

SCIENCE POLICY IN TURKEY AND THE ORGANIZATIONAL HISTORY OF
TUBITAK: INSTITUTIONAL LOGICS PERSPECTIVE

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ABSTRACT

SCIENCE POLICY IN TURKEY AND THE ORGANIZATIONAL HISTORY OF TUBITAK: INSTITUTIONAL LOGICS PERSPECTIVE

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This study examines the trajectory of science policy in Turkey and the transformation of Scientific and Technological Research Council (TUBITAK) in terms of social institutions and organizational structure. Explaining the historical transformation of the Council, I employ an institutional logics perspective, on the one hand, corresponding to academic values pertaining to scientific community and the historical formation of scientific ethos in Turkey as *academic logic*, and on the other, the premise of stimulating research for military, economic and social development under the concept of *policy logic*. To capture the complexity of different fractions internal to organizational structure of TUBITAK, and external expectations from the organizational field, in which TUBITAK is situated at multiple levels such as international and national contexts, I analyze a good amount of archival material consisting of TUBITAK's official documents, OECD and NATO Archives, legislation documents, memoirs, biographies, and TUBITAK's anniversary publications. Through this historical analysis, I argue that TUBITAK is developed around an *academic logic* between 1963 to 1983, undergone a transformation after 1983 to 1987 in relation to the establishment of a higher governance body, Supreme Council for

Science and Technology (SCST), and finally transformed into a fully policy-driven organization after 1990. During this transformational period, I argue that several key organizational actors were quite influential. In relation to the interplay of institutional logics and organizational actors, I argue that the latest transformation has been accomplished in context of a general state reorganization that took place after the 12th of September Military Coup and economic turn after 1980.

Keywords: Science, Governments, Science Policy, Social Institutions, Organizations, Institutional Logics



ÖZ

TÜRKİYE’DE BİLİM POLİTİKASI VE TÜBİTAK’IN ORGANİZASYONEL TARİHİ: KURUMSAL MANTIK PERSPETİFİ

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Bu çalışma, Türkiye’de bilim politikasının seyrini ve Türkiye Bilimsel ve Teknolojik Araştırma Kurumu’nun (TÜBİTAK) dönüşümünü, toplumsal kurumlar ve örgütsel yapı açısından incelemektedir. Kurulun tarihsel dönüşümünü açıklarken, bilimsel topluluğa ait akademik değerlere ve Türkiye’de bilimsel ethosun tarihsel oluşumuna Akademik Mantık olarak karşılık gelen kurumsal mantık, diğer yandan da askeri, ekonomik ve toplumsal kalkınma için araştırmayı teşvik etme beklentisini Politika Mantığı olarak adlandırmaktayım. TÜBİTAK’ın örgütsel yapısının içinde gömülü olarak bulunan farklı beklentilerin karmaşıklığını ve TÜBİTAK’ın uluslararası ve ulusal bağlamlar gibi çoklu düzeylerdeki pozisyonunu açıklamak için, TÜBİTAK’ın resmi belgeleri, OECD ve NATO Arşivleri, kanun ve resmi belgeleri, biyografi ve otobiyografileri ve TÜBİTAK’ın yıl dönümü yayınlarından oluşan arşiv materyalini analiz ediyorum. Bu tarihsel analiz yoluyla, TÜBİTAK’ın 1963 ile 1983 arasında *akademik bir mantık* etrafında geliştiğini, 1983’te Bilim Teknoloji Yüksek Kurulu’nun kurulması ile 1983-1987 arasında derin bir dönüşüm geçirdiğini ve 1990’dan sonra tamamen politika odaklı bir organizasyona dönüştüğünü savunuyorum. Bu dönüşüm esnasında, bir dizi kilit örgütsel aktörün oldukça etkili

olduğunu savunuyorum. Kurumsal mantıkların ve örgütsel aktörlerin etkileşimi nedeniyle, son dönüşümün 12 Eylül Askeri Darbesi ve 1980'den sonraki ekonomik dönüşümden sonra gerçekleşen, genel bir devlet yeniden örgütlenmesi bağlamında gerçekleştirildiğini savunuyorum.

Anahtar Kelimeler: Bilim, Devletler/Hükümetler, Bilim Politikası, Sosyal Kurumlar, Örgütler, Kurumsal Mantık.



To my father.



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LIST OF ABBREVIATIONS

AGARD	Advisory Group for Aerospace Research and Development
AR-GE	Turkish General Staff/Ministry of National Defense R&D Department
BAYG	Bilim Adamı Yetiştirme Grubu – Scientists Training Group
CHE	Council of Higher Education
DAS	Directorate for Scientific Affairs
DIRD	Defense Industry Research and Development Institute
DSIR	Department of Scientific and Industrial Research
DTM	Undersecretary of Foreign Trade – Dış Ticaret Müsteşarlığı
EPA	European Productivity Agency
FP	Framework Programme
GATÖM	Güdümlü Araçlar Teknoloji Ölçüm Merkezi
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
İLAR	İlmi İstişare ve Araştırma Kurulu – Advisory Board for Scientific Research
IRC	International Research Council
ITU	Istanbul Technical University
KOSGEB	Small and Medium-Sized Industry Development Organization
METU	Middle East Technical University
MoNE	Ministry of National Education
MRP	The Mediterranean Regional Project
MSA	Mutual Security Agency
MSIRI	Marmara Scientific and Industrial Research Institute
NAS	National Academy of Sciences
NATO	North Atlantic Treaty Organization
NDRC	National Defense Research Committee
NRC	National Research Council
NSF	National Science Foundation
NUC	National Unity Committee

OECD	Organisation for Economic Co-operation and Development
OEEC	Organisation for European Economic Co-operation
OR	Operational Research
OSRD	Office of Scientific Research and Development
OSTP	Office for Scientific and Technical Personnel
PRA	Productivity and Applied Research
R&D	Research and Development
RIS	Research Information System
SACEUR	Supreme Allied Commander of Europe
SAGE	Savunma Sanayi Araştırma ve Geliştirme Enstitüsü
SCST	Supreme Council of Science and Technology
SPO	State Planning Organization
SSM	Undersecretary of Defense Industry
STG	Scientists Training Group
TİDEB	Directorate for Technology Review and Examination
TTGV	Turkish Technology Development Foundation
TÜBA	Turkish Academy of Sciences
TUBITAK	Science and Technical/Technological Research Council
MAM	Marmara Research Centre
TUSIAD	Turkish Industry and Business Association
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organisation
US	United States of America
USIMP	University-Industry Cooperation Centre
USSR	Union of Soviet Socialist Republics
WWI	World War I
WWII	World War II

CHAPTER 1

INTRODUCTION

To be independent, we have to be authentic, we have to develop original ideas and projects. We need to create our own path, not only in politics and diplomacy, but also in science and technology. As we do not become engraved with what imposed on us in politics, foreign policy, and defense industry, we go beyond the roles assigned to us and write our own story in science and technology with the National Movement for Technology.

Recep Tayyip Erdoğan – On National Movement for Technology (2024)¹

Science has ceased to be the occupation of curious gentleman or of ingenious minds supported by wealthy patrons, and has become an industry supported by large industrial monopolies and by the State.

John Desmond Bernal – The Social Function of Science (1939)²

[...] we can see very clearly that the latest developments across broad sectors of the German university system are moving in the same direction as in America. The major institutes of science and medicine are "state-capitalist" enterprises. They cannot be administered without funding on a huge scale. [...] we see the situation that exists wherever capitalist operations are to be found, namely, the "separation of the worker from the means of production."

