at https://www.wipo.int/treaties/en/ip/berne/summary_berne.html , accessed 12 May 2021.

The copyright holder has a set of different rights which are governed partly by Berne Convention where the minimum rights and partly by national law which often takes the rights even further.

Traditionally and historically the right of reproduction is the key which incidentally is reflected in the word copyright. Article 9 of the convention states that *“Authors of literary and artistic works protected by this Convention shall have the exclusive right of authorizing the reproduction of these works, in any manner or form”*.

Another right is the right of performance. Article 11 of the Bern convention has regulated the performance rights for dramatic, dramatico-musical and musical works. According to the Article, *“Authors of dramatic, dramatico-musical and musical works shall enjoy the exclusive right of authorizing: (i) the public performance of their works, including such public performance by any means or process; (ii) any communication to the public of the performance of their works”*.

The right of broadcasting and the right of communication to public are also covered by the Convention in several provisions. The broadcasting in nature is also a way of communication to public or may have parallel concepts but communication to public is also includes other actions for example, distribution and internet distribution.

Article 6bis states that *“(1)Independently of the author's economic rights, and even after the transfer of the said rights, the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation.(2) The rights granted to the author in accordance with the preceding paragraph shall, after his death, be maintained, at least until the expiry of the economic rights, and shall be exercisable by the persons or institutions authorized by the legislation of the country where protection is claimed...”*The convention introduced the moral rights which enables creators to claim authorship of their works and object any kind of mutilation, modification or deformation or any other derogatory action which makes the work prejudicial to its author's reputation. The moral rights are granted to the persons or institutions authorized by the legislation of the country where protection is claimed after the death of its author at least until the expiry of the economic rights.

In regard to the duration of the copyright protection, the Convention specifies “the life of the author and fifty years after his death” in Article 7 with a couple of exceptions to this general rule¹⁰⁸.

b. Copyright Protection of the Computer Programs and Databases Under TRIPS

It was an impressive accomplishment that the TRIPS Agreement has achieved harmonizing and setting minimum intellectual property rights with the enforcement power of WTO¹⁰⁹. The copyright protection of the computer programs had received explicit recognition for the first time on the international level by the adoption the TRIPS Agreement¹¹⁰.

¹⁰⁸ Exceptions under Article 7 are: “...*(2) However, in the case of cinematographic works, the countries of the Union may provide that the term of protection shall expire fifty years after the work has been made available to the public with the consent of the author, or, failing such an event within fifty years from the making of such a work, fifty years after the making.*(3) *In the case of anonymous or pseudonymous works, the term of protection granted by this Convention shall expire fifty years after the work has been lawfully made available to the public. However, when the pseudonym adopted by the author leaves no doubt as to his identity, the term of protection shall be that provided in paragraph (1). If the author of an anonymous or pseudonymous work discloses his identity during the above-mentioned period, the term of protection applicable shall be that provided in paragraph (1). The countries of the Union shall not be required to protect anonymous or pseudonymous works in respect of which it is reasonable to presume that their author has been dead for fifty years.*(4) *It shall be a matter for legislation in the countries of the Union to determine the term of protection of photographic works and that of works of applied art in so far as they are protected as artistic works; however, this term shall last at least until the end of a period of twenty-five years from the making of such a work....*”

¹⁰⁹ **Barbosa**, Roberto Garza, “International Copyright Law and Litigation: A Mechanism for Improvement”, *Barbosa Article*, vol. 11, Issue 1, 2007, p.79

¹¹⁰ **Ledendal**, Jonas, “Copyright Protection of Software Under the TRIPS Agreement - Software Reengineering And Reverse Engineering In The Context Of International Trade Law”, 2010, see at <https://lup.lub.lu.se/search/publication/1716374> , accessed 12 May 2021.

Article 10.1 of the TRIPS Agreement provides protection for computer programs regardless of it is in source code or object code by making reference to the Berne Convention: *“Computer programs, whether in source or object code, shall be protected as literary works under the Berne Convention (1971)”*. This emphasize that the provisions of the Bern Convention of the literary and artistic works will also apply to the computer programs. However it should be noted that the application of such provisions would be to extent it is suitable for application.

Article 10.2, takes compilations of data or other material such as database into the scope of copyright protection. Article states that *“Compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creations shall be protected as such. Such protection, which shall not extend to the data or material itself, shall be without prejudice to any copyright subsisting in the data or material itself”*. The eligibility criteria for database is to be of the selection or arrangement of contents which are the outcome of intellectual creation.

Under Article 11 of the Agreement, the copyrighted works in respect of computer programs whether originals or copies may be prohibited or authorised by the authors for the commercial rental to the public. The provisions on such rights are obligatory for the member states, however, pursuant to the sub-article (2) of the Article 11, *“..., this obligation does not apply to rentals where the program itself is not the essential object of the rental”*.

D. Tradesecrets

Intellectual properties such as inventions and designs which carry commercial value are protected through registration mechanisms. Inventions, for instance, are protected by patent registration within a 20-year protection period starting from the filling date in accordance with the TRIPS Agreement Article 33. Thus, as long as the applicant makes the annual fee payments related to the registration in question, he/she can apply to the relevant authorities in case of any wrongful exploitation such as an

imitation that may occur during this 20-year period with a claim of necessary sanctions to be imposed on such infringement. Although a certain protection period is provided by registration, there is a disclosure of valuable information with the public. After the end of the protection period, the competitiveness of the applicant company can be reduced by the exploitation of this information by any competitor. For this reason, some enterprises may prefer to keep some valuable information as a secret instead of registering it. These are mostly the ones that are technical production secrets, production methods, chemical formulas, quality control methods and research and development plans, etc. Even information on the negative outcomes can be covered by tradesecrets. For example, the negative result of a production method research activity which is conducted to make products lighter in weight is valuable in terms of showing competitors what not to do. The competitor who obtains this information will not try this method if it indirectly reaches the information that such a production method will have negative results. Thus, there will be unfair competition as it will be freed from the costs of the production method trial in question.

1. Definition of Tradesecrets

Tradesecrets are any kind of economically valuable information which provide competitive advantage to their owner and are preserved as confidential by the owner of such information. WIPO describes tradesecrets as “intellectual property rights” on “*confidential information which may be sold or licensed*”¹¹¹.

It sets the qualification of tradesecrets as:

“

- (a) *commercially valuable because it is secret,*
- (b) *be known only to a limited group of persons, and*
- (c) *be subject to reasonable steps taken by the rightful holder of the information to keep it secret, including the use of confidentiality agreements for business partners and employees”.*

¹¹¹WIPO, Tradesecrets, <https://www.wipo.int/tradesecrets/en/> , accessed 12 May 2021.

Under the most basic perspective, trade-secret law protects secret information¹¹². Should such information be used without the consent and the authorization of its owner in a manner contrary to honest commercial practices, it infringes tradesecret protection¹¹³.

2. Criteria for an Information to be Considered as A Tradesecret

Tradesecrets have three essential criteria:

a. Expressing a Commercial Value

The subject matter of the confidential information has to qualify for tradesecret protection. It means that it has to be a valuable information which relevant law meant to protect and it should not be known to the people in the industry. Provided that an information is capable of adding an economic value for the benefit of its owner on the relevant industry, it is eligible for protection.

Information that does not express any value and is not likely to be in the future cannot be considered a tradesecret. However, all R&D studies that do not yet express a value but are likely to express value in the future should be considered a tradesecret¹¹⁴.

The other essential point of this aspect is that no one is enable to claim rights on the information which is publicly known or known in the industry or trade¹¹⁵. Here,

¹¹²**Rowe**, Elizabeth A., “Introducing a Takedown for Tradesecrets on the Internet” Wisconsin. Law. Review, 2007, p. 1046.

¹¹³**Karahan**, Sami &**Suluk**, Cahit&**Saraç**, Tahir&**Nal**, Temel “Fikri Mülkiyet Hukukunun Esasları”, 4th ed. Seçkin Yayıncılık, , İstanbul, 2015, p.446.

¹¹⁴**Şahinoğlu**, Cansu “Şirketlerin Fikri Mülkiyet Stratejisi Olarak Ticari Sırlar”,17 January 2019, see at <https://www.mondaq.com/turkey/trade-secrets/773214/350irketlerin-fikri-mlkiyet-stratejisi-olarak-ticari-sirlar> accessed on 12 May 2021.

¹¹⁵**Lemley**, Mark A. “The Surprising Virtues of Treating Tradesecrets as IP Rights”, 2008, p.8. see at <https://web.stanford.edu/dept/law/ipsc/pdf/lemley-mark.pdf> accessed on 12 May 2021

whether the secret owner and its competitors have the same knowledge is the determining factor.

In addition, since it is stipulated that the information is not generally known to anyone other than the owner, the fact that such information is known to more than one person (e.g. by licensing or sharing it with a third party through a nondisclosure agreement) does not eliminate its confidentiality. However, public disclosure of the information, even though a confidentiality agreement is concluded with each person whom the proprietary information is disclosed, will cause the information to be generally known and the secret quality to disappear¹¹⁶.

b. Intended to Be Kept Confidential

The second aspect of the Tradeseconds is that the holder of the tradesecond has to take reasonable and necessary precautions in order to prevent its disclosure¹¹⁷. The owner of the information has to intend to keep the information confidential. It is expected that a confidentiality agreement has been concluded between the people with whom shared the secret. In addition, the person whom the confidential information disclosed by operation of law or under a confidentiality agreement, the disclosed party should be sufficiently informed that the relevant information is intended or required to be kept confidential.

¹¹⁶Şahinoğlu,Cansu, “Şirketlerin Fikri Mülkiyet Stratejisi Olarak Ticari Sırlar”.

¹¹⁷ There exists a confusion over the rationale for this aspect. Lemley argues on the issue that: *“Some see in it evidence that the tradesecond is valuable enough to bother litigating; others argue that where reasonable precautions are taken, chances are that a defendant acquired the tradesecond wrongfully. 19 Whatever the justification, it is clear that no one may let information about products and operations flow freely to competitors at one time and then later claim that competitors have wrongfully acquired valuable tradeseconds. To establish the right to sue later, one must be reasonably diligent in protecting information. As always, however, the presence of the term “reasonable” ensures close cases and difficult line-drawing for courts, and it is clear that only some precautions, not completely effective ones, are required”*. Lemley,p.8-9.

c. Not Misappropriated

Lastly, the information should not be acquired in an unjustified way which is to say if the information is misappropriated, it cannot be regarded as tradesecret¹¹⁸.

3. Objective of the Tradesecrets

The main purposes of intellectual property registration systems all over the world are to accelerate the flow of information and therefore the development of technology by preventing information from remaining confidential. For example, a patent system requires that information be shared with people outside the company even in the first stage of 'literature research'. For this reason, companies apply for patents in cases where it is not possible to keep the invention as a tradesecret for a long time and can be easily detected by rival companies (by reverse engineering methods) and receive 20 years of protection from the date of application, thus preventing rival companies from acquiring a competitive advantage through imitating such inventions. At the same time, due to 'public disclosure of the technique', the flow of information remains alive and technological development is increased.

As one of the most successful examples when it comes to tradesecrets, everyone thinks of the example of Coca Cola at the first place. As is known, Coca Cola's formula has been preserved for more than 100 years. Considering that thousands of R&D activities conducted by numerous employee in the production line of this

¹¹⁸Lemley conveys the idea that *"Just because a person's information is valuable does not make it wrong for another to use it or disclose it. But use or disclosure is wrong, in the eyes of tradesecret law, when the information is acquired through deception, skulduggery, or outright theft. Close cases abound in this area, not simply because of the creativity of competitors in rooting out information about their rivals' businesses and products but because the concept of misappropriation is itself ill-defined"*. Ibid., p.9. *E. I. du Pont de Nemours & Co. v. Christopher*, 431 F.2d 1012, 1970 U.S. App. LEXIS 8091, 167 U.S.P.Q. (BNA) 1, 166 U.S.P.Q. (BNA) 421 (5th Cir. Tex. July 20, 1970)

company in 100 years, it is clear that an accurate human resources application, supplier and personnel confidentiality agreement, sanctions and measures have been applied to the rival companies in the sector. However, if a patent had been obtained for the formula in question, this formula would have already been anonymous, and after a certain period of time it would not have given the company any competitive advantage.

The fact well understood from the example of Coca Cola is that, many factors are influencing the determination of the intellectual property strategy pursued by a company. Especially in areas where reverse engineering is common, such as defense industry, it is not possible to store tradesecrets for a very long time, so companies or defense authorities of states often go on the path of obtaining patents and utility models¹¹⁹.

Although companies applying for patents and utility models have to comply with the 'disclosure of technique' procedure, which is the first requirement of the patent/utility model system, the protection periods they will provide with patent or utility model registration documents may be considered as sufficient periods to invest in these inventions and to gain a competitive advantage in this rapidly advancing technology age.

In short, whether an invention should be protected via registration or remains a tradeseecret is a highly strategic decision that requires analysis of many variables.

¹¹⁹**Lemley**,p.51-52. On the reverse engineering, see, e.g., *Sega Ents. v. Accolade Inc.*, 977 F.2d 1510 (9th Cir. 1992).

CHAPTER TWO
THE ROLE OF IPR PROTECTION
IN THE DEVELOPMENT OF DEFENSE INDUSTRY

I. DEFENSE TECHNOLOGIES AND DEFENSE INDUSTRY

A. Defense Technologies

1. Definition

Engaging into Technology, at the basic conception, creating and using of artefacts is mostly an unthoughtful activity which emerges from unattended motives and ideas and its outcome is not reflected upon. To put it more cognizable, building structures, manufacturing goods, performing services and even simplest actions such as preparing dinner, sewing clothes, driving cars and answering phone are all habits humankind engages into unthinking. However, elemental complexity, usefulness and efficacy of technology bring out not only extensive kind of technical and scientific thinking but also economic, political and even psychological considerations¹²⁰. In this study the practical efficacy of technology will have been analysed in the economic and political spectrum.

Common perception on the term “technology” is artefacts as industrial systems, machines, devices etc. yet it’s well accepted description goes beyond that and it comprises of any practical application of knowledge. “Technology” is formally

¹²⁰**Mitcham**, Carl, “Thinking Through Technology: The Path Between Engineering and Philosophy”, University of Chicago Press, vol.16, issue 3, 1994, p.1

defined as the “practical application of knowledge especially in a particular area” or “capability given by the practical application of knowledge”¹²¹. These worldwide recognized definitions preserve the meaning that technology is the outcome of a technical method, process or data used for a task to be fulfilled.

Burgelman and Rosenbloom defined technology as *“The ensemble of theoretical and practical knowledge, know-how, skills and artefacts that are used... to develop, produce and deliver... products and services”*¹²²

Freeman and Soete defined technology as *“a more formal and systematic body of learning, only came into general use when the techniques of production reached a stage of complexity where the traditional methods no longer sufficient”*. They also emphasize that technology is a combination of craftsmanship and science, and further they state that *“the older arts and crafts (or more primitive technologies) continue to exists side by side with new ‘technology’ and it would be ridiculous to suggest that modern industry is now entirely a matter of science rather than craft...The heating and ventilating engineer may still be a plumper, the tribologist may still be a greaser and the food technologist has not yet superseded the cook. They may never do so”*¹²³.

According to German Philosopher Frederic Dessauer, whose area of interests was “philosophy of technology”, the essence of technology can be found neither in industrial manufacture or end products, but “in the act of technical creation”. He emphasises that, laws of nature and human purpose are the conditions to produce technology. However, there is one another critical element for its existence, which is

¹²¹Marriam Webster, Dictionary, <https://www.merriam-webster.com/dictionary/technology>

¹²²**Burgelman, R.A. & Rosenbloom, R.S.** “Technology strategy: an evolutionary process perspective” Research on Technological Innovation, Management and Policy, vol.4., 1989.

¹²³**Freeman, Chris & Soete,** “The Economics of Industrial Innovation”, Pinter, London, 1997, p.14.

named by Dessauer as “inner Bearbeitung”, meaning “inner working out”. It is this inner working out that, represents the process of bringing pre-established solutions to technical problems and enables inventions to work in real world. In his opinion, for practical application to be counted as generated technology, two circumstances must be confirmed: (i) *the artefact shall not be previously found in the world of appearance* and (ii) *“when it makes its phenomenal appearance through the inventor, it actually functions or works”*¹²⁴

Technology should not be confused with the term “technique”. Technology is associated to complex processes where the principles of science is applied whereas technique, is referred as a style of making an activity in a specific field. Technique is characterized methods and procedures and implies systematic treatment. On the other hand “technical” means pertaining to the mechanic or useful arts¹²⁵ and represents a partial dissociation from human condition as the performer of the technical action does not impact the object proportional to the return impact which affects the performer him/herself. Plane take-off by the technical action of it’s Pilot may be illustrated as to dramatize the instance of independence of the performer of the technical action from the technological object¹²⁶.

“Defense technology” or “Military technology” are the common used terms which describe numerous kinds of weapons, vehicles, components, manufacturing or maintenance equipment, processes, structures, programs etc. It comprises of all the knowledge necessary to develop such technology, to activate it in war or attack, or to

¹²⁴**Mitcham**, p. 32.

¹²⁵<https://wikidiff.com/technic/technical>

¹²⁶**Feenberg**, Andrew, Critical Theory of Technology: An Overview, Tailor-Made BioTechnologies, vol. 1, no. 1, 2005, p.1.

repair or replacement¹²⁷. It is a technology generated particularly for warfare and distinctly for the application of armed forces since it is not suitable for civilian in nature either because lack of legal civil application or their hazardous potential when used without military training. As other technologies, it is developed by engineers and scientists, but apart from the others, it is usually funded by government's armed forces in order to place it into their inventories and enhance their defense capabilities. Having an advance defense technology is very crucial at many aspects but especially for military power of a nation and economic growth a country¹²⁸. O'hanlon categorises the key defense technologies into four areas. According to him *"The first is sensors, of many different types, which gather data of relevance to military operations. The second comprises the computer and communications systems that process and distribute that data. Third are major weapons platforms and key enabling technologies for those platforms"*.¹²⁹

2. Defense Technologies as a Core of Military Power

One precise way to preclude battle is to be provident to be win one. Improving a competitive approach to the development of military innovation and a consistent investment is essential in order armed forces to be accoutred against the hardship of warfare and restore its readiness. The advancement of armed forces is an increasingly

¹²⁷**Guilmartin**, John F. "Military technology". Encyclopedia Britannica, 4 Nov. 2020, <https://www.britannica.com/technology/military-technology>. Accessed 16 February 2021.

¹²⁸**James**, Andrew D., "Emerging Technologies and Military Capability", Rajaratnam School of International Studies, November 2013, page 1.

¹²⁹**O'hanlon**, Michael, "Forecasting Change in Military Technology 2020-2040" Foreign Policy of Brookings, p.5.

technology centric. Although the capacity of military plays a substantial role in defense matters, in the midst of 1940's a brand new approach emerged on military related technology: defense being technology centric is considered to be the best to handle challenges of war¹³⁰. The fundamental purpose of the defense authorities and the military is basically accomplishing victorious military operations with the minimum expenditure and material damage or loss of lives. The key factor of such military engagements provident and resistant to the challenges of warfare is to have well developed technological substructure and adopting and remaining new technologies and techniques¹³¹ which are named as "emerging technologies" cumulatively by academics and practitioners of not only national security but also business and economics.

a. Technology Based Military Expenditure

In most states, military technology is more dynamic compared to the other areas of technology as it is crucial for national security. Therefore, the budget reserved to military technology related activities is assorted as a consequence of national variables. According to the latest research published by SIPRI, the military expenditure globally in 2019 is accounted to be the highest level ever since 1988 being 1917 billion

¹³⁰**Bellais**, Renaud, "Technology And The Defense Industry: Real Threats, Bad Habits, Or New (Market) Opportunities?" De Boeck Supérieur-Journal of Innovation Economics & Management, vol.12, issue 2, 2013, p.60.

¹³¹**Major**, Lieutenant Colonel Ollie, "Defence Innovation and Invention: A Vision is Always Required", 2020, <https://www.defenceiq.com/defence-technology/articles/defence-innovation-and-invention-a-vision-is-always-required>

dollar in total which is 3.6 % higher than 2018 and 7.2 percent higher than 2010 rates¹³²(see figure 1)¹³³.



Figure 1: World Military Expenditure by region 1989-2019

Source: SIPRI Military Expenditure Database, Apr. 2020

SIPRI also revealed 15 leading, contemporary military spenders¹³⁴(see figure 2) in terms of defense technology with the total expenditure of 1553 billion dollars in 2019 accounting for 81 % of all spending. Among this top 15, three countries, China were by far the greatest with the increasing rate of 85 per cent where as Japan having the least military burden devoting just 0.9 percent of its gross domestic product to

¹³² **Tian, Nan & Kuimova, Alexandra & Silva, Diego Lopes Da & Wezeman, Pieter D. & Wezeman, Siemon**, "T. Trends In World Military Expenditure", SIPRI Fact Sheet, April 2020, p.1.

¹³³ SIPRI Military Expenditure Database, Apr. 2020.

¹³⁴ SIPRI Military Expenditure Database, Apr. 2020.

military spending and Saudi Arabia having the highest with the rate of 8 per cent¹³⁵. Apart from this classification, there are couple of countries which made a remarkable investment to the military technology such as Turkey with the increasing percentage of 86, Ukraine 132 and Romania 154 from 2010 to 2019¹³⁶.

United States by landslide, by accounting for 38 per cent of global military spending in term of defense technologies remained the greatest military spending country with the budget of 732 billion dollars, all around the world, in 2019 in such a way that the combination of the expenditure of next largest spending countries almost catches its numbers and figures (see figure 2).

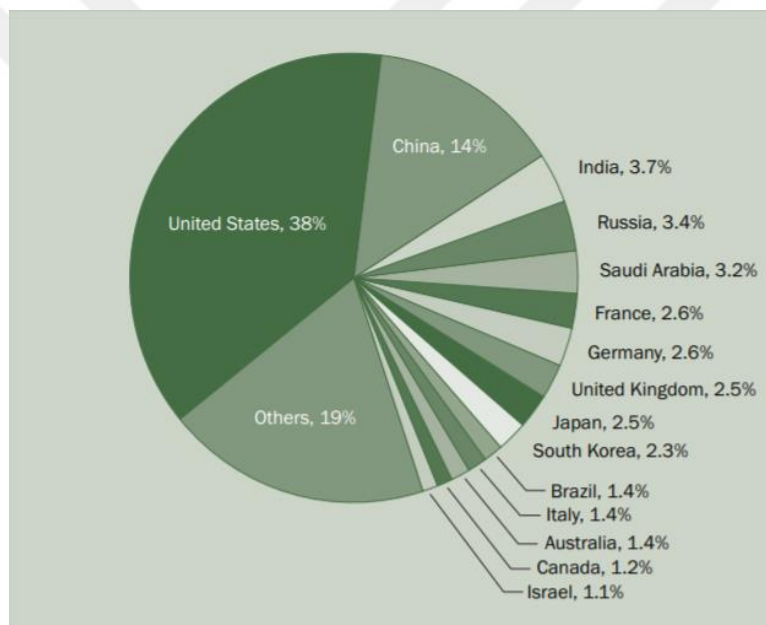


Figure 2: *“The share of world military expenditure of the 15 countries with the highest spending in 2019”*

Source: SIPRI Military Expenditure Database, Apr. 2020

¹³⁵ Also, “Among the top 15, the military burdens of Israel (5.3 per cent), Russia (3.9 per cent), the USA (3.4 per cent), South Korea (2.7 per cent) and India (2.4 per cent) were also higher than the global military burden”. **Tian&Kuimova&Silva&Wezeman&Wezeman**, p.3.