Max Weber – Science as a Vocation (1917)³

On the occasion of the Science Awards, organized by the Scientific and Technological Research Council (TUBİTAK) and Turkish National Academy of Sciences (TÜBA), Erdoğan, the president of the Republic of Turkey, introduces a new national plan for technological development. Recalling the past two decades under his rulership, Erdoğan reminds that TUBİTAK has funded 128 billion Turkish Liras for nearly thirty-three thousand academic research and development projects, and 109 billion Turkish Liras for private sector for about more than twenty-six thousand technological research and development projects while spending 35 billion Turkish Liras for

¹ “Cumhurbaşkanı Erdoğan: ‘Milli teknoloji hamlemizle bilim ve teknolojiye kendi hikayemizi yazıyoruz’” accessed on 14th February, 2025, <https://www.iletisim.gov.tr/turkce/haberler/detay/cumhurbaskani-erdogan-milli-teknoloji-hamlemizle-bilim-ve-teknolojiye-kendi-hikayemizi-yaziyoruz>

² John Desmond Bernal, *The Social Function of Science*, London: George Routledge & Sons, 1939(1946), xiii.

³ Max Weber, *The Vocation Lectures*, eds. David Owen and Tracy B. Strong, trans. Rodney Livingstone, Cambridge: Hackett Publishing, (2004), 3.

supporting scientists. The quote from Erdoğan's speech also shows an emphasis on the problem of originality in science and technology, to prevent losing independence to "others", assigning the role to a "we" should also write our history in science and technology. In considering the large-scale TUBITAK funding, and the task of writing "our" own story in technological developments, this turn of events requires us to ask; What has changed to this day, that John Desmond Bernal, a renowned British scientist, who wrote on the subject of social function of science, declaring the end of disinterested curiosity of devoted minds to science as it is becoming an industry on itself, with large scale fundings from the industry and the state? What makes Max Weber call science a "state-capitalist enterprise", showing the reorganization of the famous Humboldtian University, which was based on the ideals of pure science, towards the American way similar to a capitalist enterprise? What stakes do governments, industry, and society have in science?

As a British communist, Bernal's answers to these questions are direct, because he wants to give the impression of the supposed beneficial contributions of science to human welfare, which opens the question of the social functions of science, despite the capitalist and fascist developments of his time. He answers the question by pointing out *the growth of science* in economic matters such as lowering the costs of production and the conduct of warfare via the development of more lethal weapons, and the industry and governments' stake in administrating and organizing scientific efforts. Weber's answer reflects the context of his famous speech on "Science as a Vocation". On the one hand, he describes the process of rising *intellectualization* and *rationalization* through calculated actions, which he announces led to the *disenchantment of the world*. On the other hand, Weber opens the debates about the situation of the German academic profession, as this speech was delivered on "science as a vocation", contrasting the earlier Humboldtian ideals, the ethics of researcher, and the ethics of knowledge implicating the quest of science should be "for its own sake", with economic and social developments.⁴

⁴ This discussion on the ethics of self and the ethics of knowledge goes back to the philosophical articulations. These articulations are what constitutes the Humboldtian ideals on the unity of teaching and research, i.e. the pursuit of pure science. See Chad Welton on the emergence of German research university and Kant, Schelling and Fichte's interventions on the debate of the ethics of self and knowledge about ideal university and researcher, specifically chapter 9, "The Disciplinary Self and the Virtues of the Philologist": Chad Wellmon, *Organizing the Enlightenment: Information Overload and the Invention of the Modern Research University*, Johns Hopkins University Press, 2015. It should also

Although diverging in their perspectives, both Weber and Bernal point out the growing interaction between science and governments, science and economic affairs, and science and society. In Bernal's case, as he is advocating for scientists' social responsibility to society, he emphasizes the problem of the "disproportionate growth" of certain scientific disciplines, which are beneficial only to the economy and the State, namely, the natural sciences such as physics and chemistry. For Weber, it is more complex, both because of his ideas about the conduct of science, trying to prevent it from external developments, and his methodological preferences about stating the "value-free" observations on the changing role of science considering its reorganization towards becoming a "state-capitalist enterprise". Thus, this requires investigating the convergence point of science, governments, and economy i.e. science policy.

Returning to the question of what governments, industry, and businesses have a stake in science that invented the science policy frameworks, I offer to look at the interaction between science, politics, and economics as *social institutions*. As science policy did not occur without a history and political reasoning of the governments and wider social classes, which have a direct stake in the economization of science, as well as the values of the scientific community, an institutional approach to science policy and its organization may provide answers to these questions:

Why a specific kind of new government agency that oversees spending on science, and coordinating the research efforts occurred in the first place?

Which type of interests have led the governments to set up science policy organizations?

How does the negotiation between scientists and governments, and the market take place?

Under what conditions this government agency and its organization have changed and why?

be noted that Weber pays a special attention on the formation of the concept of vocation, as *Calling*, or *Beruf* in German, which has a particular meaning connoting the religious duties, about work ethics, while investigating the relationship with Protestantism and Capitalism.

What this change might show about the trajectory of a national science policy, its organization, and its environment, considering the overlapping and conflicting areas of interest?

To show the overlapping and conflicting interests of these institutions, it is necessary theoretically to separate what, for example, science as an institution depends on, considering its values, expectations, practice, and cognitive frameworks in a specific context. For example, it is possible to suggest that a context depending on the values of the scientific community in Germany, provided the basis for Weber's critique of German universities' transformation into state-capitalist enterprises in the way of American Universities, considering the Humboldtian ideals found in the scientific community. Accordingly, the institutional environment in Britain enabled John Desmond Bernal to advocate the social function of sciences against the "disproportionate growth" of certain scientific disciplines, and his proposal for the utilization of science in the name of human welfare. Thus, in this study, I argue that institutional logics depending on government expectations, i.e. *policy logic*, and the values of the scientific community reflected in *academic logic*, come into conflict in the case of TUBITAK and science policy in Turkey. I suggest that this struggle is best observed in the organizational transformation of TUBITAK. In contrast to this approach, social studies of science have been developed towards intra-institutional aspects of scientific practice, rather than an inter-institutional approach.⁵ As these studies do problematize, for example, the content of the scientific practice in relation to a science policy organization, they might inquire about the selection mechanisms of research projects. On the contrary, I argue that a historical account of the establishment and the organizational transformation of science policy mechanisms can explain more accurately the emergence, and external relations of science with governments, and the market.

1.1. Science and the Policymaking in Context

In Recep Tayyip Erdoğan's address to Turkish science and technology policy, there is an emphasis on independence and authenticity, "us" and "others", military technology

⁵ Undoubtedly, this is a matter of theoretical preference, as most of the social studies of science do not begin with a presumption of theoretically isolated institutions to explore internal and contextual meanings of scientific practice.

production, and preserving the national identity. These themes reflect the continuous issues of Turkish modernization. From the Late Ottoman Empire to the Republican Era, the question of culture i.e. authenticity and nationality implicating the “us”, and civilization, technology, and progress, representing the “others”, have become a very deep issue for Turkish intelligentsia when proposing a path to be taken for Turkish society on the quest of modernization. Science and technical progress on the one hand, and preserving the “identity”, “morality”, and “culture” i.e. the properties that make “us”, being independent while “contributing to the progress” of civilization, have become major problems when the Ottomans faced with military defeats. Internal debates on Turkish modernization and the path to be taken across different ideologies i.e. Islamism, Secularism, and Nationality reflected on the problem of “imitating” others or preserving the “authenticity”. Much of the controversies about political undertakings represent this issue describing the properties that make “us” in contrast to “others” when dealing with the issues of science and technical progress.

During the Late Ottoman Empire, Alperen Yalçinkaya discusses how Ottoman elites interpreted the “newness” of scientific and technical progress, as properties of the “possessors” in contrast to their “material consequences”.⁶ These early remarks about the qualities of the “possessor” i.e. the Europeans, Westerners, or Civilization have become a part of a broader discourse of who possesses this new knowledge in the Ottoman bureaucratic cadre, and those who did not, a distinction between the “knowledgeable and the ignorant”, which according to Yalçinkaya refers questions about “social order” and “social boundaries”. Similar to Erdoğan’s emphasis on authenticity and independence against “others”, this perception of science and technical progress is still haunting the political scene, and cultural-cognitive framework of the official discourse on science and technology.

The problem of “technical progress”, on the other hand, referring to the practical application of science, was another pressing issue of the Late Ottoman Empire in the case of modernizing the military. Which sciences and techniques are beneficial to overcome the problems of the military? The quest for defining the “beneficial” properties of sciences, is reflected in the ideology of Young Turks as *vulgar*

⁶ Alperen Yalçinkaya, *Learned Patriots: Debating Science, State, and Society in the Nineteenth- Century Ottoman Empire*. Chicago: The University of Chicago Press, 2015.

materialism. As Hanioglu discusses Mustafa Kemal Atatürk's scientism, a type of *vulgar materialism* is embraced by the Young Turks as a conglomeration of popular interpretations of materialism, Darwinism, and science, against the religious properties of the Empire.⁷ In addition to that, Şerif Mardin discusses the influences of French positivism on the founder of the Committee of Union and Progress, which implies that the quest for development requires the "scientization" of the minds of people.⁸ These debates on science, although reflect an ongoing political nature defining the properties of empire and/or society, and as a solution to the problems of modernization, reflect a certain type of characteristic when dealing with the issues of policymaking. Education, science and technology, economic development, and the problem of military modernization were handled based on these earlier debates among the bureaucratic cadre when science policy became an issue in the late 1950s. The scientist generation of the 1960s were members of the academic community who witnessed the University Reform in 1933 and 1946 were the first Science Committee of TUBITAK in 1963. When the military overtook the government in 1960, for example, the university reforms emphasized the autonomy of the sciences, and the university have become inscribed in the 1961 Constitution. As I argue in the second chapter, while the scientific community upholds these properties of autonomy and freedom to research, the issue of "technical progress" and economic development for certain bureaucratic cadre i.e. the military and the State Planning Organization were also influential when TUBITAK established in 1963.

While the national debates on science and technical progress were shaped around these themes, the emergence of science policy itself has a particular history. As I track in the third chapter, the organizational structure, mechanisms, and concepts of science policy have their origins in the two Great World Wars. During World War I, the first science policy organizations are established in Britain. This was related to the problems of a perception of the dependency on Germans, among British scientists, senior government officials, and the military. The Second World War, on the other hand, constitute a change in the cognitive framework, concerning the relationship between the military, economy, and science leading to the spread of science policy mechanisms and organizations to other countries. The cognitive changes were related to

⁷ Şükrü Hanioglu, *Atatürk: An Intellectual Biography*, Princeton University Press, 2011.

⁸ Şerif Mardin, *Türk Modernleşmesi Makaleler 4*, İletişim Yayınları, 1991, 101.

probabilistic thinking, as I argue in the second chapter, represented by the invention of operational research. Having its origins in the military, particularly the British scientists' request to apply the scientific method during the late 1930s, the invention of operational research has enabled thinking of any type of organization to be rationalized and managed via the scientific method.

1.2. The Contrast between the Social Studies of Science and Sociology of Institutions

The literature on social studies of science, although it is not possible to deal due to its broader scope, takes its primary question as to how scientific facts are socially constructed. Bruno Latour and Steve Woolgar's work on *Laboratory Life*, for example, employs an anthropological study of the daily lives of scientists at the laboratory.⁹ This anthropological study included the observations of scientists' routinized activity and the experiments' translation into scientific facts i.e. social aspects of "objective knowledge". Much of Latour's later work focused on how science or scientists have created coalitions to promote themselves like in *The Pasteurization of France*¹⁰, or his critique of sociological theory¹¹, such as rebuilding a network identifies the agency of non-human actors¹² are all based on the Latour's project problematizing and expanding the internal affairs of science. Some scholars suggest that the field's development towards the studies of scientific practice is related to the critique of Robert K. Merton's inquiry about the norms and ethos of science.¹³

Merton's PhD dissertation on *Science, Technology and Society in the Seventeenth Century in England*¹⁴, published in 1938, may be considered an example of the interaction of institutions; science and religion. In this study, Merton explores the conditions that enabled the rise of modern sciences concerning the scientific community, and Royal Society members, who were predominantly Puritan origins in seventeenth-century Britain. Similar to Weber's explanation about Protestantism and

⁹ Bruno Latour & Steve Woolgar, *Laboratory Life: The Social Construction of Scientific Facts*, Princeton University Press, 1986.

¹⁰ Bruno Latour, *The Pasteurization of France*, Harvard University Press, 1988.

¹¹ Bruno Latour, "Why has critique run out of steam? From matters of fact to matters of concern", *Critical Inquiry*, 30, 2004, 225-248.

¹² Karin Knorr Cetina, "Merton's sociology of science: The first and last sociology of science?", *Contemporary Sociology*, 20(4), 522-526, 1991.

¹³ Cetina, "Merton's sociology of science", 1991. See also Vidar Enebak, "The Three Merton Theses", *Journal of Classical Sociology*, 7(2), 2007, 221-238.

¹⁴ Robert K. Merton, "Science, Technology and Society in Seventeenth Century England", *Osiris*, 4, 1938, 360-632.

the cultural-cognitive framework of “worldly” capital accumulation of Protestants as a precondition of the rise of capitalism, Merton identifies the predominance of Puritanism among the scientists *before the institutionalization* of science, as a precondition of the rise of modern science, as he explains: “[...] in partnership with a social movement, which induced an intense devotion to the active exercise of designated functions, science was launched in full career”.¹⁵ In addition to this thesis on Puritanism, Merton discusses the role of science in solving everyday economic and technical problems at that time in Britain.¹⁶ In his later works, he tries to provide definitions of the norms i.e. the ethos of science, describing the values of the scientific community as “four sets of institutional imperatives: universalism, communism, disinterestedness, and organized skepticism”. As Cetina discusses while Merton supposes these values as universal norms, the critiques opposed suggesting “the production of counter-norms”, and “objections to these values stable property.”¹⁷

The trajectory of social studies of science is developed towards a framework that problematizes what makes a scientific fact, showing its social connections, for example, through the coalitions of the triumph of a specific scientific theory; the literature emphasizes the internal affairs of science and/or external coalitions as a case of explaining the social construction of the scientific practice. Similar to Merton’s earlier study on Puritanism and the rise of modern science i.e. the convergence of religious values and science, I argue that science policy emerged in relation to a particular set of changes in the institutional environment *before the institutionalization* of science policy. These changes reflect, firstly, the emergence of governments’ stake in science, the creation of mechanisms as an interface to negotiate with scientists, and the elaboration of those mechanisms in time. Thus, I argue that a number of particular developments have led to the invention of “science policy” itself at multiple levels. Concerning this, I propose a specific theoretical framework that enables to capture of the emergence of science policy mechanisms, and the differences between the

¹⁵ Merton, “Science, Technology and Society in Seventeenth Century England”, 442-443.