¹³⁶ *ibid.* p.2.

United States military as possessing the world's leading defense technology, increasingly devote to advance generating new technologies in the defense sector to compound national security and keep pace with its competitors. Although its technologic superiority ensures its dominance in conflicts and warfare, not long ago, the technology sector evolved by leaps and largely proliferated as a consequence of the improvements in the commercial field. Chuck Hagel the former Secretary of the U.S. Department of Defense, (U.S. DOD) underlines that this circumstance eroded the traditional resources of military advantage¹³⁷. U.S. DOD to prevent this inclination in the sector by introducing new offset strategies for the purpose of implementing emerging technologies in the military and established various organizations¹³⁸ to enhance defense innovation thus and so maintain the military superiority¹³⁹.

In fact, in the uttermost publish of U.S. DOD, they announced their perspective by stating that *“We cannot expect success fighting tomorrow’s conflicts with yesterday’s weapons or equipment. To address the scope and pace of our competitors’ and adversaries’ ambitions and capabilities, we must invest in modernization of key capabilities through sustained, predictable budgets. Our backlog of deferred readiness, procurement, and modernization requirements has grown in the last decade and a half and can no longer be ignored. We will make targeted, disciplined increases in personnel and platforms to meet key capability and capacity needs. The 2018 National Defense Strategy underpins our planned fiscal year 2019-2023 budgets, accelerating our modernization programs and devoting additional resources in a sustained effort to*

¹³⁷**Hagel**, Chuck, “Defense Innovation Days Opening Keynote”, 3 September 2014, at <https://www.defense.gov/Newsroom/Speeches/Speech/Article/605602/> Accessed on 12 May 2021.

¹³⁸ including the Defense Wargaming Alignment Group and the Defense Innovation Unit.

¹³⁹**Work**, Bob, “National Defense University Convocation,” 5 August 2014, see at <https://www.defense.gov/Newsroom/Speeches/Speech/Article/605598/>. Accessed on 12 May 2021.

solidify our competitive advantage”¹⁴⁰. Having the largest defense industry and the most advanced armed forces of the world, this declaration set the common objective of nations with respect to military power which is basically to solidify their competitive advantage by modernisation of the military programs.

The adoption of emerging technologies is what leads to modernisation of the military strategic projects and accoutrement. Therefore, it is worthwhile to analyse the strong correlation between emerging technologies and military capability within the scope of this study.

b. Emerging technologies and Military Capability

James suggests that “*the future of defence technology policy is likely to be in building absorptive capacity and agility by (i) developing effective search mechanisms to identify potentially important emerging technologies and their sources, (ii) building effective partnerships with (potentially) nontraditional suppliers of such technological capabilities, and (iii) finding means for the agile exploitation of those emerging technologies to military advantage*”¹⁴¹. As understood from his words, emerging technologies are one of the main pillars of an advanced military capacity.

Emerging technologies are described as “immature technologies in the early proof of-principle stages; more mature technologies but where a novel defence

¹⁴⁰U.S Department of Defense, “Summary of the 2018 National Defense Strategy of the United States of America,” 2018, p. 6, see at <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>. Accessed on 12 May 2021.

¹⁴¹James, p. 1.

application has been identified”¹⁴². By their nature, they possess remarkable uncertainties such as would their practicality and efficacy be fulfilled as promised, how long will it proceed to be advanced and reach the state of maturity to be used out of and what will be the total cost to manufacture or use such technology?

With the improvement of the emerging technologies notably computer technology in the centre, robotics/artificial intelligence, data analytics, cybersecurity and machine learning , progress of military innovation gained speed and expected to be more consequential in the following twenty years than it has proven over the passing years . The U.S being the leader of developing many of these technologies echoed the importance of such new technologies under the U.S. National Defense Strategy.

Emerging technologies have huge and various impact on every technology based businesses. A dominant company at the time whose area of business was photography, dramatic collapse of Eastman Kodak is one example. Its dominance for a century has been swept away when the technology of digital imaging has been developed and stepped into the market as the new entrant companies build their capacity to use such technology in their products.

As in other areas of technology, emerging technologies have the same power to determine the future of defense industry and organisations as well as military capability and battles. They may alter the environment where armed forces conduct operation. For instance, the emergence of radar had a drastic influence on the defense strategies of the United Kingdom during the Battle of Britain and North Atlantic during the World War II. Weaponry systems and the performance of the armed forces have been changed due

¹⁴²ibid. p. 4.

to emerging propulsion, computer and electronic component technologies which are all developed under military funded programs¹⁴³.

Emerging technologies further may dramatically change the destiny of the countries. One and most concrete yet infamous illustration is the allied development of hydrogen and atomic bombs which disrupt the balance of power and cause new forms insecurities during the World War II¹⁴⁴.

A further aspect of emerging technologies should be appreciated to understand a reality in the contemporary era. Defense authorities are no longer the leaders in many areas technology; controversially, they have become followers rather than being sponsors of technology development. Non-defense industry are the main source of the emergence of military related technologies because they are developed as a result of technological activities and scientific researches of universities, institutions and companies taking place in the commercial field. In the same respect, the conception of military technology is becoming increasingly redundant due to the fact that there exist very less technologies which have “strict military application”. Most of the technology which have military relevance developed out of the innovative activities which are non-defence.

James argues that *“too often advanced technologies are discussed in the abstract but it is the combination of technologies into military systems and the development of doctrine, training and organisation to exploit them to best effect that is the key issue for military capability...The future of defence technology policy is likely to be in building absorptive capacity and agility by developing effective search mechanisms to identify potentially important emerging technologies and their sources,*

¹⁴³James, p. 2.

¹⁴⁴ibid. p. 3.

*building effective partnerships with (potentially) non-traditional suppliers of such technological capabilities, and finding means for the agile exploitation of those emerging technologies to military advantage”*¹⁴⁵. Such a paradigm is already taking place in many sectors of technology in which companies are increasingly engaged into what is acknowledged as “open innovation”.

B. Defense Industry

1. The History of Defense Industry

The history of the defense industries dates back to the 19th century. The reason for the development of weapons technology so much is the result of the rise of the capitalist industry, mass production and mechanization. During this period, the arms industry had a distinctly international feature. At the end of the World War I, companies formed cartels to grow the international market in the face of stagnant demand. This continued until the 1930s, when large powerful governments became more internal and made conscious efforts to build their domestic weapons production capabilities.

In the UK and US, this has been in the form of direct government involvement in a number of key defence industries. The Second World War was the period when capitalist economies were militarized to an unprecedented degree and defense industries were established "nationally"¹⁴⁶. After the end of the Second World War, enterprises switched from military production to civilian production again. However, new

¹⁴⁵James p. 9.

¹⁴⁶Sandler, Todd & Hartley, Keith, “ The Defence Industrial Base, Handbook of Defence Economics”, 12th ed. North Holland Vol.1, chapter 14, p. 403.

technologies developed during the war revealed the need for new specialized sectors. The importance of air power in war encouraged technological developments in the post-1945 period by demonstrating the need for civilian and military developments in the aircraft industry. As a result of major advances in warplanes, the scale has grown and it has become necessary for the state to be involved in the sector for large investments.

In the postwar period, the developed economies of the United States, Britain and Sweden greatly consolidated their defense industries.

The polarized world entailed the need for the development of national capabilities in the development and production of weapons technologies has increased. In the U.S., especially new companies have developed, to produce new weapons and there has been a great development in the defense industries. In addition to specialized companies, State-funded R&D complexes were established especially in the United States. Barriers to entry into the defense sector have been increased by increasingly complex tender regulations and accounting procedures, while barriers to exit have been increased by the same factors. As a result, the list of major defense contractors has changed little since the 1960s.¹⁴⁷

In between the second World War and beginning of the 1990s, the defense related share of the market have been shaped by minor business units within huge industrial congeries. In the late 1990s, almost fifty percent of the revenue generated by the biggest twenty defense corporations was associated with congeries and many of them left the defense market as a consequence of peace dividend.

¹⁴⁷Sandler & Hartley, p.404

Then large amount of overcapacity has been eliminated by a consolidation among remaining actors in the market. As a consequence, defense specialist corporations have been emerged only to perform services for the necessities of armed forces of their countries. Until the beginning of 2000, just about ten percent of the accumulated revenue of the biggest twenty corporation in the market was associated with congeries¹⁴⁸.

Defense industry appears drastically different since the end of the Cold War because the nature of the war transitioned from wide arsenals to high degree of innovative weapon systems. Meanwhile, defence authorities reduced the research activities after the end of war and consequently defense industry needed to adopt such innovative technologies to expand its market in order to survive. As a consequence, leading defence corporations evolved to international private organizations instead of serving only to government¹⁴⁹.

¹⁴⁸ S&P Capital IQ and Compustat; Deloitte analysis see at <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-manu-next-era-of-aerospace-and-defense.pdf> , accessed on 12 May 2021.

¹⁴⁹ **Reis**, João Carlos Gonçalves dos. “Politics, Power, and Influence: Defense Industries in the Post-Cold War”, Social Sciences, Vol.10, issue 10, 2021, p.1. EU companies has followed merger policies which provided new opportunities for the industry. For example: “...the merger in 2000 of the German Daimler Chrysler Aerospace with the Spanish aeronautical company, Construcciones Aeronauticas SA, and later with the French Aerospatiale-Matra created the European Aeronautic Defense and Space Company (EADS), later called **Airbus**, the third largest aircraft company in the world (Maye 2017). Thus, the coordination of European defense policy and arms procurement through the European Defense Industry (EDA) aims to make the defense industry better structured and organized, and, in theory, this would lead to long-term coordination, cooperation, and integration between member.” However, different scenarios were for different counties. See Turkey example: “...the Turkish defense industries, which have significantly improved their production capacity since 1980, reaching a production level of 54% in 2011 and expecting to reach the defense industrial autarky in 2023. However, ... the Turkish defense industry remains inefficient due to weak institutions and civil-

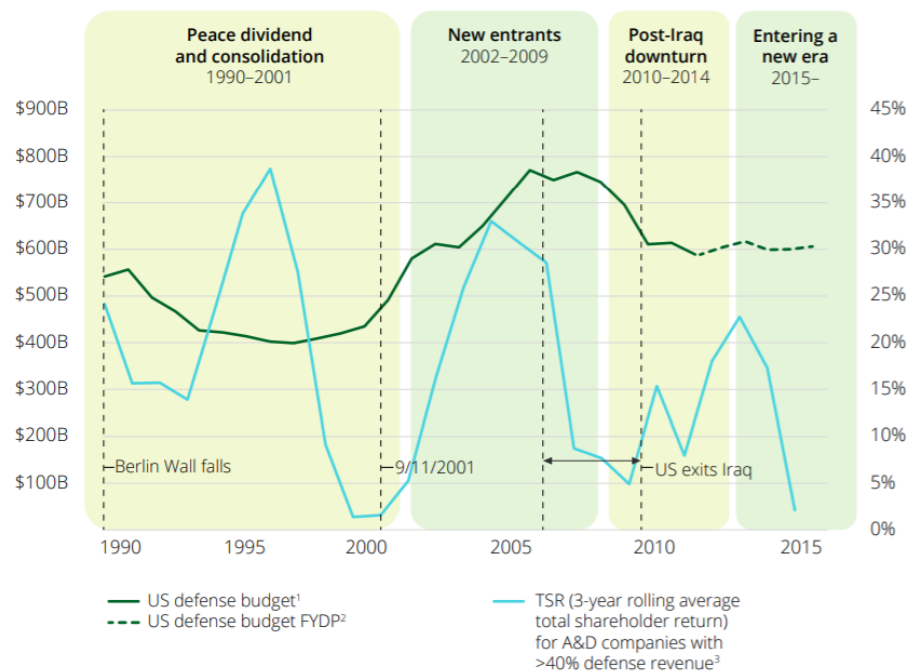


Figure 3: Defence Cycles: Instance of US as a defense industry pioneer ¹⁵⁰

Source: US DoD Green Book

At the present the defense industry still eminently effected by international and domestic political pressures. It is under the dominance of governments since they constitute demand in the defense sector and the industrial structure are formed by the policies and investments of the defense authorities. They determine the structure and size of the industrial base by the choice of what to, where to and how to buy technologies which is different than the past. Government decide entry and exit criteria of the industry, ownership, the acquisition and integration of technologies and

military rivalry. Although, foreign partnerships have accelerated the development of defense companies, they continue to suffer from weak investments in research and development". Ibid, p.10.

¹⁵⁰ US DoD Green Book; usgovernmentspending.com; projections represent Future Years Defense Program (FYDP) FY17; Deloitte analysis of S&P Capital IQ data, see at <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-manu-next-era-of-aerospace-and-defense.pdf> , Accessed on 12 May 2021.

infrastructure yet they don't have the control over the prices and profits as much as in the past and shorten barriers to foreign ownership because of the privatization of defense firms. The leading defense companies which are the prime contractors of the defense authorities (department of defense, ministry of defense or presidency of defense industry, etc.), today, still different from the other commercial companies because of the elaboration of the orders and regulation in procurement.

2. The Structure of Defense Industry

The defense industry is mainly found in developed countries. These industries, which develop as a certain group or sector, aim to make the country self-sufficient in arms production to a certain extent. While important companies in the defense industry can be easily identified, conceptual and practical problems arise when we try to analyse the entire defense industry. Because the defense industries represent a complex structure where unified economic activities with basic characteristics are gathered. Apart from all this, wherever these companies are established, they serve the government differently from other markets, so here the government is the sole buyer power.

With the end of the Cold War period, the demand for defense products decreased and competition increased in this market. This led to the downsizing and restructuring of defense firms, and these changes also changed government-company relations. With globalization, the concept of national defense firms has started to weaken as defense firms have started to cooperate and become multinational companies.

The defense industry consists of the sum of industrial assets that provide basic elements to national security and military power. The defense industry consists of the country's defense-related value, employment, the sum of its technology-creating

manufacturers, or the entire companies that provides defense or defense-related equipment to the public defense authorities¹⁵¹.

In addition to production in the defense industry, it must also include R&D activities, service support, updating and eliminating the product during use (nuclear weapons). It should include not only the basic manufacturer, but also other manufacturers involved in the production of that product¹⁵².

Taylor and Louth described the defense industry as the industry division that supplies equipment to the country's armed forces. The ministry of defense is called in the community of companies that produce defense and defense related equipment¹⁵³. Todd defines the defense industrial zones as an industry group that includes companies that produce purely military goods, as well as companies that produce civilian goods. In the defense market, the scale of companies varies. Some of these companies may be public, some of them private, and there are only companies that sell defense products with different specialties, as well as companies that sell them in civilian products¹⁵⁴. For instance, TAI (Turkish Aerospace Industries) is an expert company in the field of air defense in Turkey, ASELSAN a Turkish company produces communication products as well as defense equipment.

Although the definitions of the defense industry and the market it creates are similar to those that can be made for other goods and services markets, the defense

¹⁵¹**Sandler & Hartley**,p.415-420.

¹⁵²**Sezgin, Şennur &Sezgin**,Selami “Defense Industry In The World And In Turkey: An Overview”, Eurasian Journal of Researches in Social and Economics (EJRSE), 5th ed., vol:12, 2018, p.7.

¹⁵³**Louth, John,&Taylor, Trevor**,“A Defence Industrial Strategy for the UK”, RUSI Occasional Paper, 2018, p.14.

¹⁵⁴**Sezgin&Sezgin**,p.7

industry has its own characteristics. In particular, the close connection of the defense industry with national security, the fact that the state is more effective in the functioning of the market than in other markets, even if it regulates one-to-one operation and comes across as the only buyer, requires that the defense industry be placed separately from the others along with many other features. Relations with the political authority, which was instrumental in establishing the defense industry and determining the supply of goods and services produced, also reveal the unique characteristics of the defense industry¹⁵⁵.

Defense firms and industry are responding to new threats and new technologies by changing. The most important defense firms of the 19th century were Armstrong, Gatling, Maxim, Krupp and Vicker (Machine gun, warship, armored), replaced by Boeing, Lockheed Martin; EADS and UAE (missiles, fighter jets, electronics). The defense firms of the future will be different from today. How much of the products of the companies producing weapons and equipment for the armies of the countries will be considered as defense industry if they are of a military nature. First, the production of large and small weapons systems for killing is very clearly the production of defense industry. Production to kill people or destroy property, such as tanks, warships, bombers, missiles, rifles, bombs. Although, these equipment's are produced for destruction, they are often used for threats and deterrence purposes. Secondly, the equipment involved is quite spacious. These are equipments that are not directly lethal but associated with military activities, i.e. strategic products. Air defense radars, communication networks, bridge laying equipment. Such vehicles are close to their civilian counterparts but meet the needs of military forces due to their special

¹⁵⁵**Yayın**, Ahmet Fuat, “Savunma Sanayiinde Küreselleşme Biçimleri : Özel Askeri Şirketler”, Master’s Theses, İstanbul, 2006.

qualities. In general, it is made more durable and robust. Military trucks, cargo planes and helicopters are in this group¹⁵⁶.

The defense industry is strategic, both militarily and economically. Being economically strategic industries where R&D expenditures are high and unit costs are low with learning and scale economies. High fixed R&D costs and reduced unit production costs are important factors in determining the total cost of output units. Disarmament at the end of the Cold War led to the decline of new projects and the decline of national orders, putting pressure on defense firms to look for export markets and cost-cutting routes. As a percentage of the total production cost, there are increases in R&D expenditures and the obligation of the companies to respond to this and the reduction of costs as part of the contract.

Changing the understanding of security raised the question of whether the domestic defense industry was needed, and the nations began importing more defenses, and the national defense industries increasingly faced the global defense market¹⁵⁷.

3. The Importance of a National Defense Industry

In order for a country to be able to maintain its security against external factors and to maintain the continuity of national sovereignty, its armed forces must be designed according to the most advanced technological conditions and the defense structure must be a deterrent that can move very quickly. It is only possible to have this strong and deterrent defense structure and modern defense equipment with a strong

¹⁵⁶Sezgin&Sezgin, p.7

¹⁵⁷Garcia-Alonsa,Maria Del Carmen&Levine, Paul Leslie,“Arms Trade and Arms Races: A Strategic Analysis”, in Handbook of Defence Economics, Todd Sandler and Keith Hartle ed., North Holland Vol.2, chapter 29, p. 947.

defense industry. The developments in electronic technology every day, the increasing demand of information technologies in defense systems, as well as the dependence of defense systems on the software that controls them with the developing technology, have led countries to believe that weapons from other countries cannot be trusted against future problems. This suggests that the production of the defense industry nationally is more important¹⁵⁸.

The number and quality of weapons equipment of countries from the past to the present is important in the wars that may occur between the countries, but it has made them the most powerful states in the world. However, technology is also influencing the defense policies of countries. The fact that the countries with the most advanced technology in the field of industry and defense industry are the most powerful countries in the world is an indication of this reality¹⁵⁹. Countries need to use the elements of national power in the most effective way in achieving their national ideals. Although the priorities of the countries in the understanding of national power differ, it is seen that the factors of economic military and political power are slightly more prominent in protecting the national interests. States need a strong defense industry in order to protect their national sovereignty and ensure the security of the country.

At the same time, the defense industry is a locomotive in all branches of industry, its contribution to employment and its contribution to economic power cannot be ignored. The defense force is also strict with political power. For example, defense systems can be used as leverage in tenders. Defense industry contributes to the

¹⁵⁸**Kayan**, Ali, “Savunma Sanayinin Gelişimi Ve Savunma Harcamalarının Ekonomik Büyüme ile İlişkisi”, Masters Theses, Aydın, 2016, p.4.

¹⁵⁹**Gümüldaş**, Emine, “Türkiye’de Savunma Sanayii ve Savunma Harcamalarının Ekonomideki Yeri”, Masters Theses, Niğde, 2010, p.6.

technological progress of the country due to its advanced technology and science. The resources allocated to the defense industry, directly contributes to the country's economic development because of the foresaid reasons¹⁶⁰. Therefore, it is considered by the States that it is very important to consider investments in the defense industry in an optimal integration with the general economic development model and to plan the investments towards the lower branches of this industry according to the economic and political levels of the country.

Depending on the political position of the countries, it was foreseen that the defense industry should create environment which is economically, socially, culturally, technologically and politically very strong in order to establish national security. A technology formed as a result of a country's R&D studies can change the balance of power between countries and further increase the country's deterrence against external dangers. The transfer and commercialization of R&D studies in the field of defense over time has a positive effect on reducing R&D costs of countries and achieving competitive advantage.¹⁶¹.

4. Technological Information Flow within the Defense Industry

As previously indicated, defense industry products are complex integration of main, secondary parts and subsystems such as sensor systems, weapons, communication, command and control systems, carrier platforms (tanks, ships, aircraft, etc.). The defense industry is a high value-added, technology-intensive sector where

¹⁶⁰Kayan, p.8

¹⁶¹Duyar, Yalçın, "Türk Savunma Sanayiinin Ekonomideki Yeri ve Önemi", Masters Theses, Anadolu Üniversitesi Sosyal Bilimler Enstitüsü, 1997. Kayan, p.8.

scale and timing are important. Costly production and R&D studies entail the support of central governments in the sector. The success of defense companies is based on being able to take part in complex long-term production networks and keep up with rapid technological development¹⁶².

The spread of information in the defense and aerospace industries is based on supply chains. Internationally established supply chains are seen as the most effective way of disseminating information. International cooperation and the intensive flow of information related to each other are increasingly taking place between 1st, 2nd and 3rd tier companies, while local spreads/externalities occur in relation to 4th tier companies. For the companies in the last level, the dissemination of information is not very important in terms of quantity and strategic value. Although these small-scale specialist firms are loaded with very important functions, they depend on the main contractors who take responsibility for defense industry contracts.