¹⁶ This might contribute the discussion I will make in the next chapter on the developments in Britain concerning the establishment of science policy organizations and the invention of operational research, which would explain a certain tendency in British scientific community towards the utilization of science.

¹⁷ Cetina, “Merton’s sociology of science”, 1991, 523.

academic community and the government concerning the development of science policy through an analysis of the organizational transformation of TUBITAK.

1.3. Main Arguments of the Study

In consideration of this brief historical discussion, I argue that TUBITAK's organizational history reflects this complex web of ideas among the preferences of the bureaucratic cadre: on the one hand, scientists are emphasizing the values of the scientific community i.e. disinterestedness, freedom, and the autonomy of sciences, and on the other, there are bureaucrats and the military, emphasizing the role of science stimulating economic and social development, and military modernization. As I argue in the next chapters, this controversy is invoked within the context of the emergence of science policy, through transnational organizations towards the end of the 1950s. To capture this complexity, I offer a theoretical framework which employs a multilevel and a relational approach. First, I argue that a set of historical events has led to the formation of earlier types of mechanisms and the organizational structure of science policy during WWII. These specific events form what I call an *institutional environment* i.e. the emergence of the government's interest in stimulating science for the military and economic growth. Secondly, I argue that this interest has become a recognized institutional area through a transnational *organizational field*, particularly formed around the North Atlantic Treaty Organization (NATO) and Organisation for Economic Co-operation and Development (OECD), being influential in dispersing the cognitive framework of science policy, type of mechanisms, and main policy frameworks to national contexts. As these ideas emerged from the organizational field and reflect a specific kind of logic, I argue that the reception of this framework depends on a particular interpretation of these frameworks and mechanisms in a national context. In relation, I argue that the controversy between science from the perspective of scientists, and bureaucrats reflects the two types of specific *institutional logics*, a *policy logic* and an *academic logic* in the case of TUBITAK. Accordingly, I argue that this controversy is central to TUBITAK's transformation of organizational structure throughout its history. As I discuss in the following chapters, TUBITAK employed a predominant *academic logic* between its establishment in 1963 to 1983. To capture the main locus of the controversy, I suggest that scientists employ certain types of *boundary work* (e.g. *statements on academic values*) to preserve the values of the scientific community i.e. academic logic. In contrast, other actors who preferred a

more policy-driven TUBITAK introduced the mechanisms emerging from the organizational field as *practice work* (e.g. *principles of project management schemes*) in the form of schemes for project management, statistical reviews, and internal and external critiques. After 1983, these internal and external debates about the problems of national science policy led to the introduction of a higher council, the Supreme Council of Science and Technology, which changed TUBITAK's autonomy to an executive role in the government's science policy formation. Following this, a final controversy occurred between academic logic and policy logic through a set of internal debates which reflects an unstable period for TUBITAK from 1983 to 1989. After the 1990s, TUBITAK has become a full policy organization, reinforced by the transformation of the country's economic policy towards market liberalization that began in the 1980s.

In the next section, I offer an eclectic theoretical framework to form a basis for my arguments about the institutional environment and the organizational transformation of TUBITAK. The complexity of the issue requires a multilevel and relational approach, considering the historical development of the institutional environment, organizational field, and institutional logics, and an emphasis on the actors, as I show in the following chapters, for their tremendous effect in the story of TUBITAK.

1.4. Theoretical Framework and Literature Review

In this section, I construct a theoretical framework to capture the complexity of the transformation of the organizational structure of TUBITAK. The difference concerning an institutional approach to science policy and a social study of it regarding social studies of science refers to the earlier distinction I made, namely the inquiry into the nature of knowledge production and appropriating science as a social institution. This inter-institutional relationship between science and the governments, I believe may provide answers to much of the current discussions on science, higher education, and the market logic which interferes and blurs the boundaries between what science means to scientists on the one hand, and governments on the other. In the Turkish context, today we encounter certain developments about the introduction of classifications of universities, depending on their property of the intensity of research, and quality management processes about the teaching at universities. These developments have their origins in the historical development of policymaking in

national and international contexts. Moreover, an institutional approach to science policy itself may provide the basis for further discussions about the coalitions made within the bureaucratic field, as science policy as an arena upholds certain social class interests i.e. capitalists, bureaucrats, and scientists.

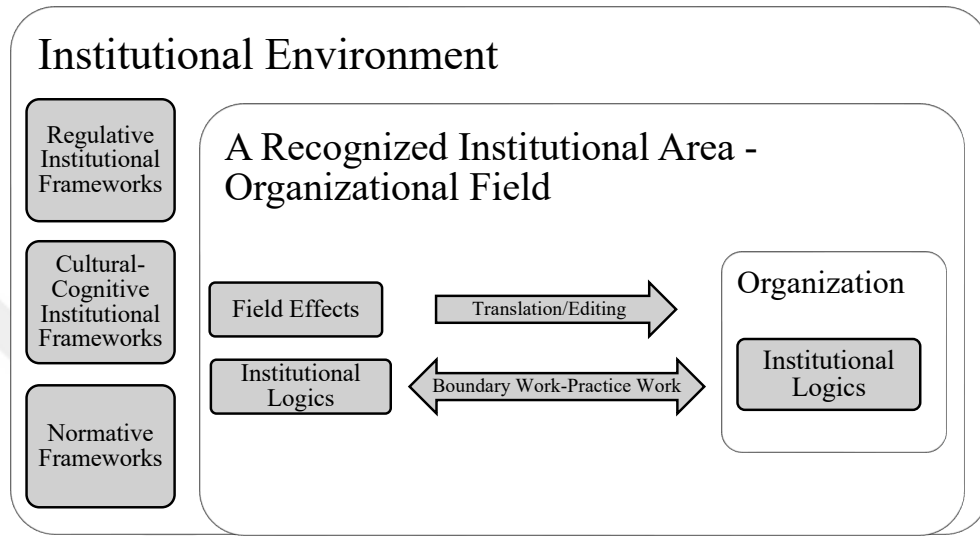


Figure 1.1. *Institutional Environment, Organizational Field, and Mechanisms*

For capturing this complex web of relations considering in relation to historical contingencies, I suggest looking at the case of science policy and TUBITAK in the following figure, which I construct with the corresponding concepts derived from the institutional approach in sociological theory (See: Figure 1.1 in the above). In Figure 1.1., the institutional environment represents specific historical developments that lead to the emergence of “science policy”. As I argue that science policy itself emerged right after WWII, before its institutionalization through an organizational field, a number of historical developments concerning the relationship between science and the governments occurred. Regulative, cultural-cognitive, and normative frameworks represent these developments. The distinction between these frameworks is only meaningful in terms of a theoretical construct, in the Weberian sense, these are ideal-typical constructs, which in reality may occur without having any connection or an erect in the historical formation of science policy. Thus, although I show the institutional environment in a restricted area, this does not mean that the historical formations considering the cognitive, regulative, and normative frameworks occur in a limited social space.

Accordingly, these frameworks simply represent the relationship between science and the governments as institutions, before science policy's institutionalization in an organizational field. In considering the specific role of governments, most of the regulative mechanisms may refer to the state's legislative action and the establishment of an agency or organization that oversees this regulation. In relation, it can be said that normative frameworks represent the values of the scientific community in this study. Cultural-cognitive frameworks, on the other hand, are related to historical changes, for example, in the attitudes of government officials and scientists when considering, for example, the invention of the atomic bomb. As I employ a historical account of science policy and the organizational transformation, the *organizational field* represents the historical moment, in which specific actors have increasingly started to disperse the changes in the cultural cognitive frameworks and regulative mechanisms. This might represent also the beginning of the negotiation between the existing normative rules with the changing ones.

The novelty of the *organizational field* is discussed in the literature about its property to be the center of innovation diffusing the perceived efficiency in a certain institutionalized area. Thus, I argue it holds itself a specific kind of institutional logic. In the case of science policy, this specific institutional logic aims to apply science to stimulate economic growth, and military modernization i.e. a *policy logic*. *Field-effects* represent the movement of impacts from the organizational field to national contexts. When considering the organization itself located in a national context, there are already existing specific institutional logics concerning the science and the governments. This implies that field-effects are translated and edited during their reception in a national context. I show this mechanism as a one-way interaction, as I argue the impact of transnational organizations as the source of the *policy logic*. The other mechanism is related to the existing institutional logics. Both within and outside of the organization, the process of translation/editing and negotiation is subject to a dialectical relationship between practice work and boundary work. *Practice work* represents the introduction of certain mechanisms that aim to change the structure of the organization. In contrast, boundary work implicates the resistance derived from the dominating institutional logic. In the table 1.1., I describe the properties of these concepts with the levels, and modes of analysis as an integrated conceptual framework.

Table 1.1. *An Integrated Conceptual Framework*

Concept	Description	Explaining for	Level of Analysis	Mode of Analysis
<i>Institutional Environment</i>	The ideal-typical properties of institutional environment i.e. regulative, normative, cultural-cognitive frameworks	Historical origins of how institution-specific concepts and organizations emerged, the institutional environment	Institution-Level	Crosscutting
<i>Organizational Field</i>	A recognized and structured/structuring institutional area	A specific field, structured and/or continues to be structured, diffusing the field-effects	Field-Level	Crosscutting, Historical
<i>Institutional Logics</i>	A specific combination of regulative, normative, cognitive structures located in the interinstitutional system.	Historical-specific construction of logics consisting of translated field effects and existing institutional frameworks	Field-Level/Organization-Level	Crosscutting, Historical
<i>Translation/ Editing</i>	Translation of Field Effects and editing processes in local settings	Field effects translated in an organizational setting	Organization-Level	Mechanism, Historical
<i>Boundary Work - Practice Work</i>	Dialectical relationship of boundaries and practices reinforcing each other dynamically	The interplay of conflicting institutional logics	Field-Level/Organization-Level	Mechanism, Historical

In the following section, I discuss this theoretical framework regarding sociological literature from which I borrowed the terms. Firstly, I introduce what *institutional* means in this study, then I discuss the theoretical approach, the concept of *organizational field* originates from, and its main theoretical innovation i.e. the *isomorphism case*, which suggests the increasing similarity between the organizations in a specific field. After that, I discuss the challenging approaches to the isomorphism thesis, offering a different perspective employing the *institutional logics* perspective.

Then I revisit the integrated conceptual framework to discuss what insights might be related to TUBITAK's organizational history.

1.4.1. The “Institutional” in Question

The term “institutional” has a long history in social sciences, as a broader sociological concept that defines the regulatory frameworks, cultural and cognitive schemas, and normative structures, that occur within wider institutions such as family, religion, science, education, politics, market, and the state. These institutions give actors a set of meaning-systems that they can act upon, legitimate their actions, or restrain and sanction them. The “institutional” in question creates boundaries and limitations, but also legitimate actions, empowers them, and gives meaning to their respective domain. Friedland and Alford show that these institutions provide meaning to social actions that are conflicting most of the time.¹⁸ For example, while markets encourage certain consumer behavior, the state may provide regulatory frameworks. Similar to Merton's thesis about the convergence of Puritan Ethos and Scientific Ethos in Britain, institutions may also enable certain developments. Thus, from an institutionalist account, institutions are collective representations that provide the basis for much of the social action. They have their existence beyond individual cognition similar to Durkheimian understanding of social facts. As scholars emphasize distinct aspects of institutions in their work, for a more detailed perspective, I benefit from Scott's distinction between three institutional pillars which discuss respectively, how social scientists applied institutional approach in their studies.¹⁹

Scott argues that social scientists in different domains work on three distinct institutional pillars. The first one is the *regulative frameworks* which show institutions as regulating social action. Regulatory properties of institutions set rules, give prescriptions on proper social action, and monitor and sanction them when the action is believed non-conforming to the specific institutional domain.²⁰ For example, the making of a legal framework, from an institutional perspective, has a direct effect on

¹⁸ Roger Friedland, and Alford, Robert R. “Bringing Society Back In: Symbols, Practices, and Institutional Contradictions.” in *The New Institutionalism in Organizational Analysis*, edited by Paul DiMaggio and Walter W. Powell, 232–66. Chicago University Press, 1991.

¹⁹ W. Richard Scott, *Institutions and Organizations: Ideas, Interests and Identities*. Fourth edition. Los Angeles London New Delhi Singapore Washington DC: Sage, [1995]2014.

²⁰ Scott, *Institutions and Organizations*, 2014

how individuals and organizations behave in a certain field. In relation, organizational actors and organizations themselves must address this regulatory framework so that their actions and the organization in question have their basis. The emphasis on the regulative aspects of institutions, for example, ascribes a certain institution and/or organization to a specific status. Studies such as emphasizing only the state's role, for example, in introducing legislative action in defining a certain area may not consider the relationship of the state with social classes, ideologies, and/or cultural differences which may diminish the explanatory strength of the theory. The second institutional pillar is the *normative framework*. This incorporates the shared values and norms of a specific area, for example, how a scientist should be, in their conduct of scientific enterprise. This brings the question of ethics, professional codes, and the true behavior in a specific field. Scott argues that "normative rules introduce prescriptive, evaluative, and obligatory dimension into social life."²¹ The legitimacy of a certain social action and/or process is defined through these shared norms and values. This framework prescribes the proper action and roles in an organizational setting, enabling certain behaviors while restraining others.²² Thus, it sustains a sense of institutional stability across correspondent organizations. The emphasis on this framework only, for example, may lead to exaggerating the role of norms when explaining stability while ignoring the conflicts and struggles. For example, an exaggerated view of the scientific community's values may lead to ignoring the inner power struggles for prestige among scientists, cooperation with the government at times, and their contribution to capitalist development.

The *cultural-cognitive pillar*, as Scott argues, has been central in the work of sociologists. For example, the novelty of new institutionalist studies of organizations is about the transformation of collective rationality, derived from the changing cultural-cognitive aspects of social life. According to *New Institutionalism* account, for example, the spread of certain types of organizations is related to the perceived rationality of their functioning, rather than the actual efficiency of their working. This approach emphasizes the study of symbols, beliefs, cognitive schemas, and ideas (Scott, 2014).²³ Scott defines the feature of what the cognitive-cultural framework

²¹ Scott, *Institutions and Organizations*, 2014: 64.

²² Scott, *Institutions and Organizations*, 2014: 64.

²³ Scott, *Institutions and Organizations*, 2014.

represents as the struggle over the meanings in which “the social interests are defined and classified, argued, negotiated, and fought out”.²⁴ In contrast to regulative and normative aspects of institutions, which delimit and/or stabilize the institutional settings -although empowering the conforming ones-, the cultural-cognitive pillar is useful to understand the change in a given organizational setting, how actors interpret the messages and changes in their environment, and how they translate, bargain and negotiate these external cultural frameworks. Cultural-cognitive changes represent the key institutional elements that disrupt the existing understandings and perspectives. Thus, it is important to decipher and identify the changes in the perceptions of corresponding actors and organizations. However, the emphasis on the cultural-cognitive framework is useful to identify, for example, in the discussion of which conditions lead to the emergence of science policy as a site for the struggle between scientists and the governments, it may lead to exaggerating the importance of these changes considering as they also part of the real power struggles emanating from wider social interests themselves.