Defense industry products are high cost products. Product development in the industry defines a long process that requires collaboration with the customer. The first products that appear at the end of the product development process are tested and evaluated by the customer. At the end of the process of working in partnership with the customer, product characteristics are finalized and production is started. This testing and evaluation process increases the cost.

Another distinctive feature of defense industry products is that their usage time is long and as a result, the supply of spare parts becomes important. Large companies dominate the defense and aerospace industries, creating specialized economies and

¹⁶²**Eceral**, Tanyel Özelçi,” Global, National and Local Dynamics of Turkish Defence and Aviation Industry: The Case of Ankara”, Akademik Bakış Journal, 11th ed., vol.21, 2017, p.90

mostly labor market economies, and suppliers to the region in the hope of selling main and secondary parts

5. The Concept of Open Innovation in Defense Industry

Defense authorities are no longer the leaders in many areas technology; controversially, they have become followers rather than being sponsors of technology development. Non-defense industry are the main source of the emergence of military related technologies because they are developed as a result of technological activities and scientific researches of universities, institutions and companies taking place in the commercial field. In the same respect, the conception of military technology is becoming increasingly redundant due to the fact that there exist very less technologies which have “strict military application”. Most of the technology which have military relevance developed out of the innovative activities which are non-defence.

James argues that *“too often advanced technologies are discussed in the abstract but it is the combination of technologies into military systems and the development of doctrine, training and organisation to exploit them to best effect that is the key issue for military capability...The future of defence technology policy is likely to be in building absorptive capacity and agility by developing effective search mechanisms to identify potentially important emerging technologies and their sources, building effective partnerships with (potentially) non-traditional suppliers of such technological capabilities, and finding means for the agile exploitation of those emerging technologies to military advantage”*¹⁶³. Such a paradigm is already taking place

¹⁶³James, p. 9.

in many sectors of technology in which companies are increasingly engage into what is acknowledged as “open innovation”.

The concept of open innovation has been introduced by Henry Chesbrough for the first time in 2003. Pursuant to what Chesbrough believes *“Open Innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the Closed Innovation era.”*¹⁶⁴

Open innovation is an approach followed by companies which leads them to seek, engage and use technological and scientific information wherever it resides. Under such paradigm, technological know-how and commercial information on the required technology becomes a key competence. The difficulty for defense sector either governmental institutions or industry, is to acquire those abilities and competencies required to communicate with non-conventional suppliers which are not in the existing defense acquisition system. A closed innovation system has a difficulty accommodating dual use technological change and therefore, cannot satisfy such necessity, instead, critical defense technologies are mostly sourced by civilian R&D activities in various industries.

Due to the criticality of artificial intelligence, data fusion, digitalisation and machine learning on developing leading edge technologies, the military programs are more complex currently than any time in the past. This emphasises the necessity of the integration of extensive variety of technological innovations. The key aspect of enabling this transitioning -the transition of emerging technology from “exploration to

¹⁶⁴**Chesbrough**, Henry, “Open Innovation: The New Imperative for Creating and Profiting from Technology”, Harvard Business School Press, Boston, 2003, p.43.

exploitation”- is to situate system integrators in the practice of open innovation. In order to achieve that, their roles in defense innovation system and interactions with the defense authorities and armed forces as the end user must be redefined¹⁶⁵. Mérimondol and Versailles suggest the goal of the system integrating companies and eventually the military is *“is to enhance the capacity to easily introduce new technological components coming from various actors and networks. In this perspective, “smart” Defence clients and system integrators should work in tandem to foster transversal approaches inside complex programs that are still mainly organized in a vertical techno-push way”* They basically emphasize that they should get the edge on interdependencies with various technological activities and programs in order to support modularity of open technological architectures.

In a research Mérimondol and Versailles have explored that large scale companies which develop “horizontal diversification strategies” in order to operate trouble free technology transfer between adjacent markets. THALES is one of such companies which operates in defense, security, aerospace and transportation sectors. THALES allocate its resources to identify potentialities for the global dual use paradigm and engage into negotiations on the adaption of each category of its clients. The air surveillance radar subsystem being used either in civilian air traffic management or military non-cooperative environments can be given as an illustration of such dual usage¹⁶⁶.

¹⁶⁵**Mérimondol, Valérie&Versailles, David W.**,“The (R)Evolution of Defence Innovation Models: Rationales and Consequences”, Armament Industry European Research Group Policy Paper,July 2020, p.14.

¹⁶⁶**Mérimondol&Versailles**,p.15.

6. Transition from Defense Industry Base to Defense Ecosystem

After the conclusion of World War II, the conception of Defense Industrial Base (DIB) has been accepted as the main source of developing defense industrial policies. This consideration represents a closed form of innovation. Under the DIB, there is a direct financial relationship between the defense authorities and the industry which serves to military as the perimeter of strategic technological and industrial competences required for strengthening military capabilities nurtured from such link.

The evaluations show that the defense policy makers have an unsparing effect on the structure of the defense related industry and the trajectories for innovation¹⁶⁷. However, this boundary has been blurred because of the evolution of technology in respect to the digitalization followed by other cutting edge innovations. Consequently, the idea of open innovation found its practicality and became the preferred policy of industrial organisations.

The role of companies, research and development centres which are directly working with the defense authorities being the sole remedy for critical technological and industrial base for the development of military programs dwindled as they do not typify the whole network of competences necessary for increasing military capabilities. Artificial intelligence, machine learning, robotics, data fusion and many other digital and information technologies emerge outside the boundaries of DIB's. They are developed under a novel industry ecosystems and by start-ups aroused in these systems.

Alberts, Garstka and Stein explain in their book how information technologies dominate the contemporary battle operations. They emphasize that the characteristics of

¹⁶⁷**Matelly, Sylvie&Lima, Marcos** “The Influence Of The State On The Strategic Choices Of Defence Companies: The Cases Of Germany, France And The UK After The Cold War”, *Journal of Innovation Economics & Management*, vol. 20, issue 2, 2016, p.11.

the information age and technologies affected the capabilities of armed forces in the battle field and change the nature of conflict environment¹⁶⁸. This circumstance introduced the concept of “network centric warfare (NCW)” which is described by Alberts, Garstka and Stein as *“as an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. In essence, NCW translates information superiority into combat power by effectively linking knowledgeable entities in the battlespace.”*¹⁶⁹(see figure 4).

¹⁶⁸ **Alberts**, David & **S. Garstka**, John J. & **Stein**, Frederick P., “Network Centric Warfare: Developing And Leveraging Information Superiority”, CCRP Publication Series, 2nded., issue 2, 2000, p.1.

¹⁶⁹ **Alberts & Garstka & Stein**, p.1. He further explains the concept of NCW in page 88, by following *“NCW is about human and organizational behaviour. NCW is based on adopting a new way of thinking— network-centric thinking—and applying it to military operations. NCW focuses on the combat power that can be generated from the effective linking or networking of the warfighting enterprise. It is characterized by the ability of geographically dispersed forces (consisting of entities) to create a high level of shared battlespace awareness that can be exploited via self-synchronization and other network-centric operations to achieve commanders’ intent.*⁵⁹ *NCW supports speed of command—the conversion of superior information position to action. NCW is transparent to mission, force size, and geography. Furthermore, NCW has the potential to contribute to the coalescence of the tactical, operational, and strategic levels of war. In brief, NCW is not narrowly about technology, but broadly about an emerging military response to the Information Age”.*

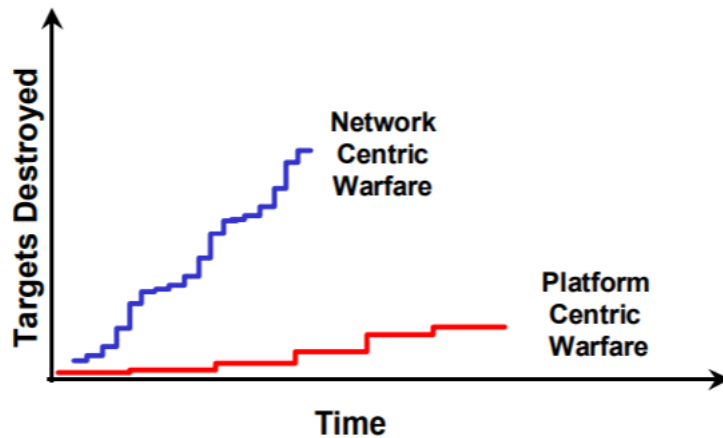


Figure 4: Network Centric Warfare— Fleet Battle Experiment Delta¹⁷⁰

Those technologies are the ones which are driven by the demands of civil market, not a technological development pioneered by military organisations¹⁷¹. Alberts, Garstka and Stein believe that *“They have accomplished this by exploiting information technology and coevolving their organizations and processes to provide their customers with more value”*. This is a great example of the commercially produced technologies becoming main source of power of military and the success of “exploiting instead of exploring” strategy¹⁷² which is aimed to be propagated by the proponents of the open innovation and defense industrial ecosystem.

As the system adapted by the defense markets especially in the Western Countries, international pioneers of the industry locate outside the direct influence of

¹⁷⁰ Alberts & Garstka & Stein, p.179.

¹⁷¹ There are many other technologies and concepts exploited by the military. *“Similar concepts are beginning to take root in military thinking, new concepts, plans, and experiments. It is for this reason that developments in the commercial sector are significant and worthy of note, for they provide insights into the potential power of information superiority in the conduct of military operations”*.

¹⁷² Mérindol & Versailles, p.14.

defense authorities and policy makers because exploration activities of advance technologies are no longer driven by military issues¹⁷³.

7. Building a Defense Ecosystem

It should be acknowledged that a well-structured defense ecosystem rescues or at least make less dependent the nations from not only the discretion of international leading defense technology companies but also the decision making processes of the governmental agencies which such companies under the laws and regulations of.

In order to actualise such a sustainable system, US is following the policy with the essentials of:

“A commitment to a strong, vibrant and financially successful defence industry

a) Prime reliance on market forces to generate needed structural change

b) Competitive pressures should be preserved and even enhanced

c) All established and emerging sectors relevant to defence should be addressed

d) Barriers to market entry should be minimised

e) Globalisation should be embraced and exploited”¹⁷⁴

Key to achieve such ecosystem and eliminate the dependency to defense monopolies (which is also important for a dependent, national defense industry) is to enhance the actors in the national and international technology market¹⁷⁵. At this stage

¹⁷³Mérindol&Versailles, p.16

¹⁷⁴Heidenkamp, Henrik&Louth John &Taylor Trevor, “The Defence Industrial Ecosystem Delivering Security in an Uncertain World”, Whitehall Report 2-11, RUSI Publications, UK, 2011, p.11.

¹⁷⁵Mérindol&Versailles, p.15.

the public policy model should incentivise start-ups and promote R&D activities in every field of technology which get into touch with defense application.

a. Defense Strategy on Start-Ups

The defence industry is especially different from other industry systems in terms of "user profile". Innovation studies always give advice on being customer-oriented, discovering the user's problems and focusing on how to solve them. However, specific to the defense industry, there is no possibility to conduct user interviews by reaching beyond the boundaries of military.

The defense industry needs to work closely with the security forces, observe the field, listen to the problems and come up with solutions. However, this kind of work is possible for state-owned companies, but not for 'startups' who want to operate in this field. Because it is impossible for anyone who says that "I have established a defense industry startup" to have the opportunity to work on the ground with the security forces due to the nature of the work. So, could open innovation be the solution to easily integrating 'startups' who want to work in the field of defense industry into this sector?

In today's atmosphere and conditions, it is increasingly difficult for a single factory to master all the technologies for the required product by a single factory, no matter how large the R&D department is. In practice, an automobile factory buys the headlight technology of the car it produces from another company that develops it, prefers to buy autonomous driving technology from another and electric battery technology from another company. In this way, it can achieve more efficient results by focusing R&D opportunities on the characteristics of the main product.

A similar situation applies to tractor production companies, the tractor needs to drive the field in the most efficient way through 'GPS', spray the area as needed by analysing the pictures taken from the satellite, communicate with the 'IOT' sensors, and spend less fuel analysing the terrain conditions. The size of the technological ecosystem around a product such as a tractor has become larger than the tractor industry.

Today, the lifespan of patents obtained, especially technologies developed in the field of electronics, is significantly reduced. Most of the time, a whole new technology emerges before the certificate of the patent application arrives. Seeing this transformation and using technologies in the field of electronics, most companies are trying to out-source some of their R&D to technological start-ups operating in this field. Instead of developing some technologies themselves, they collaborate with start-ups and prefers to integrate the technologies developed by them into their products. Now, in the case of a car or tractor, imagine a defense industry product that incorporates much more complex technologies, such as an aircraft or air defense system. It's currently the same problem and need inevitably exists for the defense industry.

Of course, for the defense industry, there is another parameter that does not exist in other industries: "national security". For security reasons, the defense industry does not want the technologies it develops to be learned by everyone, or even heard from most of the time. So how can this need for innovation and national security concern be implemented together in a way that does not threaten each other? In fact, the answer to this question lies in the example given about the automotive industry. To focus R&D on the basic features of the product that often require privacy, and to go to the path of open innovation in the technological innovations required by the product. Open innovation studies can cover many different areas such as the defense industry-specific internet of things, big data analytics, virtual intelligence, 'blockchain',

communication, cybersecurity. Of course, there are rules for open innovation. Rather than a general approach of "Anyone with an idea, send it to us," industrial companies need to set their own open innovation strategy and work around it. To achieve this, it is conceivable that defense industry companies will identify specific themes about "complementary technologies" in terms of their products and focus their cooperation with the outside world on these areas.

It is of great importance that the defense industry acts as a bridge between start-ups and security issues in the position of "users". This cooperation will increase the potential of 'start-ups' working in this field to develop solutions focused on "user problems" specific to the defense industry, as well as serve the power of the defense industry to attract the agility and energy of 'start-ups'.

This approach has been had not only by the countries in the developing stage of their national defense industry but also the pioneer countries such as United States to remain their dominance on the defense sector as the emerging technologies developed rapidly and constantly by its competitors in the international commercial area such as internet of things, big data analytics, virtual intelligence, 'block chain', communication, cybersecurity has been shaping the future of military capabilities worldwide. That is the reason why the U.S. Department of Defense (DoD) has publicly praise the significance of innovative defense start-ups for decades¹⁷⁶.

Acknowledging the importance of enrichening the market by commercial companies, the real question is how the plenitude in the market will be composed? The

¹⁷⁶ Venture Capital Community Leaders, The Defense Industry Needs New Entrants, And A Supportive Government During Crises, 2020, see at <https://www.defensenews.com/opinion/commentary/2020/05/04/the-defense-industry-needs-new-entrants-and-a-supportive-government-during-crises/>

answer on this question lies in the policy of IPR which will be analysed in the upcoming section of this study.

b. Promoting R&D in the Civilian Industry

OECD describes R&D as “*systematic creative work to increase the stock of knowledge and to devise new applications using such knowledge*”. R&Dcomprehends three activities:

Basic research: It is defined as a theoretical or experimental study undertaken to reach new information of a phenomena which has no specific application in view.

Applied search: Opposite to basic research, it aims to resolve a practical challenge.

Development: This part comprises of creating the good, service and process to be marketed¹⁷⁷.

As previously discussed since the 1940s, militaries have invested high-technologies through a pursuit of R&D to build and maintain a defense industrial base of their nation. The notion that the defense effectiveness can only be provided through technological superiority led pioneer countries in defense promote defense R&D to access relevant advanced technologies. This illustrate the reason, since World War II, western countries have been pouring a big portion of their expenditures on R&D into applications for defense¹⁷⁸. Bellais have believed that the acknowledgement of the potential that technical and scientific progress has a strong effect on the military power,

¹⁷⁷ **Lewis**, James A. “Intellectual Property Protection Promoting Innovation in a Global Information Economy” CSIS Publication, January 2008, p.57

¹⁷⁸ “*Technology played a minor role before the middle of the twentieth century, but World War I and even more World War II marked a radical change*”. **Bellais**, p.60.

increased the shares of R&D in the budget of defense authorities and illustrated US R&D spending: *“For instance, R&D spending in the United States represented only 0.8% of federal budget in 1940, but more than 10% by 1960 – and defense R&D received most of these additional resources”*. He identified this as a “major change” since World War II what is called “Big Science”.¹⁷⁹

The immensity of the R&D activities of the countries has played an essential role in the national security. R&D builds up a foundation for emerging and advanced technologies which underpin a wide range of applications including advanced defense systems¹⁸⁰.

There is a great deal of literature which exhibit the connection between civilian and military technology and R&D. There are studies of the interaction between these two industries from which a common understanding has been reached. This understanding is that the industries immensely influence each other, yet military R&D is not as value to the civilian technology market because the defense R&D works in an increasingly specialised area and the data gathered from such works are not disclosed or disclosed under strict confidentiality agreements due to national security and has a narrow relevance and contribute to civilian industry¹⁸¹. However, according to Cowan

¹⁷⁹**Bellais**, p.60.

¹⁸⁰**Congressional Research Service**, Government Expenditures on Defense Research and Development by the United States and Other OECD Countries: Fact Sheet, January 28, 2020, p.1.

¹⁸¹The challenges which arise in the commercialization of defense Technologies is set forth as : *“The first difficulty, they claim, is that technology transfer is not a matter of handing over some ‘box’ of knowledge, easily usable by the receiving side, but rather requires a significant joint effort from both parties. Second, current intellectual property laws and practices do not fit technology transfer from the government-funded secrecy-based defense R&D to the privately funded patent-based civilian industry”*.**Setter, Oren &Tishler, Asher**,“Introduction: Defense Research And Development In The 21st Century”, Defence and Peace Economics, vol.17, issue 3, 2006, p. 167.

and Foray, there are still technological fields where the military funded R&D activities produce useful outcomes in the commercial domain¹⁸².

In either case, it is an unquestionable fact that, civilian market directly or indirectly contributes to the emergence of defense related technologies and defense acquisition by means of dual use technologies.

Dual use policy accelerates the technology marketing process of start-ups and SMEs which do not have sufficient military product marketing opportunities, by enabling them to participate in the projects of defense acquisition. It reduces the product unit costs with the expansion of the market volume which is a very important factor in terms of expansion of the civilian use area. It also increases competition and consequently increases the efforts to improve product qualifications¹⁸³.

Trends in military expenditure illustrates that a defense related technology persists at the core of defense procurement in the western countries. “*Western armed forces feel that strategic surprises can be avoided by mastering innovation and disruptive technology. This explains why defense R&D remains a key dimension of defense spending*”¹⁸⁴.

In spite of the conclusion of cold war, R&D in defense sector absorbs a major dividend of defense expenditure even if there are no state which is able to challenge NATO country or the U.S. in the technology based defense sector at least in the short

¹⁸²**Cowan, Robin&Foray**, Dominique, “Quandaries In The Economics Of Dual Technologies and Spill Overs From Military to Civilian Research and Development”, Research Policy, vol.24, 1995, p.1.

¹⁸³**STM ThinkTech**, Savunma Sanayiinde Adaptasyon: Çift Kullanım (Dual-Use) Konsepti, ThinkTech Online/Focus Semminar, 24.06.2020, watch at <https://thinktech.stm.com.tr/detay.aspx?id=352>

¹⁸⁴**Bellais**, p.60.

term¹⁸⁵. Battles since 1990's can be described as low-tech conflicts. Gulf Wars are the strongest demonstration of what a military equipped with high tech capable of at its time¹⁸⁶.

As explained above, technology and innovation are momentous for a military to remain and consolidate their strategic superiority. On the other hand, technological or in a more common sense scientific opportunities are not foreseeable. In order to overcome this capriciousness, militaries incline to avert strategic surprises by anticipating probable technological setback which threatens national security. Key to face this issue is to allocate remarkable amount of resources to research and development activities in the field of potential superior technologies.

Even the outcome is a failure, it is considered to be one of the desirable features of basic and applied research since it illustrates that the subject technology most probably cannot be used by an adversary. In the absence of any inefficacy, technologies may never be sufficiently pushed or alternative military uses be explored¹⁸⁷. This exploration ensures "*experimenting long after a market would have standardized on one technology*"¹⁸⁸ According to Cowan and Foray, defense R&D has two kind of significant effect "*First, it has a value through the knowledge it produces about the characteristics of the technology which is of direct importance to the extent that military and civilian users have common interests and second it also has*

¹⁸⁵ **Ibid.** p.61.

¹⁸⁶ **Rochlin**, Gene I. & **Demchak**, Chris C., "The Gulf War: Technological and Organizational Implications, Global Politics and Strategy", *Survival*, vol. 33, issue 3, 1991, p. 260.

¹⁸⁷ **Bellais**, p.62.

¹⁸⁸ **Cowan**, Robin, **Foray**, Dominique, "Quandaries in the Economics of Dual Technologies and Spillovers from Military to Civilian Research and Development." *Department of Economics Research Reports*, vol.25, issue 9, p.852.

considerable indirect value through its contribution to the information infrastructure”¹⁸⁹. Foresaid effects of defense R&D eventually provides subject technologies more affordable as the learning curves of its users moves along. It also enlightens the technology users on planning future strategies with the information gathered as an outcome of applied R&Ds.

R&D per se does not generate economic value unless the outcome of the research and development activity is commercialised through effective strategies. Governments may fund R&D in order to acquire a technology with excessive investments however, private sector is unlikely to invest into a research activity if it does not foresee an adequate return. The same ambiguity takes place when considered from defense point of view: No matter how high the defense authorities invest into technological development for the benefit of military usage, private enterprises will not be attracted unless it is commercialized by the ones who generate it. Also, diffusion of innovation will not scale up when the technology is preserved as confidential and under such circumstance, military would enhance its capabilities with the added innovation produced as a result of R&D investment, but no further benefit would be acquired by them by means of defense related technology diffusion in the commercial sector.

II. THE ROLE OF INTELLECTUAL PROPERTY RIGHTS PROTECTION FOR DEFENSE ECOSYSTEMS

A. IPRs and Diffusion of Commercial Innovation

¹⁸⁹Cowan &Foray, p.852.

Until this stage of this study, it is endeavoured to be clarified how and why defense industry flourish by open innovation, high quantity of the actors in the commercial market and increased R&D activities for the development of emerging dual use technologies to structure and maintain independent, superior military capabilities. Besides their individual benefits to defense sector, these aspects serve to diffusion of commercial innovation which have defense applicability or eventually gain such applicability by means of dual use abilities.

The role of commercial companies, research and development centres which are directly working with the defense authorities being the sole remedy for critical technological and industrial base for the development of military programs dwindled as they do not typify the whole network of competences necessary for increasing military capabilities. Artificial intelligence, machine learning, robotics, data fusion and many other digital technologies emerge outside the boundaries of DIB's. They are developed under novel industry ecosystems and by start-ups aroused in these systems. As the system adapted by the defense markets especially in the Western Countries, international pioneers of this industry locate outside the direct influence of defense authorities and policy makers because exploration activities of advance technologies are no longer driven by military issues. That is why it is very critical to manage a transition from DIBs to defense ecosystems which emphasize the importance of commercial innovation.

As Schmid proposes, there are three steps to be taken by the defense authorities of facilitating commercial innovation: *“(1) First, military R&D expenditure may fund institutions or researchers engaged in activities that enhance civilian*

*innovation...(2) Second, defense spending can result in civilian innovation by increasing demand for new technologies through government procurement...(3) Finally, defense R&D expenditure can drive overall innovation by producing knowledge and technologies that themselves go on to enhance subsequent innovative outputs”.*¹⁹⁰ This determination of Schmid is important for the construction of a defense ecosystem as it is the gate opening to technology transfer from civilian industry to defense industry. To that end, commercial companies, especially start-ups in the commercial market to take place into the defense acquisition systems and R&D activities on the civil technologies has to be promoted by defense authorities.

The fundamental element of the technology transfers in any kind is the IPR policies of governments and a well-structured IPR Law. The reason of this basically is that the IPR protection is what incentives the transfer of technology because it enables economical value of technologies to be capitalized by the ones who make an effort to develop and market such technology.

IPR protection is correlated positively to the dissemination of defense related technologies by the scholars of military technology. However, scholars of economy are irresolute on the issue. Most believe that technical knowledge disclosed through patenting increases the diffusion of technology. However, there are still hesitations to make a firm determination because while it incentives patent applications, it may obstruct market entrants and prevent diffusion¹⁹¹. In spite of this ambiguity in theory,

¹⁹⁰ Jon **Schmid**, “The Diffusion of Military Technology”, Journal of Defence and Peace Economics, p.3. 2017.

¹⁹¹ **Schmid**, p.5; **Breitwieser** Anja & **Foster** Neil, “Intellectual Property Rights, Innovation and Technology Transfer: A Survey”, WIIW Working Paper, vol. 8. 2012, p. 33: “On the one hand, stronger IPR protection can restrict the diffusion of technology with patents preventing others from using proprietary knowledge and the increased market power of IPR holders potentially reducing the dissemination of knowledge due to lower output and higher prices. On the other hand, IPRs can play

technological dissemination across countries is regarded to be one of the greatest outcome of the TRIPS Agreement. Article 7 of the TRIPS Agreement states that *“The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge in a manner conducive to social and economic welfare, and to a balance of rights and obligations”* It promotes technology transfer through fundamental channels of trade, licensing, foreign direct investment (FDI) and joint venture contracts¹⁹².

1. Elements of Defense Related Commercial Innovation

a. Commercialisation of IPRs

IP and IPR commercialization, in practice, are used interchangeably and they basically mean *“making money out of one’s ideas”*. Ideas have no value, unless they are benefitted in practice as tangible objects. WIPO defines IP commercialization as *“a continuum of activities and actions that provide for the protection, management, evaluation, development and value-creation of ideas, inventions, and innovations to implement them in practice. Prototypes and implemented processes lead to the development of products and services by entrepreneurs, start-ups, existing companies*

a positive role in knowledge diffusion, since the information available in patent claims is available to other potential inventors”.

¹⁹² *ibid*, p.6

as well as governments resulting in economic and societal benefits”¹⁹³. In that vein IP can be commercialized individually or collaboratively by universities, existing companies, enterprises, and governments.

For the commercial companies, the idea is as described by Schmid “...while profit-seeking firms have a clear incentive to commercialize defense-funded technologies, their ability to do so may depend on the possession of enforceable property rights on the technologies in question”¹⁹⁴. This realistic determination ascertains that the commercial firms are attracted by the existence of enforceable IPRs for the benefit of them in order to ensure profitability at least equal to the one gained through transactions in the commercial market. Such an IPR policy definitely promotes technology transfer from the civilian sector to military one. The other way around, Bellais and Guichard, put forth that “...establishing an ‘intellectual property rights (IPR) culture’ within the defense sector is critical to stimulating the transfer of military technology into the civilian sector”¹⁹⁵. They believe in the visa versa, which is the transfer of defense technology to the civilian field can be driven by the protection of IPRs in a reasonable manner. Their view seems quite valuable because of the fact that the defense funded high- technologies can be benefitted by the commercial firms which develop them under DOD Contracts (Department of Defense Contracts) in the other commercial transactions of them and long term profit can be maintained. Consequently, the companies which participate in the military development programs granted by IPRs to a mutually agreed extent can spur defense technology diffusion.

¹⁹³**Keller**, Gary N. “*Guide On Intellectual Property (Ip) Commercialization*”, WIPO CDIP, 2015, p.18.

¹⁹⁴**Schmid**, p.5

¹⁹⁵**Bellais**, Renaud, &**Renelle**, Guichard. “Defense Innovation, Technology Transfers and Public Policy.” *Defence and Peace Economics*, vol.17, issue 3, 2006, p.273.

The fundamental source of innovation is the R&D activities conducted by academic institutions and research centres. Research results to be turned into products or services require a process which involves the participation of government (financial investment), enterprises and existing commercial companies through the channel of commercialization of IP. The innovation to become marketable product requires compilation of activities such as testing, verifying, refining, conducting a market research, etc. Therefore, a strong IP policy is important to construct and sustain the correlation between these actors.

A comprehensive enactment has been made in U.S. to empower the correlation between academic institutions, start-ups, non-profit entities and federal laboratories which is called Bayh-Dole Act. The act entitles proprietary rights on the inventions and other IPs which are the outcome of R&D performed under government funding to the entities which choose to do so. This encouraged various academic institutions to establish TLOs (Technology licensing offices), TTOs(Technology Transfer Offices) and TMOs(Technology Management Offices) to commercialize their intellectual property¹⁹⁶.

The objective of the act stipulated under section 200 of the legislation as: *“to encourage maximum participation of small business firms in federally supported research and development efforts; to promote collaboration between commercial concerns and non-profit organizations, including universities; to ensure that inventions made by non-profit organizations and small business firms are used in a manner to promote free competition and enterprise; to promote the commercialization and public availability of inventions made in the United States by United States industry and labor;*

¹⁹⁶Keller,p.20

to ensure that the Government obtains sufficient rights in federally supported inventions to meet the needs of the Government and protect the public against nonuse or unreasonable use of inventions; and to minimize the costs of administering policies in this area."¹⁹⁷

The act entails ownership to certain requirements including but not limited to commercialize invention, comply with the notification and reporting in terms of managing relevant intellectual property and to share royalties with the inventor himself/herself (obligation for universities and non-profit organisations).

Prior to such legislation, intellectual property rights which were owned by the government -with the understanding of if the research is funded with the money collected from taxes, the outcome of the research must be publicly owned caused- there were numerous inventions which remained unexploited¹⁹⁸. The Act basically entitles small scale companies and non-profit organisations for the election of retaining title to the subject invention¹⁹⁹ after the invention disclosed in accordance with the relevant provisions of the Act. The act provided a sharp increase in the commercialization of new technologies and their relevant IPRs by universities along with enterprises/start-ups in many sectors one of them being defense.

¹⁹⁷ Bayh Dole Act (35 U.S.C.) §200

¹⁹⁸ "An estimated 27,000 federally owned, patented technologies were sitting on the shelf before the law's entry into force." **Morrison & Foerster**, "The Government's Patent Policy: The Bayh-Dole Act and Authorization and Consent" Mofo News Item, 2002, see at <https://www.mofo.com/resources/news/the-governments-patent-policy-the-bayh-dole-act-and-authorization-and-consent.html#6> , accessed 12 May 2021.

¹⁹⁹ 35 U.S.C. §201 (e), Subject Invention means within the scope of the Act: "...any invention of the contractor conceived or first actually reduced to practice in the performance of work under a funding agreement..."

Paragraph 202 Act stipulates that the federal state will acquire a license which is granted world-wide, paid up, non-exclusive, irrevocable and non-transferable for the subject invention produced or put into practice under a public funding²⁰⁰.

Although the research and development activities of the individuals work under the non-profit entities and small enterprises which are not publicly funded may originate inventions The Bayh Dole Act only covers the ownership rights on the inventions financed by the state²⁰¹. In such a circumstance the proprietary rights of these entities remains unregulated. In regard to universities, if the research activity is not a state-funded one, each university applies different regulations and royalty shares in terms of ownership rights within the scope of its own patent policy. However, as a rule, it is accepted that these inventions are evaluated within the scope of employee inventions and that the beneficiary will be the employer. Obviously, the law makers did not feel the need to regulate this field, because the universities may free to regulate the ownership rights on the inventions which arise as a result of R&D activities of the members of universities²⁰².

²⁰⁰ 35 U.S.C. §202 (c) (4) *“With respect to any invention in which the contractor elects rights, the Federal agency shall have a nonexclusive, non-transferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world: Provided, That the funding agreement may provide for such additional rights;[3]including the right to assign or have assigned foreign patent rights in the subject invention, as are determined by the agency as necessary for meeting the obligations of the United States under any treaty, international agreement, arrangement of cooperation, memorandum of understanding, or similar arrangement, including military agreement relating to weapons development and production”.*

²⁰¹**Suluk**, Cahit, “Çalışan Buluşları Hukuku”, 2nd ed., Seçkin Yayıncılık, Ankara, 2020, p.93

²⁰²**Merhacı**, Selin Özden, “The Bayh-Dole Act and an Analysis on the Inventions of University Lecturers in Turkish Law”, Ankara Üniversitesi Hukuk Fakültesi Dergisi (AÜHFD), 64 (2), 2015, p.412.

b. Commercial Transfer and Acquisition of Technology

Technology transfer is the transfer of technological knowledge and experience between individuals, institutions and organizations, sectors, regions, national and international economies, or the transfer of technological knowledge from transferor to transferee²⁰³. Bellais and Guichard defines technology transfer as *“the process by which technology, knowledge, and/or information developed in one organization, one area, or for one purpose is applied and utilized in another organization, in another area, or for other purpose”*²⁰⁴. It can be in the form of the transfer of a new technology, or it can be done in the form of developing and modifying existing information or technology and adapting it to advanced technology or even can be in the form of educating and training personals.

The transition process of the transfer is one of the most important issues in technology transfer. Technology transfer can be done in many different ways. The path to be chosen for such a purpose can vary from company to company, sector to sector and country to country²⁰⁵. There are three common ways of commercial technology transfer, namely, assignment, license agreement and knowhow agreement²⁰⁶. Although these methods may take place for the transfer of the other intellectual property rights such as trademarks, utility models, industrial designs and copyrights, for the sake of

²⁰³**Arıkan**, L. Yasemin, “Teknoloji Transferi Yöntemleri”, *Idarecinin Sesi Dergisi*, vol. 192, November-December 2019, p.31

²⁰⁴**Bellais&Guichard**, p.274.

²⁰⁵**Arıkan**,p.31

²⁰⁶**WIPO**, “IP Handbook”, p.172.

simplicity, further explication will be maintained in regard to the principles of the transfer of the patented invention.

i. Assignment²⁰⁷

Assignment or sale is generally referred as a legal channel to sell out all of the exclusives rights granted by a patent to a person or a legal entity. All the proprietary rights on the invention is transferred without any detriment in terms of duration or a different restriction. The legal act between the assignor and the assignee is called “instrument of the assignment of patent(or other IPRs) rights”²⁰⁸.

ii. License Contract

WIPO describes the license as *“the permission by the owner of a patented invention to another person or legal entity to perform in the country and for the duration of the patent rights, one or more of the acts which are covered by the exclusive rights to the patented invention in that country.... those acts are the making or using of a product that includes the invention, the making of products by a process that includes*

²⁰⁷ Sample Patent Assignment And Technology Transfer Agreement, see at https://higherlogicdownload.s3.amazonaws.com/AIPLA/c96234c2-048c-430b-ba69-5ad97a647c4b/UploadedImages/ip_transactions_-_forms_microsite_docs/16_Assignment_and_Tech_Transfer.pdf accessed 12 May 2021.

²⁰⁸WIPO, “IP Handbook”, p.173.

invention or the use of the process that includes invention”²⁰⁹. This permission is substantiated by a written license agreement which is usually called as “license contract” or “license”. Licensor transfers the exercise of certain rights on the invention to another person or a legal entity which is referred to as licensee generally in return for a royalty and for a certain period of time.

License agreements have an important function for enabling technology transfer. Since the most profitable way in terms of the use of technological assets is the license agreement, it plays a more functional role in commercial activities than other types of contracts.

iii. Know-How Contracts

Another legal option for the commercial technology transfer and acquisition is through know-how contracts. Know-how contracts may a separate legal agreement between persons and legal entities as well as provisions included to license contract in particular when the owner of the invention is the one who developed and owned such know-how. Under a know-how contract, the holder of the know-how undertakes to disclose relevant information in accordance with the terms and conditions of such contract²¹⁰.

The knowhow can be shared in tangible or intangible forms. Documents, written illustrations technical drawings, photographs are in tangible form whereas a

²⁰⁹WIPO, “IP Handbook”, p.173.

²¹⁰Ibid, p.175.

training which includes know-how information of an engineer by the disclosing party or a process which includes know-how information is witnessed by the engineers of the disclosed party are the illustrations of intangible form²¹¹.

2. Dual-Use Technology Conversion

Dual-use technology conversion is a form of technology transfer which represents the process of civilian-military technology integration. Both private corporations and defense authorities may be transferor or transferee of the technology subject to different conditions. As Mowery argues, *“defence R&D investment has influenced innovation in the civilian sector of several OECD nations. The growing importance of dual-use and civilian-origin technologies, along with changing national security requirements and European cuts in defence research budgets, has changed the dynamics of defence technological innovation”*²¹². This is the consequence of big science as previously described by Bellais. Dual use policies which facilitates the technology transfer between civilian and military industries and markets have an increasing significance in a knowledge-based economy.²¹³ There are two main roads to such kind of technology transfer: Spin-in and spin-off.

²¹¹WIPO, “IP Handbook”, p.175.

²¹²Mowery, David. C. “Defense-Related R&D as a Model for Grand Challenges Technology Policies.” Research Policy, vol.41, issue 10, 2012, p.1712.

²¹³Mérindol, Valérie&Versailles, David W., “Dual Use as Knowledge-Oriented Policy: France during the 1990–2000s.” International Journal of Technology Management, vol.50, issue1, 2010, p.88

a. Spin-off

Spin-off is addressed as the commercial application of the defense related technology²¹⁴. Economists define spin-off process as the “*occurrence of situations in which the product or a civil technology were originated on products or technologies developed initially to military purposes*”²¹⁵. It may be through the contractors of the defense authorities which produce the military technology or parts of it, the integrator company (private or semi-private) of the final product as a deliverable to the military. Spin-off activities are less common when compared to spin-in activities because the corporations which serve to military has to fabricate their features to an utterly competitive commercial market sphere²¹⁶. Correalatively, Bellais and Guichard states, “*successful collaborative technological development requires deep understanding of the technical context of applications and relies on the organizational environment in which scientists, engineers and technicians, often coming from different disciplines, work and interact*”. Therefore, bridging defense R&D outcomes and commercial companies, entails dedication, persistence and creativity²¹⁷.

Besides, if the technology is state funded, the additional circumstances would be taken into account such as security, confidentiality, ownership of the intellectual property and export restriction conditions of the government imposed upon its

²¹⁴**Cao, Xia &Yang, Xiaojun&Zhang, Lupeng**,“Conversion of Dual-Use Technology: A Differential Game Analysis under the Civil-Military Integration” Symmetry, 12 November 2020, p.2.

²¹⁵**Leske,Ariela D. C.**,“A Review On Defense Innovation: From Spin-Off To1 Spin-In”,Brazilian Journal of Political Economy, vol. 38, issue 2, April-June 2018, p.377.

²¹⁶**Cao & Yang &Zhang**, p.2.

²¹⁷**Bellais &Guichard**, p.285.

contractors may be some of the problematic issues when the company inclines to acquire and/or commercialize dual-use technologies.

On the other hand, spin-off creates a cumulative effect of technological knowledge which will contribute to the development of dual use technologies. To this respect U.S. system of innovation is managed to prevent ramification of the defense and commercial spheres in order for a greater benefit from the existing research and development sources. The applicability of this objective depends on the systematic and effective diffusion of military related technologies which requires a collaborative environment among government, private industry and academic institutions (which in general universities). Turkey is one of the countries which adopted this policy in its national system of innovations only recently²¹⁸.

b. Spin-in

Spin-in is referred as the term used when “*products or civil technologies make feasible new products or military technologies*”²¹⁹. Cao, Yang and Zhang defines it as “*the use of civilian production facilities to produce arms or military products*”.

²¹⁸ The president of the board of directors of the Istanbul Chamber of Industry, Erdal Bahçivan projected the current policy of the Turkish defense industry by the following “*This sector is engaged in commercial activities to meet defense-related needs; I believe that we should think of defense systems as an organism that covers a much wider area such as R&D activities, construction activities, food, clothing, health, logistics. Besides, perhaps most importantly, the defense industry has a multiplier effect on other sectors. This sector contributes significantly to many industrial sub-sectors such as machinery, chemical, textile, automotive, IT, construction and ship industry both through the production demand it creates and technological feedbacks*”. ISO, Press Release of the 2nd Defense Industry Meeting, 23.01.2021, see at file:///C:/Users/ab33418/Downloads/2020.01.23-basin-bulten-9733.pdf accessed 20 May 2021.

²¹⁹ Leske, p.377.

Researchers analysed that *“the results obtained from technological overflows were only possible due to the period of strong military tension, in which the high and urgent investments enabled the success of these projects”*. The government expenditure on military R&D activities is a great impetus for improving the technological capabilities of armed forces during the war time. However, after the conclusion of this period it became clearer and they reach the conclusion that in peace time along with the pace of the technological development in the civil industry and the budgeted cuts of the military, the direction of the overflows changed and the term spin-in is generated. Stowsky emphasize that with the advancement of the communication technologies, the pace and the intensity of the dissemination of technological information increased. This circumstance caused a reduction of the protection over the military technologies – countries are in a race to access information of the adversary’s technology. He asserts further to that, such protection on the confidential technical data is relegated to a secondary importance because the integration of advance civil technologies through business with commercial companies enhance major productive efficiency and technological superiority²²⁰.

In order to scale spin-in aspect, many scholars and experts examined through defense authorities, competitive pricing and patent citations to explore the civilian application in the defense field. The researches indicate that the fundamental obstacle was the greater technical specifications and standards of the military application²²¹.

²²⁰ Leske, p.386.

²²¹ China is an exemplary country which embarked on spin in to catch up with the technological advancement of the pioneer defense industry countries, U.S being in the first place. Nouwens and Legarda reported on the spin in activities of China that: *“The global market for robotics and systems utilising Artificial Intelligence (AI) is expected to reach US\$153bn by 2020. The amount of venture capital funding going into robotics in 2015 stood at US\$587 million, double the amount invested in 2011. ... The trend of focusing policies to take advantage of these technologies and lead in their*

B. The Impacts of Defense Related IPRs

Each category of intellectual property rights has separate aspects for innovation and technology diffusion and eventually for the civil-military integration. IPRs which have the most value for defense technologies are patents, copyrights, trademarks and tradeseecrets.

1. Patents

development is evident ... in China under President Xi Jinping's leadership. In an effort to drive the country towards the 2049 centenary goal of becoming a modern and prosperous socialist state, as well as building a global top-tier military capable of fighting and winning wars, Xi has turned to a two-pronged strategy for military modernisation: making large defence state-owned enterprises (SOEs) more efficient, globally competitive and innovative, while also turning increasingly to the civil and commercial sectors for innovation potential and inspiration. In particular, China is investing heavily in its pursuit and integration of emerging dual-use technologies, hoping they will help the People's Liberation Army (PLA) to surpass conventional military capabilities to achieve battlefield dominance across domains. Technologies such as AI, cyber infrastructure and software, and automation are primarily civilian in their application, but their relevance to defence and to how future wars will be fought is clearly growing". Another notable factor of the Chinese dual use spin in strategy is also emphasized by the authors is that *"Some of these dual-use technologies may not be operationalised in a military context in the short to medium term, either because their applications are unclear or because the technologies are too expensive or simply not developed enough to be rolled out widely. However, the inherently dual-use nature of all of these technologies means that, even if they turn out to be of little use for military purposes, they will have other civilian uses that will have a much broader impact on China, on Europe–China relations and on the global balance of power. China's rapid advances, therefore, should be of concern to policymakers and industry in the European Union".* **Nouwens, Meia & Legarda, Helena**, "Emerging Technology Dominance: What China's Pursuit Of Advanced Dual-Use Technologies Means For The Future Of Europe's Economy And Defence Innovation" Research Papers, 2018, see at <https://www.iiss.org/blogs/research-paper/2018/12/emerging-technology-dominance> accessed May 12 2021.

The initial and most important IPR for the dissemination of defense related technological knowledge and innovation is patents. There are three channels of technology diffusion through patents : (i) disclosure of the technical data of the inventions to public provides information flow and (ii) patents incentivize enterprises, universities and research centres to undertake R&D activities and the cost reimbursed to invent a novel technology or technological progress because they may translate these efforts into commercial revenue, and lastly (iii) participate into defense acquisition systems and be a defense contractor provided that the outcome of their effort will add economic value by means of exploiting the rights on their invention²²².

2. Trademarks

Trademarks are not directly contributing to the technological dissemination yet they have very critical role in technological advancement. (i) First of all, trademarks are the signals of a technological product or service (in practice it is called as technical assistance) meeting certain quality standards. Each product or service having different qualifications creates market variability and boost competition in market and so encourage enterprises to improve their technologies in a constant manner. (ii) Secondly, since they create and protect commercial reputations by means of quality, they rescue customers from frauds or confusions in terms of the origin of the products and therefore extreme search costs to find the products which are eligible for their use.

²²²Which means that they may acquire “*additional revenue streams by generating commercial assets that can be monetised*” via IPRs, especially licensing. **Anderson**, Stephen & **Love**, James, “The Strategic Use of Intellectual Property Within the Aerospace & Defense Industry” National Law Review, Vol. 11, no:141,21 May 2021, <https://www.natlawreview.com/article/strategic-use-intellectual-property-within-aerospace-defense-industry> , Accessed on May 12.

3. Copyrights

Literary and artistic works which are covered by copyright laws are lack of industrial applicability. On the other hand, database and computer programs are also copyright material which largely takes place in defense technology acquisitions²²³. Therefore, they have the similar effects of patents in terms of database and computer programs²²⁴.