Methodologically, the pillars approach is useful for categorizing various institutional changes in identifying the institutional frameworks that I describe as constituting elements of the environment. As I suggested earlier, these distinctions between pillars are an ideal-typical one. Scott also discusses these differences by recalling how economists emphasize the regulative aspect, especially the state’s role, while sociological studies focus on the cultural-cognitive frameworks.²⁵ Thus, instead of calling them *pillars*, I employed Scott’s concepts as frameworks to point out the changes in the institutional environment. In the empirical chapters, especially in the second chapter, I employ this approach to describe the conditions of how science policy emerged, and how it is institutionalized in the transnational organizational field. In the next section, I elaborate on the concept of the organizational field and the New Institutionalism in organizational studies.

²⁴ Mary Douglas, *The Effects of Modernization on Religious Change*, 1982, as cited in Scott, *Institutions and Organizations*, 2014: 67.

²⁵ Scott, *Institutions and Organizations*, 2014.

1.4.2. What is “New Institutionalism”? The Isomorphism Case and the Organizational Field

New Institutionalism in organization studies has a distinctive approach to the debate on the relationship between institutions and organizations. The prefix “new” is derived from a group of scholars’ emphasis on the idea of pervading collective rationality in organizations. Against the earlier institutionalist accounts, such as economists’ emphasis on the efficiency of organizations and cost-benefits, New Institutionalists explain the spread of organizations in terms of the “perception of efficiency or rationality” in contrast to their actual efficiency. The collective rationality here refers to this perception. In contrast to earlier functionalist explanations about cost-benefit and efficiency, New Institutionalist accounts put emphasis on “rationalized myths” and decoupling these myths from their actual functioning to explain the standardizing effect of an organizational field.²⁶ For example, employing this approach, scholars explain the spread of the Bologna Model in the field of higher education, in terms of its perceived rationality while situating the universities in an organizational field that points out the standardization of educational practice.²⁷ The emphasis in these works, accordingly, is the level of field, and the impact of powerful organizations in this field. Concerning this, new institutionalists suggest there is an increasing isomorphism among the organizations.

The two foundational texts of new institutionalist accounts are first John Meyer and Brian Rowan’s article on rationalized myths and Paul DiMaggio and Walter Powell’s study on the isomorphism and organizational field. In their article, Meyer & Rowan’s work on “Institutionalized Organizations” provides answers to the question “Why are there so many formal organizations similar in terms of symbolic and ceremonial form yet separated from practical functionality?”²⁸ In other words, they ask: “How do organizations survive without fulfilling the functions that are ascribed to them in the first place?” Meyer & Rowan explain this by coining the term *rationalized myths* that are diffused from powerful organizations that can be imitated by others to gain

²⁶ John W. Meyer, and Brian Rowan. “Institutionalized Organizations: Formal Structure as Myth and Ceremony.” *American Journal of Sociology* 83, no. 2, (September 1977): 340–63. <https://doi.org/10.1086/226550>.

²⁷ Jürgen Schriewer, “Rationalized Myths” in European Higher Education”, *European Education*, 41, 2, 31-51. DOI 10.2753/EUE1056-4934410202.

²⁸ Meyer et al. “Institutionalized Organizations: Formal Structure as Myth and Ceremony.”, 1977.

legitimacy.²⁹ To do this, organizations imitate powerful examples in terms of ceremonies and rituals. DiMaggio and Powell's work provides answers to the diffusion process of rationalized myths.³⁰ According to DiMaggio and Powell, organizations are situated in organizational fields.³¹ Ideal-typically, this organizational field, structuring the institutional environment, provides norms and cognitive frameworks to organizations despite their actual functioning decoupling the myth from the practice. Organizations imitate others, following norms and values that are inscribed in organizational fields, and wider legal conventions may coerce organizations to behave in certain ways.

The novelty of these earlier new institutionalist studies is derived from the emphasis on what Scott calls the cultural-cognitive framework. Although I borrow the term organizational field from DiMaggio and Powell's study, the course of Meyer and Rowan's work went on to suggest that the spread of rationalized myths constitutes what Meyer's students call the formation of World Polity. The problem with this approach is that the emphasis on cultural-cognitive frameworks as I discussed earlier may lead to exaggerating the importance of ideas, perceptions, and beliefs while I argue that the diffusion process is much more complex than both DiMaggio and Powell's earlier studies, and quite different than Meyer's advocacy of the formation of World Polity around institutions. This emphasis occurs from Meyer's epistemological preference deriving from phenomenological social studies, which emphasizes ideas while ignoring the actual power struggles, the intervention of wider social institutions, and social class interests. In the next section, I discuss other new institutionalist accounts that challenge the case of isomorphism and the spread of collective rationality.

1.4.3. Challenges to Isomorphism Case

The argument of isomorphism is challenged in several ways, as the original argument emphasizes only homogeneity at the level of the organizational field. While it is understandable the origin of this theoretical approach itself challenged the earlier

²⁹ Meyer et al. "Institutionalized Organizations: Formal Structure as Myth and Ceremony.", 1977.

³⁰ DiMaggio et al. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields.", 1983.

³¹ DiMaggio et al. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields.", 1983.

perspectives emphasizing the functionality of organizations, in a similar vein, later critiques in the new institutionalist account emphasize diversification. For example, known as the Scandinavian School, Sahlins-Anderson suggests that the diffusion process from an organizational field takes place as a translation and editing process which takes place when new ideas about organizations are introduced in a specific area.³² As Sahlins-Anderson argues, this translation is never a literal one, as the existing institutional settings have their specific effect on how these ideas are interpreted. The other critiques, for example, emphasize the role of agency doing the *institutional work* by organizational actors interpreting and negotiating with internal and external institutional borders.³³ In relation, DiMaggio's question about the role of agency in institutional settings is conceptualized as *institutional entrepreneurs*, who have the capacity to disrupt, renovate, and change the institutional settings of a specific organization by doing the "institutional work".³⁴

While the innovator of the concept, the organizational field, DiMaggio himself opened the debate on the role of agency, some of the schools in new institutionalism, for example, Meyer and his students continue in their later studies explaining the homogeneity at the level of World Society as I argued earlier. For example, in their study on *Science and the Modern Polity* with Gili Drori, Meyer suggests that the scientization of formal organizations leads the way to a globalized World Society.³⁵ This perspective, however, proposes a superficial homogenization across different organizations and national contexts as I pointed out earlier about the exaggeration of cultural-cognitive framework. It also undermines the concerted effort of certain international actors that are related directly to politics, power relations, and historical contingencies that cannot be explained by only a phenomenological study. Thus, in

³²Kerstin Sahlin-Andersson, "Imitating by Editing Success: The Construction of Organizational Fields." In *Translating Organizational Change*, Czarniawska, Barbara, Guje Sevón, Barbara Czarniawska, Guje Sevón, and Kerstin Sahlin, eds. *De Gruyter Studies in Organization* 56. Walter de Gruyter, 2011: 69-91.