4. Tradeseecrets

Patentable subject matter may be rationalized to be kept as a tradeseecret under reasonable conditions which are (i) *“the innovator may judge their creation to be unpatentable in legal terms, but hard to imitate”*; (ii) *“a firm may prefer not to disclose its processes, as required by patents, because disclosure could reduce expected profits”*; and (iii) *“firms may wish to avoid the costs of patenting. Tradeseecrets do not incur costs in the form of application and grant procedures, yet they also do not add to the base of knowledge available to the public”*²²⁵. Technological knowledge being preserved as an asset within the company would seem like it does not contribute to

²²³ According to Devecchio, *“... the largest categories of information generated under Government contracts today—technical data and computer software.”* **Devecchio**, W. Jay, “Copyright Protection Under Government Contracts”, Briefing Papers, Thomson and West Publication, May, 2005 p.1.

²²⁴ *“Unlike in the USA where the protection of private IP rights in databases is generally confined to copyright and the protection of the architecture of the database, across Europe there is an additional IP right – database right – which reserves to the IP owner the ability to control the extraction and reutilisation of the contents”.* **Anderson&Love** “The Strategic Use of Intellectual Property Within the Aerospace & Defense Industry”.

²²⁵ **Breitwieser&Foster**, p.7

technology diffusion but reverse engineering encourages especially small or medium scale enterprises to acquire technology without lower financial burden²²⁶.



²²⁶**Breitwieser&Foster**, p.7

CHAPTER THREE

GOVERNMENTS IPR POLICIES AND IMPLICATIONS IN DEFENSE TECHNOLOGY ACQUISITIONS

I. DEFENSE ACQUISITION CONTRACTS

The traditional process of contracting includes the actions of identification and justification of the technology, data or innovation needed by the defense authorities, planning the acquisition strategy to obtain such items and implementation of such strategy through forming a contract with vendor. The stages consist of “presolicitation”, “solicitation” and “source election”.²²⁷

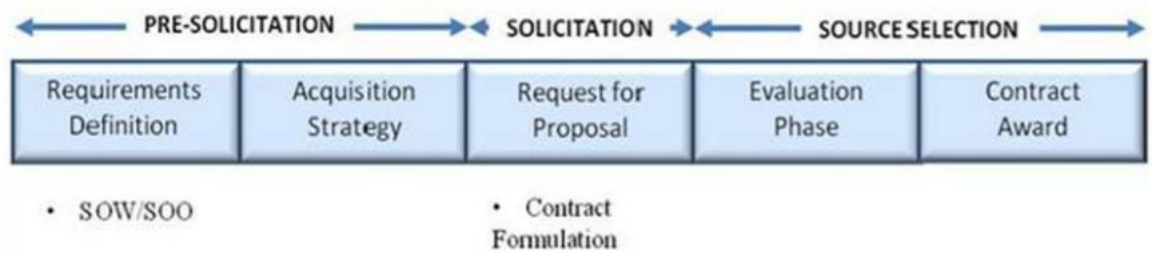


Figure 5: Acquisition Process²²⁸

²²⁷Sabin, Jacob D.& Mark K. Zakner, “Analysis Of Expedited Defense Contracting Methods In The Acquisition Of Emerging Technology”, MBA Professional Report, December, 2016, p.7

²²⁸ibid.p.7

A. Traditional Contracting Process

1. Requirement Definition

The first step of the first stage presolicitation is the requirement definition. After capturing customer requirements which includes accurate understanding and full identification of the needs of customer, requirement definition is made. Requirement definition consists of market survey (to determine the vendors which can satisfy the requirements), constructing objectives and preparing statement of work (SOW) document which will be integrated into the contract between the defense authority and the vendor who will supply the requirements. One of the vital determinations in this phase is to decide whether commercially available COTS products will be acquired or it will be a development program.

2. Acquisition Strategy

Generating the strategy for the acquisition management is defined as the process of coordination and integration of all efforts of the relevant divisions which contributes to the acquisition, on the plan for the accomplishment of fulfilling customers' needs including schedules and costs²²⁹. This planning serves to the determination on the suitable contracting method which can be a technology transfer agreement, joint venture or IP license contract other than traditional contract methods such as development or COTS agreements.

²²⁹Sabin & Zakner, p.8

3.Request for Proposal (RFP) Process

The RFPstage is defined as a *“formal negotiated solicitation issued for buys over \$100,000 resulting in a formal contract [and] includes the contract form, contract clauses, work statements, specifications, delivery schedule, and payment terms”*²³⁰

4.Evaluation Process

The purpose of the evaluation phase is to comprehensively analyse whether the proposals of the vendors are meeting the requirements under the SOW, legal and administrative²³¹.

5. Contract Award

The last phase of source election stage is concluding the contract depending on the final negotiations and evaluation process²³².

²³⁰Ibid., p.9

²³¹*“Required evaluation factors include price or cost and quality, using one or more non-cost factors such as past performance, compliance technical excellence, management capability, and personnel qualifications”***Sabin & Zakner**,p.8.

²³²ibid., p.10

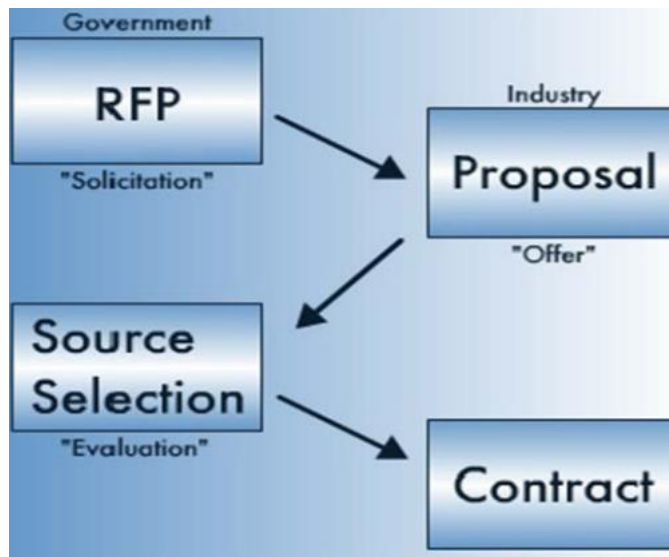


Figure 6: Contract Award Phases²³³

B. Change in the Defense Acquisition Strategies based on IPR

Defence Acquisition policies has shifted in correlation with the parameters which effect the technological advancement as analysed in the previous section. The new concept of the “agile capability” is adopted as an acquisition strategy by the most countries which appreciate the importance of technology diffusion and the market compatibility for creating a defense ecosystem. Under this concept the priority of the defense authorities is not the military capability per se but the ability to generate capabilities which include not only state of art, efficient and cost-effective equipmentbut also industrial and intellectual capacity to do this when it is necessary. This ability is not

²³³ibid., p.9

expected to be solely driven by the defense authorities, industry, commerce and academic institutions are the key source of developed military technologies²³⁴.

Navigating through the contemporary IPR policies of defense authorities in numerous countries, the most remarkable change is the exploitation of IPR as an instrument to provide technological development through technology transfer and diffusion strategies as explained above by means of civil- military technology integration. These policies of the governments which appreciate the significance of well-defined IPR protection for the improvement of defense related technologies and their cumulative impact on the military capabilities requires a multidimensional policies and regulations because of the historical reasons and institutional grounds and priorities. Those policies should be and are endeavoured by the conscious governments to be setting up “*relevant legal and contractual environment*”²³⁵.

The dominant precedent in defense acquisitions is to prevent military innovations as secrets instead of patents or other relevant IPRs fundamentally because “*military value cannot be protected in the same way as those of economic value*”²³⁶. In the commercial sphere, since firms are profit-seeking organisations, the purpose is to protect economic rights and increase revenue through multiple exploitation of a singular asset (licensing for instance). Although they may prefer the tradesecret option, it is almost a rare method to secure economic rights because it does not ensure sufficient legal protection from unauthorised use of intellectual property. On the other hand, patents and other types of IPR protection provide their right holders stronger protection

²³⁴**Jenkin**, Bernard, “Defence Acquisition for the Twenty-first Century”, Civitas, 1sted., London, 2015, p.11.

²³⁵**Bellais & Guichard**, p.277.

²³⁶*ibid.*, p.277

andenable them to bring actions, claim rights and impose heavier sanctions on the infringers²³⁷.

In the defense sphere, whether to enable IPR protection venturing the divulgence of the technical information is an ambiguity for major development programs (weapons or aircraft for instance) because the purpose of the defense institutions is ensuring strategic superiority that only can be retained if adversaries cannot get in touch with such technical data to imitate or develop counter defense against it. Such non-disclosure policy is maintained on the ground of national security, which is the main struggle of governments and to pursue stronger IPR protection for the benefit of defense contractors even if they are aware of the tremendous influences of it by means of creating a competitive defense market and supplying technological advancement (as described in the previous section of this study under the concept of defense ecosystem).

The lack of IPR culture in the national defense industrial base explains the subdued rates of IP registration especially patent registration throughout the history. However, such paradigm is insufficient in regards to two aspects:

²³⁷ “Tradeseecret protection only applies to unlawful breaches. It does not bar parties from legitimate duplication efforts such as reverse engineering in order to arrive at the secret independently. Designating a tradeseecret does not prevent another party from independently developing its own version of the product, process, or formula. A rival company could even file a patent for the process and claim exclusive right to it, completely shutting out the original inventor. Finally, a company must remain vigilant about protecting its tradeseecret at all times. Unintentional disclosure of a tradeseecret could upend the process and leave the company empty-handed. If company executives are lax about non-disclosure agreements, someone with access to the secret could reveal it. Once a secret is publicly known, it is no longer protected”. **Morningside**, “Tradeseecrets Vs Patents: Which Approach Is Right for You?”, 2021, see at <https://www.morningtrans.com/trade-secrets-vs-patents-which-approach-is-right-for-you/> accessed on may 22.

(1) Entitling each part of technological information confidential is not relevant all the time because not every piece of technical data preserves a strategic value. The extensive protection over the innovation counteract the potential of commercialization of defense innovations produced or funded by government in the civil market. As Sharp indicates, if government demands more rights than sufficient, contractor may refuse to engage into commercial relationship with the government or charge a remarkably high amount of price²³⁸.

(2) It has hazardous effects on the defense firms (public or private) who wants to be in the commercial markets and commercialize their IPRs on the defense related technologies²³⁹.

II. IPR REGULATED UNDER DEFENSE ACQUISITION CONTRACTS - GENERAL OVERVIEW

A. The Objective of the IPR Protection

As provided in the previous section of this study, the financial investment and endeavour to generate innovation needs to be worthwhile for the industry which rely on IPRs as a foundation of recoupment of the nonrecurring and recurring costs and pursue profit. IPRs protection ensures that the right holder can exploit its proprietary rights for financial revenue. Through IPR Protection governments aim rewarding innovators and

²³⁸**Sharp**, Gregg S. "A Layman's Guide to Intellectual Property in Defense Contracts." Public Contract Law Journal, Vol. 33, no. 1, Fall 2003, p.101.

²³⁹**Bellais & Guichard**, p.278.

encourage technology development and diffusion because it aims to reach “*maximum practical commercial use of inventions while performing contracts*”²⁴⁰.

Commercial firms are inclined to engage into defense transactions merely if a mutually agreed formal contract takes place to clarify either party’s (commercial firm and the public institution) rights, obligations and responsibilities towards each other. Bellais and Guichard specify two aspects which a technology transfer transaction is likely to be conducted between parties:

(a) if “*it is necessary to make the transfer possible*”;

(b) “*civilian partners will participate if and only if they can control their share of benefits*”²⁴¹.

The first aspect is mainly the concern of the government. If the public defense authority assumes that specific technologies or innovations in the form of goods, processes or services or databases should be acquired whether under a development program or as COTS (commercial of the shelf) items it initiates a contractual process for the transfer of such item. This, necessitate that government to be capable of determining its IP rights on the subject item and to contemplate transferring or sharing IPRs with an economic agent.

The second aspect refers to the understanding of no party is prevented to take advantage of their status under a transfer contract. As claimed by Bellais and Guichard “*the aim is to provide an incentive for any additional investment that is required to*

²⁴⁰U.S. Secretary of Defense for Acquisition, Technology and Logistics, “Intellectual Property: Navigating Through Commercial Waters Issues And Solutions When Negotiating Intellectual Property With Commercial Companies” Version 1.1, October 15, 2001, p.14.

²⁴¹Bellais & Guichard, p.278.

make the technology transfer effective and successful...avoid any opportunistic behaviour, resulting from the impossibility of writing complete contracts"²⁴². This dimension is significant because commercial firms would not make a substantial sum of investment for the development of defense technologies even if they are applicable to the commercial sphere if it is anxious about defense authorities will collect all the advantages of such an investment. If the subject of the defense procurement is a COTS item rather than a development program, the firms will only go for the commercialization of its IPRs unless the government purchase the technology as a whole by an epochal payment. The experience of U.S. under Technology Reinvestment Program is a concrete demonstration of these aspects and to what extent the evolution in the IPR protection policies of the government provided benefit for both defense and civil industry²⁴³.

Subcontractors of the defense authorities are the vital components of technology acquisition and are subjected to government rules on IPRs indirectly since prime contractors are obliged to flow down IPR related clauses to their

²⁴²ibid.,p.278.

²⁴³**Dunn**, Richard L., "Other Transactions, Dual-Use and the Technology Reinvestment Project (TRP)", Strategic Institute, October 2018, see at, <https://strategicinstitute.org/other-transactions/part-4-ots-dual-use-and-technology-reinvestment/> accessed on 23 May 2021. *"In particular, by allowing industry to retain rights to the intellectual property generated during the TRP, government gained early access to some of industry's best ideas. Interviews confirmed that IPR were a major issue, and are likely to remain so. Resolution of this issue enabled industry to introduce ideas and technologies into the project, rather than withholding them or introducing them only after the TRP project was over. These comments clearly assess the role of IPR as a strong incentive for commercial industry to work on military technologies. It allowed program managers to work with companies that normally do not work on government contracts, such as IBM or Hewlett Packard. This IPR approach was one of the 'business-like' approaches and practices used in the TRP, which were well received and proved to be crucial to program efficiency and in attracting the interest of commercial industry."***Bellais & Guichard**, p.280.

subcontractors. Therefore, the IP policies of the government is important to attract actors of the commerce as it has a wide sphere of influence on the industry.

The protection of the tradeseecret from unauthorised disclosure is crucial for the companies who economically make benefit out of it. The legal remedies such as monetary damages and criminal sanctions are imposed for the inconvenient disclosure of the secret information. On the other hand, typical remedies under contracts for the divulgence of the tradesecrets are in general insufficient for the full protection of the value of such information since it is challenging to prove the misappropriation. Consequently, many corporations refuse to enable another person or entity to reach their proprietary information unless such person or entity adequately submits assurance which stipulates the confidential information would be handled pursuant to the confidentiality rules which carry maximum protective measures. In this regard, defense authorities regulate the protection tradesecrets to minimize divulgence concerns as well as take security measures to protect the secret information to be revealed to their adversaries²⁴⁴.

B. Overview of IPR Related Clauses

IPR clauses are essential aspects of the agreement when acquiring or developing advance innovations or technologies. IPR related terms and conditions are integral elements of the performance obligations and the price of the agreement and they have a permanent influence on the acquired or developed technology's life cycle

²⁴⁴ They must also “utilize all available means for safeguarding restricted IP, including employee training for the handling of restricted materials, technological access or copying protection, and physical access restrictions”. U.S. Secretary Of Defense for Acquisition, Technology And Logistics, p.14.

support. Besides the material aspects of the contract, the parties should reach a consensus on these terms and conditions within the pre-award phase²⁴⁵.

Commercial companies or other institutions or entities which engage into commercial relationship with the public defense agencies are dealing with a unique set of rules and matters in regard to acquiring or protecting IPRs²⁴⁶. Those rules and matters are adhesive to the IPR strategy and the IPR legislation of a country and therefore vary. However, the structure of IPR clauses in government contracts resembles each other. In general, there are four types of IPR related clauses: Ownership of IPRs, rights in technical data, IPR infringement and confidentiality of proprietary information

1. Ownership of IPRs

The ownership of the proprietary rights depends on the specific rules and regulations which a government intervenes the relationship between defense agencies and commercial contractors for the sake of defense strategies. Since those rules and the IP policies are unique to each country, exemplary ones will be illustrated after an overview of the general structure of the ownership of IP clauses.

The ownership of IPRs clauses are basically IPR license or assignment agreements²⁴⁷ which is integrated into the defense acquisition contracts. Parties

²⁴⁵ibid., p.15.

²⁴⁶**Bergmann, William C.&Aina, Bukola**, “Intellectual Property Rights in Government Contracting”, Andrews Litigation Reporter, vol. 23, issue 6, July 27, 2009, p.1.

²⁴⁷**Aceto, Joseph F.**, “Intellectual Property Licensing and Confidentiality Agreements, an Overview”, Jan 24, 2019 see at <https://www.amanet.org/articles/intellectual-property-licensing-and-confidentiality-agreements-an-overview/> accessed 26 May, 2021. Alternatively, a joint venture or other technology transfer agreements may be suitable for this section.

establish the explicit terms and conditions and the extent of the ownership, the payment or royalties and eligibility of the party which entitled to such rights to the relevant know-how (such as tradesecrets, techniques and formulations) and technical assistance which enables the granted rights to be efficiently exploited.

Apparently and as it fully discussed previously, the defense agencies require those rights for the security and sustainability of the military capabilities but the government does not always need to preserve all of the proprietary rights on the intellectual creations of its contractors if they are not necessary under the procurement objectives. The exploitation of the rights might only aim and be limited to the post-contractual management for the upgrade or just maintenance of the IP related items or operational requirements. Defense industry policies suggest that the defense agencies should beware when requesting IPRs purely “as a matter of contingency” or “just in case.”²⁴⁸

Under ownership clauses the IP generally separated into two as “background IP” and “foreground IP” and the rights on these are separately described. The existing intellectual properties before the effective date or the contract or the ones which are not generated out of or in relation to the performance of the contractor are referred as background IP and the ones which are generated out of or in relation to the contractual performance are named as “foreground IP”. The rights on the background and foreground IP are dependent to the existing IPR policy of the governments²⁴⁹.

²⁴⁸ **Kow**, Keng Wee, “Managing Intellectual Property in Procurement – Applicable Laws and Policies for MINDEF and the Local Defence Industry”, DSTA Horizons, 2007, p.61; **U.S. Secretary Of Defense for Acquisition, Technology And Logistics**, p.16.

²⁴⁹ Take an example of the Singapore IP policy on these rights described by Kow, “... *it makes both economic and strategic sense for the Government to allow the Background or Foreground IP of a procurement contract to reside with the contractor, especially when the latter is in a better position to*

2. Rights in Technical Data

The “rights in technical data” or shortest “data rights” are the phrases which refer to the rights granted to the defense agency and the end user (usually armed forces) in two categories of IP namely technical data and computer software provided to defense agency and the end user under the defense contract. Technical data comprises of *“any recorded information of a scientific or technical nature (e.g., product design or maintenance data, computer databases, and computer software documentation)”* and computer software involves “executable code, source code, code listings, design details, processes, flow charts, and related material that would enable the software to be reproduced, recreated or recompiled, but excludes computer databases or computer software documentation”. The rights might either be protected under copyright law or tradesecret. The ownership terms and conditions on data rights are in general regulated under a different clause.

exploit or commercialise the IP for the betterment of the local industry. This not only promotes innovation and growth in the defence and other industrialised sectors, but also optimises the overall value of IP in Singapore. A sustainable industry can then contribute to the development of national defence capabilities by providing industry investment and support in R&D and other defence-related disciplines. Conceivably, such investment and support would, in the long run, reduce the overall cost to the Government of operating its procurement regime in the build-up of its defence capabilities. All these outcomes augur well for both the Government as well as the local defence industry in terms of the economy, defence and national security.”Kow, p.61.

Again depending on the IP strategies and the negotiations with government contractors may seek ownership of technical data and computer software generated under defense contracts or required to assign copyrights to the government²⁵⁰.

3. IPR Infringement

IPR infringement clauses are unilaterally set for the immunity of the government from the third party infringement claims and a typical would be as follows:

“... shall warrant that to the services and/or goods and/or technical data and/or any part thereof performed/delivered under this contract will not infringe or otherwise violate the patent rights, letters patent, registered design, trademark, copyright and/or other intellectual property rights (regardless of whether it is registered or not registered) of any third party in any country. In the event of a breach of the warranty in this article, ... shall indemnify, and hold harmless ...(defense agency)... from and against any claims, damages, losses, costs, and expenses, including attorney’s fees, settlement arising out of any action by a third party that is based upon a claim that the services and/or goods and/or technical data delivered under this contract infringes or otherwise violates the intellectual property rights (regardless of whether it is registered or not registered) of any person or entity.

In the event of any claim being made, or actions being brought against ... (defense agency) ... shall give notice to the ...of such claim or action. ... shall, at its own expense and option, settle or defend the claim and pay to (or, as applicable,

²⁵⁰**Defense Information Systems Agency**, “Intellectual Property: Data Rights”, see at <https://disa.mil/en/About/Legal-and-Regulatory/DataRights-IP/DataRights#> accessed 26 May, 2021.

reimburse) each indemnified party all damages and costs finally awarded against such Indemnified party. ... will be only liable for such Claim on the conditions that the Indemnified Party which is the subject of the Claim informs the Subcontractor within days of the Indemnified Party's knowledge of such Claim, the ...has full control of the defense of the Claim, and that at ... s expense the Indemnified Party provides all assistance and information reasonably required by ... in relation to the Claim”.

4. Confidentiality of Proprietary Information

The purpose of the confidentiality clauses or confidentiality agreements is to secure classified information of the government for any divulgence incident and the information of the contractors which carry economic value to be disclosed to their competitors.

Under a defense contract, contractors are requested to disclose their most valuable but meanwhile most vulnerable type of know-how which is called as tradesecrets. The risk associated with the contact of government to tradesecrets is mostly because the information loose its status to be tradesecrets. The confidentiality terms and conditions are the protective measures to prevent the disclosure of secret information to third parties²⁵¹.

²⁵¹ § 1905 of the The U.S Tradesecrets Act (18 U.S.C.) decreases “*the likelihood that a federal government agency would intentionally disclose your company's tradesecrets to a third party because it makes an intentional disclosure a crime that is punishable by a fine, imprisonment and/or loss of employment. If the disclosure of your company's tradesecrets by a government agency constitutes a crime, then it is unlikely that your company's information would lose its “tradesecret” status*”. **Wells, James R. & Vernick, Scott L. & Colvin, David H.**, “Protecting Your Company’s Tradesecrets and Confidential Information in Government Contracting” October, 2009, see at

III. EXEMPLARY POLICIES AROUND THE WORLD

A. United States

1. U.S. IPR Policy

U.S. IPR policies have been reformed with the awareness of that the technologies generated under government research programs were not sufficiently being transferred to industrial applications and lowering the return of the federal investment for the R&D. IPR policies were the central issue for transfers of technology as the IPR ownership and control have major implications for the actors the commercial transactions between government and private contractors, mainly because:

(1) *“Improperly defined IPR in a government contract can result in the loss of an entity’s critical assets or in limiting the development of an application critical to public health or safety”*; and,

(2) *“Conversely, successful contracts can spur economic development from innovation, and growth, and dramatically improve the quality of delivered goods and services”*²⁵².

Consequently, the Congress of U.S. has enforced several legislations within the previous decades to prove that inventions which are funded by government are translated into civil sphere for the purpose of their commercialization. The Bayh–Dole

<https://www.foxrothschild.com/publications/protecting-your-companys-trade-secrets-and-confidential-information-in-government-contracting/> accessed on 26 May.

²⁵²Bellais & Guichard, p.281.

Act and the Stevenson–Wydler Technology Innovation Act are enacted in 1980 in order to accomplish such objective through creating a uniform practice for the exploitation of patent rights on the federally funded inventions produced under governmental R&D programs. This landmark laws are applied to small scale entities, non-profit organisations including universities. Such businesses and organisations are entitled the right to acquire or retain title and make profit out of their inventions under certain conditions and requirements. On the other hand, the state retained the right to claim license rights²⁵³ to use the inventions for the sustainability of their program.

Only three years later in 1983, the code was expanded as embracing the large scale commercial entities and the inventions produced during the performance of development (R&D) contracts which are funded by the government, cooperative agreements and grants (to the extent permitted by law). Stevenson–Wydler Technology Innovation Act has the same purpose yet it concerns the inventions owned by the government²⁵⁴.

In 2000, the U.S. Congress has enacted the Technology Transfer Commercialization Act²⁵⁵.

For the improvement of the ability of the public agencies to have license rights on the inventions made within state facilities. It allows government institutions to make Cooperative R&D Agreements (CRADA) to bring the civil financial resources and defense innovations owned by the government to promote their commercial

²⁵³ Irrevocable, non-transferable, non-exclusive and paid-up licenses

²⁵⁴ **Bellais & Guichard**, p.281.

²⁵⁵ *ibid.*, p.281

applications. The CRADA between the U.S. Department of Defense and the U.S. National Automobile Syndicate resulted in \$130 million project in 2000²⁵⁶.

Such approach is maintained and several legislations came into force as will be illustrated in the following section.

DOD has introduced its latest IPRs policy instruction in 2019, namely, DOD Instruction 5010.44 Intellectual Property (IP) Acquisition And Licensing. According to the Article 1.2 (a) of the policy instruction, the acquisition, licensing and the management of IPRs are stipulated under three conditions:

“(1) Enable coordination and consistency across DoD Components in developing and implementing strategies for acquiring and licensing IP and communicating with industry,

(2) “Ensure that program managers are aware of the rights and obligations of the Federal Government and contractors in IP, and that program managers fully consider and use all available techniques and best practices for acquiring and licensing IP early in the acquisition process,

(3) Encourage customized IP strategies for each system based on, at a minimum, the unique characteristics of the system and its components, the product support strategy for the system, the organic industrial base strategy of the military department concerned, and the commercial market”²⁵⁷.

²⁵⁶ibid.,p.282.

²⁵⁷ Office of the Under Secretary of Defense for Acquisition and Sustainment, “DOD Instruction 5010.44 Intellectual Property (IP) Acquisition And Licensing”, October 16, 2019, Article 1.2.(a) Article 1.2 (a), DOD Instruction 5010.44.

The article reflects the significant theme of the U.S policy: customization of IPR practice under DOD contracts depending on the different program requirements in relation to the characteristics of the technology systems, components and product support and maintenance requirements as well as defense industrial base strategies. It encourages the customization of IPRs licensing within program contracts for the purpose of structuring the accurate balance between DOD and the commercial companies and promote the civil usage of the defense related technologies without governments proprietary information being stepped up²⁵⁸.

Scott Maucione, who is the defense reporter for the Federal News Network states the intention of the policy makers in DOD as simply claiming that the DOD wants cheap technology and needs IPR to protect it and make the best use out of such technology. However, the industry is the innovator now, it is not like the 1960's when the defense department was the source of technological development. Therefore, it needs to acquire these dual use technologies and customize them for the military usage in order to keep up with its adversaries like China and Russia²⁵⁹.

²⁵⁸ U.S. Army has also parallel IPR strategy as the IPRs have a crucial role in their capability to advance their fighter systems and sustain technology overmatch against their adversaries. According to the Secretary of the Army Dr. Mark T. Esper *"We must be careful to ensure that the policies and practices governing intellectual property provide us with the necessary access to effectively support our weapons systems, but do not constrain delivery of solutions to the war fighter and do not dissuade commercial innovators from partnering with us."* Bruce D. Jette, "Army Enacts New Policy On Intellectual Property", January 25, 2019, see at https://www.army.mil/article/216546/army_enacts_new_policy_on_intellectual_property accessed on 26 May, 2021.

²⁵⁹ **Maucione**, Scott, "DoD releases new IP strategy that is more flexible with industry, provides update on CMMC", October 18, 2019, see at <https://federalnewsnetwork.com/defense-main/2019/10/dod-releases-new-ip-strategy-that-is-more-flexible-with-industry-provides-update-on-cmmc/> accessed on 27 May, 2021.

Article 1.2 of the DOD Instruction 5010.44 defines the overall policy under which DOD pursues fair treatment of IPR owners and promotes creating IPR terms and conditions which encourage *“technologically advanced solutions to meet DOD needs”*. The article states that the operation, modernisation, maintenance of the weaponry and the information systems which are under the acquisition process of the DOD for the U.S. war fighter is dependent on the development of the technology and assignment and license of the matching IPRs to the appropriate level is crucial to assure these systems to be functional in terms of operational capabilities, improvable and affordable. Accomplishing such an aim requires finding the balance between the interests of commercial industry and the government. Although it might be challenging to manage the necessary IPR, early planning and communication may secure an effective strategy to be implemented²⁶⁰.

In line with the policy objectives, DOD Instruction 5010.44 introduced six main principles to be followed by the relevant defense authorities in the process of DOD acquisition relevant to IPRs:

“(1) Integrate IP planning fully into acquisition strategies and product support strategies to protect core DoD interests over the entire life cycle. Seek to acquire only those IP deliverables and license rights necessary to accomplish these strategies, bearing in mind the long-term effect on cost, competition, and affordability.

(2) Ensure acquisition professionals have relevant knowledge of how IP matters relate to their official duties. Cross-functional input and coordination is critical to planning and life-cycle objectives.

²⁶⁰ Article 1.2, DOD Instruction 5010.44.

(3) Negotiate specialized provisions for IP deliverables and associated license rights whenever doing so will more effectively balance DoD and industry interests than the standard or customary license rights. This is most effective early in the life cycle, when competition is more likely.

(4) Communicate clearly and effectively with industry regarding planning, expectations and objectives for system upgrade and sustainment. Avoid requirements and strategies that limit the DoD's options in accessing vital technology and commercial solutions available from industry.

(5) Respect and protect IP resulting from technology development investments by both the private sector and the U.S. Government.

(6) Clearly identify and match data deliverables with the license rights in those deliverables. Data or software deliverables are of no value unless and until the license rights to use it are attached, and the U.S. Government actually obtains and accepts those deliverables”²⁶¹.

As understood from the principles, no matter how much government encourages the fair treatment for the IPR owners, the principle is to protect DOD interests for the efficient exploitation of the technologies over their entire life-cycle. The other core principles are the acquisition professional to be well-educated on the implementation of IPR strategies, balance of DoD and industry interests, effective and clear communication to the commercial industry to avoid the failure of accessing vital commercial technologies and solutions, respect the efforts of the IPR owners and successful matching of technical data deliverables and appropriate licence rights.

²⁶¹ Article 1.2 (b), DOD Instruction 5010.44.

2. Overview of U.S. IPR Laws Uniquely Applicable to DoD Contracts

a. Patent Rights: 35 U.S.C. §200-§212 (Bayh-Dole Act)

A comprehensive enactment has been made in U.S. to empower the correlation between academic institutions, start-ups, non-profit entities and federal laboratories which is called Bayh-Dole Act. The act entitles proprietary rights on the inventions and other IPs which are the outcome of R&D performed under government funding to the entities which choose to do so. This encouraged various academic institutions to establish TLOs (Technology licensing offices), TTOs(Technology Transfer Offices) and TMOs(Technology Management Offices) to commercialize their intellectual property²⁶².

The objective of the act stipulated under section 200 of the legislation as: “to encourage maximum participation of small business firms in federally supported research and development efforts; to promote collaboration between commercial concerns and non-profit organizations, including universities; to ensure that inventions made by non-profit organizations and small business firms are used in a manner to promote free competition and enterprise; to promote the commercialization and public availability of inventions made in the United States by United States industry and labour; to ensure that the Government obtains sufficient rights in federally supported inventions to meet the needs of the Government and protect the public against non-use

²⁶²Keller,p.20

or unreasonable use of inventions; and to minimize the costs of administering policies in this area.”²⁶³

The act entails ownership to certain requirements including but not limited to commercialize invention, comply with the notification and reporting in terms of managing relevant intellectual property and to share royalties with the inventor himself/herself (obligation for universities and non-profit organisations).

Prior to such legislation, intellectual property rights which were owned by the government -with the understanding of if the research is funded with the money collected from taxes, the outcome of the research must be publicly owned caused- there were numerous inventions which remained unexploited²⁶⁴. The Act basically entitles small scale companies and non-profit organisations for the election of retaining title to the subject invention²⁶⁵ after the invention disclosed in accordance with the relevant provisions of the Act. The act provided a sharp increase in the commercialization of new technologies and their relevant IPRs by universities along with enterprises/start-ups in many sectors one of them being defense.

²⁶³ 35 U.S.C. §200

²⁶⁴ “An estimated 27,000 federally owned, patented technologies were sitting on the shelf before the law’s entry into force.” **Morrison & Foerster**, “The Government’s Patent Policy: The Bayh-Dole Act and Authorization and Consent” *Mofo News Item*, 2002, see at <https://www.mofo.com/resources/news/the-governments-patent-policy-the-bayh-dole-act-and-authorization-and-consent.html#6> , accessed on 12 May 2021.

²⁶⁵ 35 U.S.C. §201 (e), Subject Invention means within the scope of the Act: “...any invention of the contractor conceived or first actually reduced to practice in the performance of work under a funding agreement...”

Paragraph 202 Act stipulates that the federal state will acquire a license which is granted world-wide, paid up, non-exclusive, irrevocable and non-transferable for the subject invention produced or put into practice under a public funding²⁶⁶.

Obligations of the contractor are the disclosure of the subject invention to the DOD, selection to remain title of the invention and proceeding the application for a patent. The contract may also include the requirement of reporting on the actual utilization of the subject invention. However, the title may vest in the government, under the circumstance of lack of utilization of the invention or other above requirements²⁶⁷.

The government may execute “march-in” rights in order to oblige contractor to entitle others exclusive or nonexclusive license rights in a specific area of use provided that the contractor does not commit necessary actions for the accomplishment of the invention to be applied for public security or health ground or in the relevant field of use²⁶⁸.

²⁶⁶ 35 U.S.C. §202 (c) (4) *“With respect to any invention in which the contractor elects rights, the Federal agency shall have a nonexclusive, non-transferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world: Provided, That the funding agreement may provide for such additional rights;[3]including the right to assign or have assigned foreign patent rights in the subject invention, as are determined by the agency as necessary for meeting the obligations of the United States under any treaty, international agreement, arrangement of cooperation, memorandum of understanding, or similar arrangement, including military agreement relating to weapons development and production”.*

²⁶⁷ 35 U.S.C. § 202(c)

²⁶⁸ 35 U.S.C. § 203(a).

b. Use of Third-Party Patents: 28 U.S.C. § 1498 and 10 U.S.C. § 2386

The entities work with the government may need to use third party inventions (may be additional to their inventions) in the course of performance of their R&D under a DOD contract. There are specific provisions under U.S.C. to regulate the procedure which government should follow in the event of third party invention is necessitated to be used. These laws are for the detriment of the contractors and do not disincentives to work under the DOD contracts in general. There are two possibilities for the third party invention in regards to the DOD contracts:

(a) If the contractor recognizes that the third party invention covered by a patent is required to be used for the performance of the work under the DOD contract, the contractor may retain license on such invention and use it where it is necessary. Contractor may charge government the costs under the DOD contract provided that it discretely describe such patent and the royalty which will be rendered to the holder of the patent right²⁶⁹. In this way, the government preserves the ability to recognize whether it procured such license right on the same invention. Because, if the subject invention is produced under one of the prior DOD contracts, the government may already have licence rights or the government may have obtained such rights at first hand form the patent owner²⁷⁰.

(b) If the contractor fails to decide to use third party invention for the performance of its contractual obligations before the contract is awarded, the use of such invention for the purpose of the performance would violates the patent rights of

²⁶⁹ FAR 27.204-2 and 52.227-6.

²⁷⁰Sharp, p. 120.

third party. Under normal conditions, the party whose patent rights are breached would file a lawsuit and require injunction from the court for the preclusion of the unjust use of patent rights. However, if such violation is committed during and in related to the performance of DOD contract, the right holder has limited remedies under the law because of the private legal regulations. The most significant ones are 28 U.S.C. § 1498 and 10 U.S.C. § 2386. 28 U.S.C. § 1498 covers any agency and is related to lawsuits whereas 10 U.S.C. § 2386 only applies to DOD and is related to administrative claim. The laws restrict the patent right holder to enjoin the use of his/her exclusive patents rights by third parties who work with the government and only claim financial compensation.

Instead of submitting an administrative claim, the right holder may bring a lawsuit against the DOD (not the contractor of DOD who actually committed the patent right violation) in the Court of Federal Claims (CFC)²⁷¹.

c. 35 U.S.C. §§ 181–188 (Invention Secrecy Act)

²⁷¹ Some believe that the reason for this is that *“the government prefers to have its contractors use existing inventions rather than developing new inventions at greater expense and the statute furthers this preference by preventing a patent owner from interfering with the Government's decision”*. Sharp, p. 121.

The Invention Secrecy Act which is enacted by the U.S Congress in 1951²⁷², is a body of law designed to restrain the divulgence of novel inventions or its technical data which pose a potential threat to the “national security” of the public²⁷³.

In U.S. Law, the procedure for secrecy order in patent applications is carried out by the "Licensing and Review Branch" (L&R), which is established within the "United States Patent and Trademark Office" (USPTO). It is sought that all applications have passed the secrecy audit of this agency before the procedures regarding the patent application are carried out as usual²⁷⁴.

The act also provides the patent holders or applicants with the right to seek for a pecuniary compensation as a remedial action for the detrimental effect of the secrecy order and if it is the case, the exploitation of the invention or its technical data by the U.S. government prior to the assignment of the patent rights²⁷⁵.

Inventions subject to the Act is the only ones which are generated within the U.S and the inventor citizenship does not matter²⁷⁶. On the other hand, it causes the

²⁷²**Utku**, Doruk “Secrecy Orders Relating to Defense Technologies in U.S. Patent Law” Journal of Istanbul Medipol University School of Law, Vol.3, Issue 1, 2016, p.104.

²⁷³**Locke**, Scott, "The Invention Secrecy Act: The USPTO as a Gatekeeper of National Security," IP Theory Journal, Vol. 8, Issue. 1, 2019, p.72. However, 6th Circuit has an opposing view. Their concern is that: “*inventors be encouraged to discover inventions having military value and to submit them to the United States*” Locke, Scott, p.72.

²⁷⁴ Doruk Utku, p.105.

²⁷⁵ 35 U.S.C.A. § 183

²⁷⁶ 37 C.F.R. § 5.11(e)

practical problems on deciding whether the invention was created within or outside the borders of the U.S.²⁷⁷.

Following the receipt of the patent application by the USPTO, it is assessed whether the disclosure of the invention will affect national security. The application is also sent to the relevant government agencies for examination at this stage. According to the provision 35 U.S.C. § 181 (2), which regulates such authority: *"Whenever the publication or disclosure of an invention by the granting of a patent, in which the Government does not have a property interest, might, in the opinion of the Commissioner, be detrimental to the national security, he shall make the application for patent in which such invention is disclosed available for inspection to the Atomic Energy Commission, the Secretary of Defense, and the chief officer of any other department or agency of the Government designated by the President as a defense agency of the United States."*

Upon receiving the application, the relevant defense agency delivers its opinion on the secrecy order to the Commissioner, if it concludes that the disclosure of the invention by publication of the application or the issuance of the patent may harm national security. The Commissioner, which then decides to the secrecy for the invention, suspends the publication of the application or the issuance of the patent for the period required by the national interest and notifies the patent applicant of the status. It is also possible for the head of state agency, which orders a secrecy decision, to justify the fact that even reviewing the invention at the USPTO could undermine

²⁷⁷Locke, 72.

national security. In this case, the Commissioner keeps the invention secret (closed for inspection activities) and informs the applicant about this situation separately²⁷⁸.

In the event the publication or disclosure of a patent application may harm national security, the application will not be published or patented. An application under national security supervision cannot be published until six months from the date of application and three months from the date of submission to the relevant defense agency. Patent applications granted a secrecy classification for national security reasons cannot be published or patented until the level of secrecy of the application subject is revoked and the secrecy decision issued upon the notification of the relevant defense agency is annulled²⁷⁹.

The secrecy order applies not only to the existing patent application, but also to the content of the invention which is the subject of the application and prohibits the publication of the invention or any disclosure of the invention unless special permission is granted (including applicants, heirs, licensees and their representatives and agents).²⁸⁰

Other patent applications, which have not been subjected to the secrecy order, but contain any significant part of the relevant invention, fall within the scope of the existing secrecy order, regardless of whether they were made before or after the application for secrecy, and are presented to L&R's attention if they are noticed²⁸¹.

²⁷⁸ 35 U.S.C.A. § 181 (3)

²⁷⁹ 37 CFR § 5.1 (e)

²⁸⁰ **Utku**, p.111.

²⁸¹ **Utku**, p.111.

Those who intentionally violate the prohibition imposed through the secrecy order or intentionally cause the violation will be sentenced by the criminal court to a fine of no more than \$10,000 or imprisonment not exceeding two years, or both²⁸².

d. Copyrights and Trademarks

The ownership requirements of the works protected under copyright is usually determined by the DOD contract provided that the copyrighted work is created with public funding. Although the U.S is able to make contracts on the work and claim title of its copyrights, under U.S. Copyright Law, copyright protection is not eligible for the works of the government²⁸³. In order to force the contractors to assign copyrighted works which are created with the public funding to the government under the DOD contract, the government would include into the DOD contract a reasonable FAR clause (which will be further detailed below)²⁸⁴.

Likewise, the rules applied to trademark created under the public funding is determined under the DOD contract. The different aspect is that the government can generate its trademark. Therefore, under the contract parties may agree to assign trademark rights which it acquired with the public funding, either to the contractor or the government.

²⁸² 35 U.S.C. § 186.

²⁸³ 17 U.S.C. § 105

²⁸⁴ **Bergmann&Aina**, p.3.

e. Rights in Technical Data

Within the DOD perspective, the technical data is described as *“the information concerning a contractor-built item that the Government needs in order to install, operate, maintain, repair, or replace that item at a later date”*.²⁸⁵ According to U.S. Defense Information Systems Agency (DISA), technical data comprises of *“any recorded information of a scientific or technical nature (e.g., product design or maintenance data, computer databases, and computer software documentation)”* and computer software includes *“executable code, source code, code listings, design details, processes, flow charts, and related material that would enable the software to be reproduced, recreated or recompiled, but excludes computer databases or computer software documentation”*.²⁸⁶

The technical data rights or in short data rights consist of both copyright law and trade secrets law. Under the concept of The Federal Acquisition Regulations (FAR) and Defense Federal Acquisition Regulation Supplement (DFARS), the rights in technical data represents the government's license rights in technical data and computer software which are deliverable under a DOD contract.

Technical data are considered as highly vulnerable because by nature they contain the contractors' know-how which is covered by trade secret laws. The statute 10 U.S.C. §§ 2320-2321 contain requirements for the government to retain specific rights in data and this frequently destroys the ability of contractors to remain their technologies

²⁸⁵Sharp, p. 122.

²⁸⁶Defense Information Systems Agency (DISA) see at <https://disa.mil/about/legal-and-regulatory/datarights-ip/datarights> accessed on 27 May, 2021.

as tradesecrets. Consequently, commercial agencies refrain to award contract with the DOD as they consider these mandatory provisions of the statute unbearable.

The other difficulty for contractors related to data rights protection, is the recognition of two distinctive body of law: DFARS and FAR, the former being applicable to the DOD and the latter being applicable to private agencies. In the event a civilian company intends to contract with the government should understand and follow these two separate systems.

The extent of the government's license rights is dependent to the foundation of the funding (private, government or mixed), the type of data (non-commercial or commercial) and the mutual agreements under the contract. There are three discrete level of technical data rights entitled to the government subject to the funding source under DFARS, namely, unlimited rights, limited rights and government purpose rights²⁸⁷.

i. Unlimited Rights

The government retains certain license rights in the technical data of the contractor, based on the extent of funding supplied by the government. In the event the technical data is "*Developed exclusively with government funds*"²⁸⁸ the government owns unlimited rights which includes the rights to:

²⁸⁷ DFARS 227.7103-5

²⁸⁸It means "...development was not accomplished exclusively or partially at private expense".US Code 252.227-7013 (a)(9)

(i) “...use, modify, reproduce, perform, display, release, or disclose technical data in whole or in part, in any manner, and for any purpose whatsoever”

(ii) “...have or authorize others to do so”²⁸⁹.

The unlimited rights under the DFARS is not solely dependent to the type of funding. In order for defense agencies to claim unlimited rights on the technical data produced by civil companies the data needs to fall under one of them: “ (i) *Data pertaining to an item, component, or process which has been or will be developed exclusively with Government funds;* (ii) *Studies, analyses, test data, or similar data produced for this contract, when the study, analysis, test, or similar work was specified as an element of performance;* (iii) *Created exclusively with Government funds in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes;* (iv) *Form, fit, and function data;* (v) *Necessary for installation, operation, maintenance, or training purposes (other than detailed manufacturing or process data);* (vi) *Corrections or changes to technical data furnished to the Contractor by the Government;* (vii) *Otherwise publicly available or have been released or disclosed by the Contractor or subcontractor without restrictions on further use, release or disclosure, other than a release or disclosure resulting from the sale, transfer, or other assignment of interest in the technical data to another party or the sale or transfer of some or all of a business entity or its assets to another party.*”²⁹⁰ This exhaustive list is for the benefit of the contractors because it implies that if the government has no efficient use out of such data, the rights on the data would be fully enjoyed by its producer.