³³ Thomas B. Lawrence, and Roy Suddaby. "Institutions and Institutional Work." In *The SAGE Handbook of Organization Studies*, by Stewart Clegg, Cynthia Hardy, Thomas Lawrence, and Walter Nord, 215-54. 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd, 2006. <https://doi.org/10.4135/9781848608030.n7>.

³⁴ Paul DiMaggio. "Interest and Agency in Institutional Theory." In *Institutional Patterns and Organizations: Culture and Environment*, edited by Lynne G. Zucker. Cambridge, Mass: Ballinger, 1988.

³⁵ Gili S. Drori (ed.) *Science in the Modern World Polity: Institutionalization and Globalization*. Stanford, Calif: Stanford University Press, 2003.

the next section, I propose a set of conceptual tools i.e. the dialectical relationship between *boundary work-practice work*, the emphasis on the agency, and the process of translation and editing.

1.4.4. Institutional Entrepreneurs, Translation/Editing Processes, Boundary Work-Practice Work

In considering the role of agency in the diversification of the reception of field-effects, *institutional entrepreneurs* are given primary status when dealing with the meanings circulating in the institutional environment and the organizational field. These actors decipher, translate, and introduce innovative ways in an emerging organization. While these actors enjoy a primary status altering the organizational settings, I discuss their role by also incorporating the *embeddedness* of the agency in institutional settings, when negotiating with others through the dual concept of boundary-work and practice work. The embeddedness of these actors into institutional settings requires looking at the existing institutional frameworks, which are historically constructed through beliefs, professional codes, normative expectations, and practical issues. In the literature, institutional entrepreneurs must initiate when they successfully alter the existing institutional settings.³⁶ As this alteration requires a struggle over the means, for example, of an organization's conduct in a specific area, the existing institutional setting enables other organizational actors to create boundaries as the organization depends on these institutional frameworks. On the other hand, the initiator may demarcate these boundaries via practice work to alter the organization.

Zietsma and Lawrence discuss the boundaries as simply “the distinctions among people and groups”, while practices are “shared routines of behavior”.³⁷ In their study, they focus on the interplay of how actors engage in institutional work when they define

³⁶ DiMaggio. “Interest and Agency in Institutional Theory” & Bernard Leca, Julie Battilana, and Eva Boxenbaum. “Agency and Institutions: A Review of Institutional Entrepreneurship,” *Harvard Business School Working Paper*, No. 08-096, May 2008. <https://www.hbs.edu/faculty/Pages/item.aspx?num=32451> & Battilana, Julie, Bernard Leca, and Eva Boxenbaum. “How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship.” *Academy of Management Annals* 3, no. 1 (January 2009): 65–107. <https://doi.org/10.5465/19416520903053598>, Patricia H. Thornton, William Ocasio, and Michael Lounsbury. *The Institutional Logics Perspective: A New Approach to Culture, Structure, and Process*. Oxford: Oxford University Press, 2012.

³⁷ Charlene Zietsma ve Thomas B. Lawrence, "Institutional Work in the Transformation of an Organizational Field: The Interplay of Boundary Work and Practice Work," *Administrative Science Quarterly* 55 (2010): 190.

boundaries, and how actors try to “affect the recognition and acceptance of sets of routines, rather than their simply engaging in those routines”.³⁸ The authors provide empirical data representing the recursive relationship between boundary work and practice work that gives feedback to each other:

[...] boundaries and practices are distinct, interdependent features of groups that exist in a recursive relationship, with boundaries delimiting sets of legitimate practices, and practices supporting particular group boundaries. This relationship is central to understanding both institutional stability and change.³⁹

From their longitudinal study on the British Columbia Coastal Forest Industry, the authors identify how boundaries and practices explain the phases of institutional stability and institutional change. For example, the authors identified the legislative rule that was put by the ministry and union, while the environmental groups’ pressure introduced new methods for woodcutting.⁴⁰ Thus, Zietsma & Lawrence’s conceptualization provides a dynamic process within the institutional settings and organizations. Alongside the role of agency in employing this dialectical relationship between boundary work and practice work, I employ this conceptual tool as one of the mechanisms with translation/editing processes when dealing with the organizational transformation of TUBITAK. In the next section, I revisit the theoretical approaches and conceptual tools to offer an integrated framework that I discussed earlier.

1.5. Revisiting the Concepts: The Organizational Field and the Institutional Environment

In their primary work, DiMaggio & Powell defines an organizational field as a “[...] recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products.”⁴¹ The concept is introduced to explain the shift in “the engine of organizational rationalization” as the structuration of organizational fields tends to produce effects that organizations become homogenous without necessarily being

³⁸ Zietsma and Lawrence, “Institutional Work in the Transformation of an Organizational Field.” 190.

³⁹ Zietsma and Lawrence, “Institutional Work in the Transformation of an Organizational Field.” 193.

⁴⁰ Zietsma and Lawrence, “Institutional Work in the Transformation of an Organizational Field.”

⁴¹ DiMaggio and Powell, “The Iron Cage Revisited.”, 148.

competitive or efficient.⁴² In line with the arguments of Meyer & Rowan's *decoupling* of practice from the formal structure and *rationalized myths*, early scholarly studies focus on homogeneity and isomorphic effects at the level of the organizational field.⁴³

As the original concept focuses on isomorphism across organizations, in this study I employ the concept to capture *field effects* with a historical approach. Several historical conjunctions are important for the creation or the deliberate action of governments concerning science systems. NATO and OEEC/OECD are influential with two different approaches to science, or the primacy of applied/basic research distinction as mentioned before. The emergence of the organizational field of science policy then is part of the transformation of the institutional environment in which TUBITAK is situated. Historical conjunctions, mechanisms, and cognitive frameworks derived from this environment are important for local actors' interpretation when dealing with national policy problems.

1.5.1. Institutional Logics Perspective

The novelty of the *Institutional Logics* perspective is that, in contrast to earlier new institutionalist accounts, especially the work of Meyer and his students, the institutional logics perspective does not posit a determinist account of ever-expanding rationality as rationality itself is historically constructed and context-bounded. According to this perspective, key institutions such as the market, politics, family, education, and religion have distinct and potentially conflicting logics that historically construct their specific domain, consisting of material practices and symbolic representations that structure institutional orders.⁴⁴ The authors provide a more general theoretical approach in contrast to earlier emphasis on cultural-cognitive frameworks, instead, they focus on the material and symbolic aspects of institutions, conflict-ridden nature of institutional logics, and their context-bounded properties as historical processes structuring certain institutional logics.

⁴² DiMaggio and Powell, "The Iron Cage Revisited.", 147.

⁴³ Melissa Wooten ve Andrew J. Hoffman, "Organizational Fields: Past, Present and Future," *The SAGE Handbook of Organizational Institutionalism*, ed. Royston Greenwood, Christine Oliver, Thomas B. Lawrence ve Renate E. Meyer (Los Angeles; London: SAGE, 2008). See also Paul J. DiMaggio ve Walter W. Powell, "The Iron Cage Revisited." 1983. Also Walter W. Powell ve Paul J. DiMaggio, "The Iron Cage Redux: Looking Back and Forward," *Organization Theory* 4, no. 4 (October 2023), <https://doi.org/10.1177/26317877231221550>.

⁴⁴ Friedland, and Alford, "Bringing Society Back In: Symbols, Practices, and Institutional Contradictions." 1991.