²⁸⁹U.S.C. 252.227-7013 (a)(16)

²⁹⁰ U.S.C. 252.227-7013 (b) (1)

ii. Limited Rights

In the event the technical data is “*developed exclusively at private expense*”²⁹¹ the government acquires limited rights which include the rights to “*...use, modify, reproduce, release, perform, display, or disclose technical data, in whole or in part, within the Government*”²⁹². The statute brings an exception which remarkably expands the limited data rights: if the foresaid rights are necessary for “emergency repair or overhaul”, “disclosure for foreign government” and “evaluation or information”²⁹³.

iii. Government Purpose Rights

In the event, the technical data is “*developed with mixed funding*”²⁹⁴, the government retains government purpose²⁹⁵ rights. Under the statute the government purpose rights consist of the rights to:

²⁹¹It means “...development was accomplished entirely with costs charged to indirect cost pools, costs not allocated to a government contract, or any combination thereof.” 252.227-7013 (a)(8)

²⁹²U.S.C. 252.227-7013 (a)(14)

²⁹³ 10 U.S.C. § 2320(a)(2)(D)(i) (2000) and DFARS 252.227-7013(a)(14).

²⁹⁴It means “...development was accomplished partially with costs charged to indirect cost pools and/or costs not allocated to a government contract, and partially with costs charged directly to a government contract”.¹⁰

²⁹⁵“Government purpose” means “...any activity in which the United States Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international organizations. Government purposes

(i) “use, modify, reproduce, release, perform, display, or disclose technical data within the Government without restriction”,

(ii) “release or disclose technical data outside the Government” and

(iii) “authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose that data for United States government purposes.”²⁹⁶

The significant factor of the government purpose rights is that the after a five year period of time which is commenced on the initial date of the execution of the contract, subcontractor likewise transaction, the DOD acquires unlimited rights in the technical data²⁹⁷.

iv. Miscellaneous Aspects

Under DFARS, government is also permitted to negotiate the level of these predetermined rights in technical data as long as it obtains at least limited rights²⁹⁸.

On the other hand, the right of the contractor on the technical data provided under the performance of the DOD contract are not limited. It is explicitly stated in the statute that these predetermined rights even the unlimited rights do not give the

include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data for commercial purposes or authorize others to do so”.¹²

²⁹⁶USC 252.227-7013 (a)(13)

²⁹⁷252.227-7013(b)(2)(ii)

²⁹⁸ DFARS 252.227-7013(b)(4).

government ownership on any intellectual property, more specifically the technical data. The contractor retains the ownership in the technical data whereas the government can only acquire license rights²⁹⁹.

The key element of determining the level of rights to be claimed by government is to decide what kind of data is protectable. The statute stipulates that if the technical data relate to *“an item or process that is developed by a contractor or subcontractor exclusively at private expense”*, the government might be restricted by the contractor *“release or disclose technical data”*³⁰⁰. Also, the government is allowed to retain unlimited rights under many exceptional circumstance if the technical data is related to an item produced with private funding³⁰¹.

Another important issue is to decide which party funded the technical data. Indeed, the decision is made upon the recognition of the one who funded the “item,/process which the data relate to” instead of funding the technical data itself. For instance, if the government is procuring a major defense platform such as an aircraft from the contractor X and the engine of the main platform is developed by the X prior to the contract award at private expense, would X be prevented from the entitlement of limited rights in the engine related technical data if it developed the remaining parts of the platform at government funding? Under DFARS, the answer is no because it enables that the contractor X may *“assert limited rights in a segregable sub-item,*

²⁹⁹ DFARS 227.7103-4(a).

³⁰⁰ 10 U.S.C. §2320(a)(2)(B) (2000) and DFARS 252.227-7013(b)(3)(i),

³⁰¹ 10 U.S.C. § 2320(a)(2)(C) (2000), DFARS 252.227-7013(b)(1)(ii), DFARS 252.227-7013(b)(1) (iv)-(ix), and DFARS 252.227-7013 (b)(3)(i),

subcomponent, or portion of a process.”³⁰²Therefore the government would only had limited rights in the technical data of the engine of the main platform.

B. United Kingdom

1. UK IPR Policy

The countries within the European Union (EU) have traditionally been engaged in defense industry organisation where intense R&D took place with significant amount of financial investments. However, as previously explained the conclusion of the Cold War lead a great change in the defense environment. In spite of the efforts of providing cooperation among the EU states, there were there remarkable discrete positions in terms of defense industry strategies. The historical observations indicated that UK followed a policy of openness and competition, Germany sought to disconnect from defense industry as made an interference to its lack of strategy for the defense sector and France chose to maintain its policy of military dominance in spite of the budget cuts³⁰³. This overall strategy of the UK (with fluctuations) has lead a great success building the defense industrial ecosystem and “*on a rolling 10 year basis, the UK remains the second largest global defence exporter after the USA*” (see figure 7) and it became a leading aerospace sector right after the U.S.³⁰⁴.

³⁰² DFARS 252.227-7013(a)(7)(i).

³⁰³ Matelly, & Lima, p.4.

³⁰⁴ “*The UK is one of the world’s highest defence exporters, averaging second place in the global rankings on a rolling ten-year basis (2010 to 2019), making it Europe’s leading*

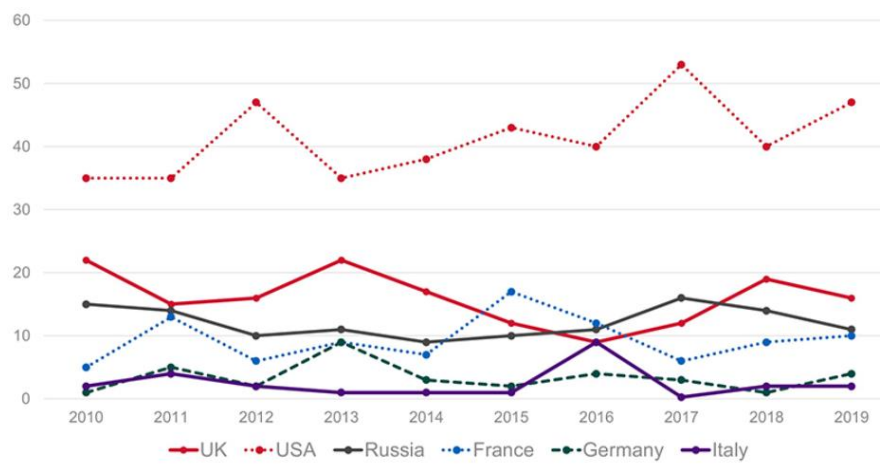


Figure 7: Defence exports(based on the Contract Awards and Purchase Orders, “estimated UK & competitor percentage market shares 2010 to 2019”)

Source: UK Defense and Security Exports³⁰⁵.

The UK pursue a defense strategy promoting the spread innovation and dual use technologies in the civil sphere with the understanding that the role of companies, research and development centres which are directly working with the defense authorities being the sole remedy for critical technological and industrial base for the

defence exporter in the period. Despite no major platform orders in 2019, core business remained strong. Aerospace remains the dominant sector for the UK, Middle East was the biggest market and the inclusion of collaborative projects in the statistics for the first time, increased exports to Europe”. Official Statistics UK defence and security export statistics for 2019, Published 6 October 2020, see at <https://www.gov.uk/government/statistics/uk-defence-and-security-export-statistics-for-2019/uk-defence-and-security-export-statistics-for-2019#:~:text=The%20UK%20is%20one%20of,2019%2C%20core%20business%20remained%20strong>, accessed on 28 May 2021.

³⁰⁵ Source: UK Defense and Security Exports, Gov.UK, see at <https://www.gov.uk/government/statistics/uk-defence-and-security-export-statistics-for-2019/uk-defence-and-security-export-statistics-for-2019#:~:text=The%20UK%20is%20one%20of,2019%2C%20core%20business%20remained%20strong>, accessed on 28 May 2021.

development of military programs dwindled as they do not typify the whole network of competences necessary for increasing military capabilities. Artificial intelligence, machine learning, robotics, data fusion and many other digital and information technologies emerge outside the boundaries of DIB's. They are developed under a novel industry ecosystems and by start-ups aroused in these systems³⁰⁶.

The approach of civil military integration is supported by the IPR policies followed by the UK government³⁰⁷. The UK Ministry of Defense (MOD) has this common, sensible attitude towards IPRs: *“where a contractor brings IP to a development (often referred to as 'background IP'), ... the contractor continues to own it”*. Other than this, the IPR policy focuses on how the exploitation of the IPRs will be managed between the contractor and the MOD in order to protect the *“national interests”* and *“carry out sensitive and technically complex duties”*. As it with any other defense authority of the world, the MOD does not basically procure the hardware technology: it needs to *“train, maintain, repair and enhance that hardware on a through-life basis”*. Therefore, MOD acquires relevant IPRs for its usage or third parties' to the extent that they are critical for the overarching program purposes³⁰⁸.

³⁰⁶**European Commission**, “EU Funding for Dual Use a Practical Guide to Accessing EU Funds for European Regional Authorities and SMEs”, October 2014, p.7-8.see at file:///C:/Users/ab33418/Downloads/EU_funding_for_Dual_Use_-_Guidebook%20(1).pdf accessed on 12 May 2021,

³⁰⁷**Price Waterhouse Coopers (PWC)**, “The Defence Industry in the 21st Century”, p.38.see at https://www.pwc.pl/en/publikacje/defence_industry_ads.pdf accessed on 28 May 2021,

³⁰⁸**Kumberg, Wolf Von&Stephens, Katharine & Warne, William &Mauny, Chris de &Puschman, Nicholas** “Intellectual Property: the hottest topic in MOD contracting?”, January 2020, see at <https://www.twobirds.com/en/news/articles/2020/global/intellectual-property-the-hottest-topic-in-mod-contracting> accessed on 28 May 2021.

2. Overview of UK MOD Regulations for IPRs

a. Intellectual Property – Statement of MOD Policy

The MOD published an IPR policy³⁰⁹ in 2007, in order to “*strike a balance between MOD's need to deliver military capability and industry's commercial interests as a consequence of their private venture investment*”³¹⁰. Under the Statement Policy, the MOD designated nine principles followed by eight policies where the former describes the essentials in MOD IP policy and the latter further details about the implementation of these policies by the MOD.

i. Principles

The Statement Policy initially appreciates the importance of the ownership of the IP created under the contracts with MOD by the civil industry not only for the defense industry but also the UK economy as set forth under the Principle 7. Therefore, it implies that the exceptions detached from the general principle will be implemented only if there is a greater interest for the public³¹¹. Accordingly, Principle 1, 2 and 4 emphasizes the value of and the access by the private sector (as an encouragement for

³⁰⁹ Intellectual Property – Statement of Mod Policy (SMP), published on 01.10.2007.

³¹⁰(SMP), Article 5.

³¹¹(SMP), Article 5.

the private sector investment) to the IP for the improvement of military capabilities. Therefore, the MOD makes a statement under Principle 5 that it will safeguard the interests of its suppliers in their IP, under Principle 6 that the rights of the MOD in its suppliers IP will be delimited as it will only access or use such IPRs if such exploitation is necessary to fulfil its needs, under Principle 8 the MOD implementation of the IP policy will be “*clear, consistent and traceable*” and finally Principle 9 that MOD will preserve the value of a proprietary information through “*setting out the rights granted to and the limitations of use imposed on the recipient*” and keeping it confidential unless the disclosure is necessary.

Among all of the principle, the 3rd is the key one because it sets the rules on the ownership rights and preserves a great importance for the civilian entities who want to work with the government. Principle 3 states that: “*Ownership of IP arising under MOD contracts will normally vest with the contractor generating the IP, in exchange for which MOD will expect rights to disclose, use and have used the IP for UK Government purposes (including security and civil defence)*”. The provision acknowledges that the foreground IP which is generated under the MOD contract would normally be owned by the contractor and the MOD only retains license rights for the use of the IPRs for the government purposes.

ii. Policies

The policies stipulate the IPR implications of the MOD in a more detailed way.

The policy 1(a) stating that the “*Contracts will normally provide that ownership of IP arising will vest in the contractor but will be subject to rights of disclosure and use for Government purposes as set out in the contracts*”, simply refers to the wording of the Principle 3 yet continues with the exclusions³¹² of the principle where it expresses the IP will be owned by the Secretary of State for Defense (SSD). However, even under such circumstance the government is compelled to permit the contractor “*using the skills and expertise developed in carrying out such work without charge for its internal business purposes*”³¹³ unless there is a reason. The noticeable point in here is that “*using the skills and expertise*” does not give the same amount of exploitation rights as “*the use*” use of the IP. Secondly, the expression of “*internal business purposes*” is a strict delamination which prevents the contractor from the international market.

Policy 2 of the Statement of MOD deals with the treatment of IP generated under the state –funded R&T³¹⁴ contract. It regulates the scope of MOD’s divulgence of

³¹²(SMP) Policy 1 (b): “*Exceptions to the ownership arrangements of Policy 1a may occur, for example: (i) where the work is to be appropriately published by and under the control of the Crown; (ii) where the work is a national or international defence standard; (iii) where the work is based upon information made available to the Crown in confidence by a third party, and exploitation by the contractor would prejudice that confidence; (iv) where a contract is let on the basis that the contractor is unable or unwilling adequately to exploit the results of the contract; (v) where the work is part of a wider programme of related work and fragmented ownership of results would prejudice exploitation of the wider programme; or (vi) where the contract is for the operation of a Government owned facility; or (vii) in respect of data outputs from infra-structure projects where the customer would reasonably expect to have full control over that data.*”

³¹³(SMP), Policy 1(b), Paragraph 2.

³¹⁴ R&D within the concept of this study, is known as R&T (research and technological development) in UK. “Research and Technology (R&T) is an applied branch of Research & Development (R&D) to industrial practices”. MMB, see at <https://www.mmbpro.com/en/research-innovate/> accessed on 28 May 2021.

technical data created under state-funded contracts³¹⁵ meanwhile expresses that the level of divulgence will depend on the funding source and extent. However pursuant to the Policy 5, it still has to safeguard the contractors properly. Also Policy 2(b) ensures that the contractors will fully exploit IP generated under state-funded contract unless the exploitation is restrained by the law or security or export control policies³¹⁶.

The Policy 3 and the Policy 4 set out the internal IP related issues including the relationship between the employees of the MOD and the MOD and the relationship between the other public agencies and the MOD.

The Policy 5 focuses on the defense industry infrastructure and military capabilities under the light of 3rd and 6th Principles ensures that the MOD may acquire IPRs on the subject item especially for the purposes of development, maintenance, operating and upgrading the defense assets of the MOD without any financial burden³¹⁷.

The Policy 6 and the Policy 8, essentially set forth the commitment to manage the IPRs including but not limited to chance in the MOD Policy Statement in the most discreet way.

³¹⁵ Under four categories, the MOD may disclose the information under Policy 2(a): “(i) for any internal UK Government purpose, include use through external advisers; (ii) to inform the UK defence supply chain and other Governments about the work; (iii) to meet other international obligations (see Policy 7); and (iv) for use in defence capability acquisition for the UK Government”.

³¹⁶ The provision of the 2nd Policy also reflects 7th Principle.

³¹⁷ “However, MOD recognises that it will need to negotiate the terms of use, including payment, for non-MOD funded IP” **Kumberg&Stephens&Warne&Mauny&Puschman** “Intellectual Property: the hottest topic in MOD contracting?”.

b. DEFCONS on IPRs under MOD Contracts

Another defense related body of rules for the enforcement of IPR strategy of the UK MOD is the DEFCONS (Defense Conditions) implemented under MOD contracts. The MOD has built a structure of conditions in the shape of standard forms for the contractors of the MOD which it integrates them into to the “invitation to tender” and several of them are related to IPRs. The most important ones are the DEFCON 703 and the DEFCON 705.

Under the UK MOD policy, the general rule for the IPRs generated under the state owned R&T work is that they are owned by the contractor of the MOD provided that the MOD is granted license rights for the necessary exploitation of the IPRs in accordance with the MOD objectives. Most commonly, the MOD acknowledges that it is reasonable to adopt this policy as its standard practice for the R&T contracts. On the other hand, the MOD may claim ownership on the IPRs under limited circumstances which are set forth under the DEFCON 703 and the DEFCON 705.

i. DEFCON 703

The MOD is entitled to ownership rights in the results “*including rights in inventions, designs, computer software, databases, copyright works and information*”³¹⁸ of specific works performed under the MOD contracts³¹⁹. DEFCON 703 applies to state-funded works whereas there is no obligation for the contract to be R&T contract for the conditions to be applied³²⁰.

The ownership of the any foreground IPR including but not limited to copyrights in documents and rights in technical data is assigned to the MOD under the DEFCON 703.

However, there are limitations on the rights of MOD which arises from “*...background patent, registered design and database rights and ...the existence of*

³¹⁸ DEFCON 703 (Edition 08/13), Article 1.

³¹⁹ The numerus clausus circumstances are included to the scope of DEFCON 703 by the guideline published by the UK MOD as an amendment of the DEFCON 703 (and DEFCON 705): “*a. acquisition support work which is providing: • independent advice to MOD on third party development programmes, equipment, processes, repair and maintenance schemes; • tender assessment and evaluation; or • independent advice to defence equipment capability managers. b. test and evaluation work on MOD or third party products. c. policy advice work, and consultancy work relating to policy or organisation d. work on the development, creation or writing of national or international standards. e. work on the preparation of procurement specifications and user requirements documents. f. work central to the operation of Government or to the formulation of Government policy, for which the results are intended to be openly published or released by MOD, in accordance with Government requirements. g. work of a highly sensitive nature where ownership by MOD is required to control disclosure and use of the results, or is required to comply with obligations owed to other governments. h. post design services work on equipment the IPR in which is owned by a third party not being a subcontractor of the Contractor. i. contracts for the operation of a Government owned facility; j. contracts with individuals or companies for the provision of manpower substitutes or contractor support personnel embedded within MOD teams or MOD organisations. k. in respect of data outputs from infrastructure projects where MOD reasonably requires control over such data*”.MOD Guidelines for Industry, 10. The Intellectual Property Rights (IPR) DEFCONs Change (MOD GFI 10), 1 October 2007, Article 16.

³²⁰ MOD GFI 10, Article 4.

*confidentiality obligations to a third party in respect of proprietary information.”*³²¹

The government may do or make third parties “*use, have used, copy and disclose the Results*” without any limitation in term of purpose yet subject to the Contractors or the third parties legal patent and design rights³²².

The background IPRs are not transferred under the DEFCON 703. In order the background IPR to be transferred to MOD, there need to be separate license agreement or stipulated under the prime contract which may sometimes be required by the MOD for its program purposes³²³.

³²¹ MOD GFI 10, Article 19.

³²² DEFCON 703, Article 2.

³²³ DEFCON 703, Article 5, MOD GFI 10, Article 22.

ii. DEFCON 705

The DEFCON 705³²⁴ regulates the standard conditions of IPRs in technical information³²⁵ and for the MOD's R&T contracts³²⁶ which are exclusively funded³²⁷ by the MOD³²⁸. The ownership of the IPRs in the technical information generated as a result of or in relation to the R&T work performed under the MOD contract vests in the Contractor³²⁹. The Condition prevents the contractor from transferring its ownership rights in technical data unless securing the continuance of rights assigned to MOD for the same technical information under the Condition³³⁰. Under the Condition, the MOD is entitled to relevant license rights including rights to use, make others use and disclosure in the Subcontractor owned technical information³³¹.

³²⁴ DEFCON 705 (Edition 11/02) annulled DEFCON 14/14A, 90 and 126 package for industry, which regulate the IPR vesting for Universities and tasking for DERA.

³²⁵ Technical information is defined under DEFCON 705 Article 1(a) as: *“information of a scientific or technical nature (including information in the form of knowhow, inventions, designs, secret formula and processes, and other confidential information) which is recorded or documented in any medium and whether or not in human readable format, but excluding unrecorded information communicated solely by oral communications. It may be presented in the form of documents, pictorial reproductions, drawing and other graphical representations, disc and film recordings (magnetic, optical and laser), computer software both programmatic and data base, and computer memory printouts or data retained in computer memory, or other form”*.

³²⁶ Other than ones under the scope of DEFCON 703.

³²⁷ DEFCON 705 is not applied if any financial contribution is made other than the government.

³²⁸ MOD GFI 10, Article 7, 25.

³²⁹ DEFCON 705, Article 2.

³³⁰ DEFCON 705, Article 5.

³³¹ *“Except for the limited right of publication described in paragraph 37, these rights are subject to a general obligation of confidence”*. MOD GFI 10, Article 38.

The DEFCON 705 Articles 32-36 set forth the obligation of the exploitation of the IPRs acquired by the contractor within the concept of Article 2. Accordingly, the contractor is under obligation to commercially exploit the results of the R&T work under the Condition where it addresses the responsibilities of the Contractor as: *“utilisation, management and exploitation”* of the *“Foreground Technical Information”* and the *“Foreground IPR”*³³². However, there is no explicit sanction or remedy for the government to be implemented or applied in the event the contractor violates such responsibility. Also MOD is enforced to favourably evaluate if the contractor requests a nonexclusive license to be granted on the MOD owned IPRs in order to commercially exploit the contractors IPRs subject to a fair royalty to be rendered to the MOD³³³.

iii. The Section 22 of the UK patent Act of 1977

The so called “secrecy order” of the Section 22 of the UK Patent Act of 1977 as being very similar to the U.S. Invention Secrecy Act is a set of rules designed to restrict or wholly prohibit the disclosure of the inventions or relevant technical information *“the publication of which might be prejudicial to national security”*³³⁴.

³³² DEFCON 705, Article 32.

³³³ MOD GFI 10, Article 35. DEFCON 705, Article 35, 36.

³³⁴ The phrase of “national security” means either *“prejudicial to the defence of the realm”* or *“to the safety of the public.”* **Mark Richardson**, “Patent Box and UK Secrecy Orders”, 20 May 2014, see at <https://ipcopy.blog/2014/05/20/patent-box-and-uk-secrecy-orders/> accessed on 01 June, 2021.

“Inventions related to cryptography, uranium enrichment and biological and chemical weapons are often made secret. Governments won’t confirm it, but seemingly benign inventions can also be made secret if they could be “dual-use”, for example, an airborne crop duster that might be used to spread

Under the Section 22 of the Act, the procedure for secrecy order in patent applications is carried out by the United Kingdom Intellectual Property Office (UKIPO). It is sought that all applications have passed the secrecy audit of the comptroller of the UKIPO before the procedures regarding the patent application are carried out as usual. Such an audit applies to all patent applications whether filed under UK Patent Act, EPC or PCT.

Under Section 22 the comptroller has the authority to restrict or prohibit the publication of the technical information or the invention³³⁵, particularize the handling of the application by the UKIPO³³⁶, specifies how the directions of prohibition or restriction be reviewed by the UK MOD³³⁷, entitles specific rights on the patent applicant in the event the grant of the patent right is prohibited by such direction³³⁸ and stipulates the special penalties if the directions are not complied³³⁹.

bioweapons” Marks, Paul, “UK Keeps Three Times As Many Patents Secret As The US”, March 2010, see at <https://www.newscientist.com/article/dn18691-uk-keeps-three-times-as-many-patents-secret-as-the-us/#ixzz6wjg8nciu> accessed on 01 June, 2021.

³³⁵ UK Patent Act (1977), Section 22, Article 1.

³³⁶ UK Patent Act (1977), Section 22, Article 2, 3, 4.

³³⁷ UK Patent Act (1977), Section 22, Article 5,6.

³³⁸ UK Patent Act (1977), Section 22, Article 7.

³³⁹ UK Patent Act (1977), Section 22, Article 9.

C. TURKEY

As stated repetitively within the scope of this study, the end of the Cold War provided a more secure environment for the many countries and the necessity of strengthening militaries with major expenditures no more sought as a security and political strategy. On the other hand, in Turkey as a result of its unique historical objectives, strategic standpoint and geopolitical location, the national security is always the initial priority for the government. This situation necessitated powerful and sustainable military capabilities in order to achieve its national objectives. Therefore, the government focused on building a technology centred, independent and self-sufficient defense industrial base to be able to keep up with the rapid changes in the defense market place due to advancement in state-of-art technologies but this process of self-sufficient defense base is mobilized long after such objectives are set as a result of lack of infrastructure.

Although the armed forces of Turkey is the second major one among the NATO alliance states, it failed to developed advanced armament systems which caused dependence to the other allies, at most the U.S. over years³⁴⁰. In 1975, U.S. sanctioned an embargo and it created a disastrous effect on the Turkish defense industry because the main supplier was U.S. However, this situation was not all bad as set forth by Karataş, *“US embargoes were a milestone for the Turkish state as weapons received from the USA via aid and procurements halted suddenly due to sanctions. However, ...it*

³⁴⁰**Kurtoglu, Haluk & Agdemir, Murat**, “An Assessment of Turkish Defense Industry and Turkey’s Efforts to Transfer Military Technology: Strategies for Arming the Future June”, Masters Theses, Naval Postgraduate School, Monterey, California, 2001, p.115.

compelled Turkey to redirect its focus on indigenous defense institutions, factories and weapons.

Consequently, the policies are set and rapidly put into practice to develop the national defense industrial base as the case was “lessons learned”³⁴¹.

Turkey has accelerated its exertions at the very end of the 20th century and started to set up efficient and fruitful projects with a greater indigenous input. As set forth by Kurtoglu and Ağdemir, *“Emphasis has shifted from direct procurement to co-production of weapon systems, thereby developing a sustainable defense industrial base”* because of the understanding that *“to gain access to first-rate technology that other countries are reluctant to export without restriction (e.g., electronic warfare equipment, sensors, encryption equipment, etc.), both military and governmental authorities believe it is necessary to build up and maintain capability in the restricted technologies. Such efforts are expected to prevent it from lagging behind in the 21st century's rapidly growing defense sector.”*³⁴².

The foundation for the modern defense industrialization in Turkey has been laid by the Law No 3238 in 1985. The purpose of the law is stated as the development of contemporary defense industry and procurement of the modernisation of the Turkish Armed Forces (TAF)³⁴³. Besides the numerous significant auxiliary regulations for the

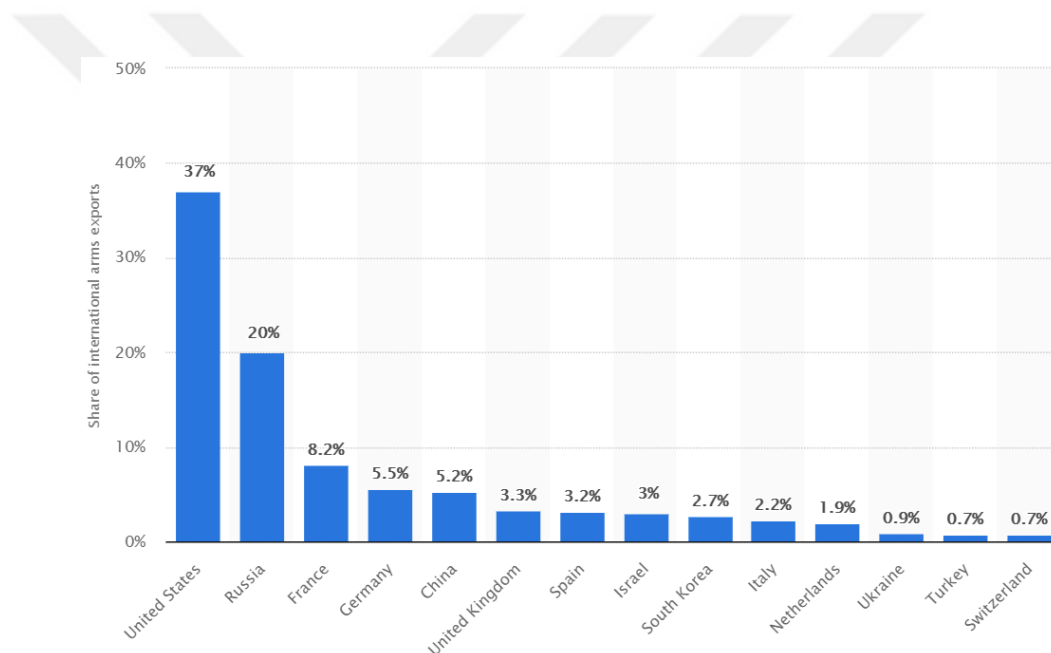
³⁴¹**Karataş, İbrahim**, “Turkish Defense Industry’s Scramble Against Arms Embargoes and Engine Production”, Social Sciences Research Journal, vol.9, issue 1, p.83, 2020.

³⁴²**Kurtoglu & Ağdemir**, p.116

³⁴³Turkish Law No 3238, Article 1.

improvement of the defense industrial base, it established the Turkish Undersecretariat for Defense Industries³⁴⁴ which lead a boost in the industrial return³⁴⁵.

Within the first decade of 21st Century, the Turkish defense industry has improved to the point that it is able to produce state-of-art defense technologies with the participation of indigenous and foreign private companies³⁴⁶. Within the last decade the defense industry flourished and according to the SIPRI statistical analyse, Turkey was the second emerging arms exporter of the 2020³⁴⁷ and become the 13th largest supplier major weapons worldwide (see figure 8).



³⁴⁴ On July 10, 2018, it was renamed "Undersecretariat of Defense Industry" by Presidential Decree No. 1.

³⁴⁵ K Kurtoglu & Agdemir, p.119.

³⁴⁶ "Locally produced systems meet 70 percent of Turkey's military's requirements, compared to 35 percent in 2002. In that same period, the number of defense procurement programs rose from 66 to more than 700, or from \$5.5 billion to \$70 billion in contract value". Bekdil, Burak Ege "Turkey Reports 17% Drop in Defense Exports", January 2019, see at <https://www.defensenews.com/global/europe/2021/01/19/turkey-reports-nearly-15-drop-in-defense-exports/> Accessed on 2 June 2021.

³⁴⁷ The progression was 2000–2004 to 2015–2019 was %16 growth. Béraud-Sudreau, Lucie & Silva, Diego Lopes Da & Kuimova, Alexandra & Wezeman, Pieter D., "Emerging Suppliers In The Global Arms Trade" SIPRI Insights On Peace And Security no. 2020/13, December 2020, p.5.

Figure 8: 2016-2020 the “market share of the leading exporters of major weapons”

Source: Statistica³⁴⁸

The armament industry of Turkey became capable of developing partially or completely most types of weapon and main defense platform systems such as “armoured vehicle; ships up to the size of frigates; all main types of artillery; ammunition and an increasing array of missiles; trainer aircraft and UAVs; and a variety of radars, sensors, electronic warfare systems and communication equipment”.³⁴⁹ On the other hand, there is still a great amount of dependency problem exists manufacturing such technologies in national facilities which is a major deficiency in term of the Turkey’s defense objectives. Take the example of Turkey’s greatest combat aircraft program TF-X. Despite Turkey lay the emphasis on the nationalisation of defense technologies³⁵⁰ and carrying out technology development programs in collaboration with R&D centres, universities and commercial companies, many of the vital systems are being imported under development programs and many components

³⁴⁸Source: Statistica, April 8, 2021, <https://www.statista.com/statistics/267131/market-share-of-the-leading-exporters-of-conventional-weapons/>; “Between 2010–14 and 2015–19 the volume of arms exported by Turkey increased by 86 per cent. Between 2015 and 2019 it ranked on average as the world’s 13th largest arms exporter” **Béraud-Sudreau & Silva & Kuimova & Wezeman**, p.9.

³⁴⁹ibid., p.9.

³⁵⁰ Such emphasis is the main theme of the governments short-medium term policy statement in terms of defense industry. The current one is the 10th Development Plan Statement published by the Presidency of the Republic of Turkey and Strategic Plan Statement published by the Undersecretariat of Defense Industry (renamed as Presidency of Defense Industry) in which the importance of foresaid policies are recapitulated. The President of the Defense Industry İsmail Demir summarised the fundamental policy as the following: “*The Tenth Development Plan is a milestone in the direction of bringing our society to a high level of prosperity in line with our country’s 2023 goals. The objectives of this document regarding the defense industry; in summary, is to make the sector competitive, to meet the defense system and logistics needs in an integrated and sustainable way with the national industry based on the indigenous designs, to increase the domesticity rate and the share allocated to R&D with the use of appropriate technologies for civil purposes, to support network and clustering structures from certain areas of defense industry*”. **Savunma Sanayii Müsteşarlığı (SSM)**, 2017-2021 Stratejik Plan, 2017, p.7.

are being purchased as COTS products from foreign companies. Another example is the UAVs which is illustrated as an indication of the *“development of the Turkish arms industry and even as a ‘military breakthrough’ for Turkey”* but some sub-system technologies and components are imported such as engines and sensors³⁵¹. Therefore, the government’s long term strategy focused on building self-sufficient, independent defense ecosystem which is adverted under recent development and strategic plans. Some of many includes following strategy plans:

(1) In order for the defense and security industry sector to fully meet the needs of the country, talent-based development and growth will be ensured by supporting competitiveness, specialization, domestic resource use and a strong infrastructure in national and international markets;

(2) Development of test and evaluation infrastructure will be established and continuously developed in order the platform and systems to be tested in the country;

(3) Through improving export and international cooperation, the competitiveness will be increased internationally by supporting the continuity and sustainability of the defense industry sector;

(4) In order to have basic and advanced technologies in the design and production of defense and security platforms of the future, the intensity and effectiveness of technology and talent acquisition through R&D programs will be increased and special attention will be paid to the use of national and domestic facilities;

³⁵¹Béraud-Sudreau & Silva & Kuimova & Wezeman, p.9.

(5) Defense and security ecosystem will be structured in a way that it ensures the training and continuous development of qualified and skilled workforce in order to provide the continuity and sustainability of the sector and increase its strength³⁵².

1. IPR Policy of Turkey

Many action items are premediated to achieve the objectives presented under previous heading, one of which is the management of IPRs. There is no existing law which regulates the ownership or licenserights of the government. The Presidency of the Defense Industry in its full discretion arranges the IPRs clauses under standard contracts which the contractors who wants to work with the government has to negotiate and convince the government to retain the IPRs of the work performed by them. However, the future policies illustrate that the government is willing to build an IPRs system as they follow the footsteps of the Defense Pioneers. The most important ones among all are as follows:

(1) Intellectual and industrial property rights will be recorded effectively³⁵³.

(2) Service capacity will be improved in technology transfer and innovation centres to enable businesses to benefit more effectively from the intellectual property system and support³⁵⁴.

(3) The mission of the Department of Subsystems amended as to develop subsystems that do not have domestic production/Warehouse Level Maintenance (DSB) or difficulty in obtaining them and to carry out activities and projects aimed at ensuring

³⁵²SSM,p.86-87.

³⁵³SSM,p.13.

³⁵⁴ibid., p.46.

production and sustainable supply, to support cooperation efforts for the domestic production of imported subsystems on the basis of Intellectual Property Rights ownership, to identify subsystems that can serve multiple platforms or systems, and to carry out projects aimed at ensuring domestic production³⁵⁵.

(4) Procedures and principles for carrying out activities related to Intellectual and Industrial Property Rights transactions will be determined and recorded.

(5) In Undersecretariat of Defense Industry Projects, the assets acquired in intellectual and industrial property rights will be specified and recorded and related transactions will be carried out.

(6) The principles of use of the "Intellectual and Industrial Property Right" owned by Undersecretariat of Defense Industry by the defense industry will be determined.

(7) Periodic meetings will be held with the units on Intellectual and Industrial Property Rights.³⁵⁶

(8) An Intellectual and Industrial Property Rights Directive will be prepared by relevant departments and put into effect.³⁵⁷

³⁵⁵ibid., p.58.

³⁵⁶SSM, p.112.

³⁵⁷ibid., p.116.

2. Confidential Patent

The mechanism under the regulation of “Confidential Patent” is pretty similar to the secrecy order rules of U.S. Invention Secrecy Act and the Section 22 of the UK Patent Act with slight differences.

Under Turkish Industrial Property Code (Law No.6769), the procedure for confidentiality order in patent applications is carried out by the Turkish Patent and Trademark Office (TPTO). Although it is not explicitly stated, it can be extrapolated from the wording of the provisions that the all applications need to pass the secrecy audit of this agency before the procedures regarding the patent application are carried out as usual.

Following the receipt of the patent application by the TPTO, it is assessed whether the disclosure of the invention would affect national security. If so, the application is sent to the Ministry of National Defense for examination at this stage. The Ministry of National Defense decides within three months upon the receipt of the application file, otherwise, the TPTO proceeds with the regarding application³⁵⁸. If The Ministry of National Defense concludes that the disclosure of the invention may harm national security, it orders a confidentiality degree. In such a case, the applicant is prohibited to disclose the invention or any parts thereof to unauthorised parties³⁵⁹. However, Ministry of National Defense may authorise such invention to be used

³⁵⁸Turkish Industrial Property Code (Law No.6769) Article 124(2)

³⁵⁹Law No.6769Article 124(4)

completely or partially any time or declassify the patent application by annulling the decision to that point³⁶⁰.

The Law also provides the applicants with the right to seek for a pecuniary compensation as a remedial action for the detrimental effect of the confidentiality classification³⁶¹.

³⁶⁰Law No.6769Article 124(5)

³⁶¹Law No.6769Article 124(6)

CONCLUSION

Due to the criticality of artificial intelligence, data fusion, digitalisation and machine learning on developing leading edge technologies, the military programs are more complex currently than any time in the past. Defense authorities are no longer the leaders in many areas of technology; controversially, they have become followers rather than being sponsors of technology development. Non-defense industry became the main source of emergence of military related technologies because they are developed as a result of technological activities and scientific researches of universities, institutions and companies taking place in the commercial field. In the same respect, the conception of military technology is becoming increasingly redundant due to the fact that there exist very less technologies which have “strict military application”. This emphasises the necessity of the integration of extensive variety of technological innovations which cannot solely be acquired through government funded R&D works. The key aspect of enabling this transitioning -the transition of emerging technology from “exploration to exploitation”- is to situate defense authorities and their prime contractors/system integrators in the practice of open innovation which aims the exploitation of defense authorities of emerging dual use technologies produced in the commercial sphere.

The IPR policies of governments plays a highly critical role in defense acquisition and maintenance of the state-of-art technologies and the advancement of the defense capabilities. Enabling the commercialization of the valuable IPRs in the commercial sector facilitates engaging in open innovation, attracts commercial businesses towards the defense industrial base and in this way increases the application of civil high technologies within the defense industry.

The IPRs are also proved to be the main impulsion of the dissemination of information and technological diffusion because it incentivises the technology producers and leads a competitive market environment. Since the most of the technology which have military relevance developed out of the innovative activities which are non-defence, a well-structured and developed commercial industry would have a major impact on the defense industry.

The exhortation role of the IPRs is also crucial for the establishment of a defense industry ecosystem which is a self-sustainable industry system where the

entrance of the start-ups to the market place and the increase of R&D activities bears a major importance, eliminating the dependency to the international defense monopolies. At this stage, the protection of IPRs incentivise start-ups and promote R&D activities in every field of technology which get into touch with defense application.

The fundamental source of innovation is the R&D activities conducted by academic institutions and research centres. Research results to be turned into products or services require a process which involves the participation of government (financial investment), enterprises and existing commercial companies through the channels of commercial transfer of IPRs such as assignments, license contracts and know-how contracts. The innovation to become marketable product requires compilation of activities such as testing, verifying, refining, conducting a market research, etc. Therefore, a strong IP policy is important to construct and sustain the correlation between these actors. A comprehensive enactment has been made in U.S. to empower the correlation between academic institutions, start-ups, non-profit entities and federal laboratories which is called Bayh-Dole Act. The act entitles proprietary rights on the inventions and other IPs which are the outcome of R&D performed under government funding to the entities which choose to do so. This encouraged various academic institutions to establish TLOs (Technology licensing offices), TTOs (Technology Transfer Offices) and TMOs (Technology Management Offices) to commercialize their intellectual property.

Also, diffusion of innovation will not scale up when the technology is preserved as confidential and under such circumstance, military would enhance its capabilities with the added innovation produced as a result of R&D investment, but no further benefit would be acquired by them by means of defense related technology diffusion in the commercial sector. IPRs promotes productivity and increases the

cumulative technological assets which are sought by the defense applicability as well as their quality and cost-efficiency.

The dominant precedent in defense acquisitions is to prevent military innovations as secrets instead of patents or other relevant IPRs fundamentally because “military value cannot be protected in the same way as those of economic value” . In the commercial sphere, since firms are profit-seeking organisations, the purpose is to protect economic rights and increase revenue through multiple exploitation of a singular asset (licensing for instance). Although they may prefer the tradesecret option, it is almost a rare method to secure economic rights because it does not ensure sufficient legal protection from unauthorised use of intellectual property. On the other hand, patents and other types of IPR protection provide their right holders stronger protection and enable them to bring actions, claim rights and impose heavier sanctions on the infringers.

In the defense sphere, whether to enable IPR protection venturing the divulgence of the technical information is an ambiguity for major development programs (weapons or aircraft for instance) because the purpose of the defense institutions is ensuring strategic superiority that only can be retained if adversaries cannot get in touch with such technical data to imitate or develop counter defense against it. Such non-disclosure policy is maintained on the ground of national security, which is the main struggle of governments and to pursue stronger IPR protection for the benefit of defense contractors even if they are aware of the tremendous influences of it by means of creating a competitive defense market and supplying technological advancement. The lack of IPR culture in the national defense industrial base explains the subdued rates of IP registration especially patent registration throughout the history. However, such paradigm is insufficient in regards to two aspects: (1) Entitling each part

of technological information confidential is not relevant all the time because not every piece of technical data preserves a strategic value. The extensive protection over the innovation counteract the potential of commercialization of defense innovations produced or funded by government in the civil market. If governments demand more rights than sufficient, contractor may refuse to engage into commercial relationship with the government or charge a remarkably high amount of price. (2) It has hazardous effects on the defense firms who wants to be in the commercial markets and commercialize their IPRs on the defense related technologies. Therefore, the need for innovation and national security objectives to be accomplished together without being detrimental towards each other would only be satisfied implementing a well-structured IPRs management which is strengthened by a detailed IPRs law as takes place in the U.S which has the most complex and valuable DIB and is the greatest defense exporter.

U.S. IPR policies has been reformed with the awareness of that the technologies generated under government research programs were not sufficiently being transferred to industrial applications and lowering the return of the federal investment for the R&D. IPR policies were the central issue for transfers of technology as the IPR ownership and control have major implications for the actors the commercial transactions between government and private contractors, mainly because: (1) *“Improperly defined IPR in a government contract can result in the loss of an entity’s critical assets or in limiting the development of an application critical to public health or safety”*; and, (2) *“Conversely, successful contracts can spur economic development from innovation, and growth, and dramatically improve the quality of delivered goods and services”*³⁶².

³⁶²Bellais&Guichard, p.281.

Consequently, the Congress of U.S. has enforced several legislations within the previous decades to prove that inventions which are funded by government are translated into civil sphere for the purpose of their commercialization.

Similarly, the UK being the second major defense exporter on a ten years rolling basis a leading aerospace sector right after the U.S. pursues a defense strategy promoting the spread innovation and dual use technologies in the civil sphere. The approach of civil military integration is supported by the IPR policies and laws by the UK government although they are not as much elaborated as U.S. body of laws.

Unlikely, Turkey is not ranked among the top defense exporters, but spurted and flourished within the last decade in terms of defense industry and became the second emerging arms exporter of the 2020 and the 13th largest supplier major weapons worldwide. The armament industry of Turkey became capable of developing partially or completely most types of weapon and main defense platform systems. On the other hand, there is still a great amount of dependency problem exists manufacturing such technologies in national facilities which is a major deficiency in term of the Turkey's defense objectives. Therefore, the government's long term strategy focused on building self-sufficient, independent defense ecosystem which is adverted under recent development and strategic plans. A great deal of these plans includes the objectives of technical development in the commercial industry and civil-military integration and aims producing well-developed IPRs management in defense transactions. As observed from the policy statements it models the IPRs policies and regulations of developed defense industry countries namely, U.S. and UK.

ABSTRACT

This study analyses the function of intellectual property rights protection - particularly the protection of patents, copyrights, trademarks and trade secrets-, for the development and independency of defense industries. The study illustrates why and how a well-structured IPRs policy promotes diffusion of technological information and diversity in the dual use technology market and facilitates civil-military technology integration. It is argued that governments should prevent the national security concerns to interfere with the technological advancement by generating convenient IPRs policies. The objective of building a defense ecosystem where the government can access state of art technologies in the domestic and international market meanwhile is not destitute for importation from foreign defense monopolies for the acquisition of desired technologies will only be fully achieved through commercialization of IPRs. In this respect, the first chapter of the study provides an overview of IPRs relevant to the defense industry technology acquisition transactions in the consideration of international agreements. The second chapter details the characteristics of defense industry and explains why the IPRs protection matters for the technological development in the defense industry. Lastly, the third chapter illustrates the IPRs management under governments technology acquisition contracts and pinpoints the IPRs policies and laws of U.S., UK and Turkey in regards to defense industry.

Key Words: *Defense Industry, National Security, Technology Transfer, Technology Diffusion, Defense Acquisition Contracts, Government Ownership of IPRs, Foreground IPR, Background IPR, Rights in Technical Data, Secrecy Order, DFARs, DEFCONs*

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