Primarily developed by Thornton, Ocasio, and Lounsbury, they discuss how the higher education publishing sector incorporates conflicting logics that is transformed from an editorial logic into a market-driven logic.⁴⁵ They emphasized institutional logics as traversing at multiple levels, the notion of agency as institutional entrepreneurs is embedded into wider structures, and the material and symbolic foundations of institutions. Another novelty of the institutional logics perspective is that it incorporates various levels of analysis conceptualizing society as an interinstitutional system.⁴⁶ And they also define rationality in terms of how legitimacy is constructed in a context-bounded process.⁴⁷

In considering the empirical studies employing the institutional logics, for example, Purdy & Gray discuss the properties of emerging institutional fields, vulnerable to internal and external interventions embedding conflicting logics, transformed through, for example, external coalitions.⁴⁸ On stability and change, van Gestel & Hillebrand focus on temporary stability via negative choice and deliberate ambiguity, while sowing seeds of change.⁴⁹ Pache & Santos's work focuses on the organizational level, and how organizations respond to conflicting institutional demands.⁵⁰

In addition to those empirical studies, two important works, Elizabeth Popp Berman's study on research universities and the rise of market-driven logic⁵¹, and Marion

⁴⁵ Patricia H. Thornton, and William Ocasio. "Institutional Logics and the Historical Contingency of Power in Organizations: Executive Succession in the Higher Education Publishing Industry, 1958–1990." *American Journal of Sociology* 105, no. 3 (November 1999): 801–43. <https://doi.org/10.1086/210361>, Thornton, Patricia H. *Markets from Culture: Institutional Logics and Organizational Decisions in Higher Education Publishing*. Stanford University Press, 2004. <https://doi.org/10.1515/9781503619098>.

⁴⁶ Patricia H. Thornton and William Ocasio. "Institutional Logics." In *The Sage Handbook of Organizational Institutionalism*, edited by Royston Greenwood, Christine Oliver, Kerstin Sahlin, and Roy Suddaby. Los Angeles (Calif.): Sage, 2008; Thornton et al. *The Institutional Logics Perspective: A New Approach to Culture, Structure, and Process*.

⁴⁷ Thornton, Patricia H, and William Ocasio. "Institutional Logics.", 104.

⁴⁸ Jill M. Purdy, and Barbara Gray. "Conflicting Logics, Mechanisms of Diffusion, and Multilevel Dynamics in Emerging Institutional Fields." *Academy of Management Journal* 52, no. 2 (April 2009): 355–80. <https://doi.org/10.5465/amj.2009.37308255>.

⁴⁹ Nicolette Van Gestel, and Bas Hillebrand. "Explaining Stability and Change: The Rise and Fall of Logics in Pluralistic Fields." *Organization Studies* 32, no. 2 (February 2011): 231–52. <https://doi.org/10.1177/0170840610397475>.

⁵⁰ Anne-Claire Pache and Filipe Santos. "When Worlds Collide: The Internal Dynamics of Organizational Responses to Conflicting Institutional Demands." *Academy of Management Review* 35, no. 3, (2010): 455–76. <https://doi.org/10.5465/amr.35.3.zok455>.

⁵¹ Elizabeth Popp Berman. *Creating the Market University: How Academic Science Became an Economic Engine*. Princeton (N.J.): Princeton University Press, 2012a.

Fourcade's comparative study on the discipline of economics in the United States, France, and Britain show how varying national contexts, give rise to different logics of thinking economically, that provide strong insights to incorporate institutional logics perspective in this study.⁵² Berman, for example, shows the interplay of the state's role in providing the impetus for market logic in research universities, while in a specific field, in biotechnology, researchers themselves become academic entrepreneurs which enhances the university-industry relations, research parks, eventually patent act, the Bayh-Dole.⁵³ According to these processes, Berman explains the rise of market logic in research universities as an example of how institutional logics can change without an entrepreneurial project.⁵⁴ In relation to this finding, Berman indicates that the ideas of a market logic are already being experimented in a field without institutional entrepreneurs deliberately promoting a dominant one, thus a "practice selection" in the institutional environment drives the field from academic to market logic.⁵⁵

Fourcade's study, on the other hand, investigates how the economy as a discipline is structured in different national contexts. Her study primarily focuses on national contexts as sources of institutional properties and changes. Here running the risk of simplifying her arguments, for example, the coupling of the state or the idea of "d'état" in France with the cognitive frameworks of French economists, the social policy function of economics in Germany, and elite properties of academic science in Britain are all developed quite different in contrast to United States' aversion of the idea of central government with a pragmatist philosophy.⁵⁶ Fourcade explains her methodology as to capture the "dialectical relationship between institutions and knowledge".⁵⁷ National contexts, institutions, and higher education structures define the objective differences across cases: in terms of the training of economists, social and professional positions, and the authority, with subjective differences in what these

⁵² Marion Fourcade. *Economists and Societies: Discipline and Profession in the United States, Britain, and France, 1890s to 1990s*. Princeton Studies in Cultural Sociology Ser, v. 38. Princeton: Princeton University Press, 2009.

⁵³ Berman, *Creating the Market University*. 2012a.

⁵⁴ Elizabeth Popp Berman. "Explaining the Move toward the Market in US Academic Science: How Institutional Logics Can Change without Institutional Entrepreneurs." *Theory and Society* 41, no. 3 (May 2012): 261–99. <https://doi.org/10.1007/s11186-012-9167-7>.

⁵⁵ Berman, "Explaining the Move toward the Market in US Academic Science", 261.

⁵⁶ Fourcade, *Economists and Societies*, 2009

⁵⁷ Fourcade, *Economists and Societies*, 2009, 339.

economists problematize, how they view societal relations, how they practice their expertise.⁵⁸ Then, Fourcade discusses “privileging the structural constraints” of national fields in Bourdieu’s terms as agents’ apprehension of the world is carried out under these structural constraints.⁵⁹

On these empirical and theoretical premises, I suggest that a multilevel and dynamic conceptual framework is crucial to understanding the organizational transformation of TUBITAK. The institutional logics perspective provides tools to identify the relational properties of the negotiation between existing institutional settings and emerging ones. The concept of organizational field is useful to identify the effects of transnational developments via powerful organizations such as NATO and the OECD, as I discussed earlier. On the other hand, the local conditions that shape the cognitive structures of organizational actors, such as what science means for bureaucrats and professors, how they define economic development in that specific period, and how government agencies i.e. bureaucratic field tackle these questions also have direct effects on the story of TUBITAK. To capture these differences, I suggest looking at what organizational actors do in cases of conflicts preserving the boundaries vs the introduction of certain practices. Revisiting the theoretical framework, in the next section, I situate TUBITAK into a transnational organizational field, the developments in the institutional environment, corresponding institutional logics, and the operationalization of the conceptual tools. On this conceptual framework, I revise the research questions of the study.

1.5.2. An Integrated Conceptual Framework

TUBITAK’s establishment and reorganization require a multilevel approach to how it is situated in an *emerging organizational field* and the changes in the *institutional environment* concerning science and governments. It is also important to identify mechanisms for capturing the processes that led to the rise of a policy logic. For doing this, I benefit from the abovementioned theoretical discussion. In *Table 1.1*, I provide brief descriptions of concepts and how they explain the processes in different levels of analysis. To understand the changes in the institutional environment, both at national and international levels, Scott’s concept of institutional pillars which I incorporated as

⁵⁸ Fourcade, *Economists and Societies*. 2009, 239.

⁵⁹ Fourcade, *Economists and Societies*. 2009, 240.

institutional frameworks, are useful as an organizational field of science policy is emerging during this time, and the changes in the institutional environment took place during the WWII. These are related to the negotiation between science systems and governments that occurred during WWII, multiplying the effect of concepts of science policy produced during this time, and led to the establishment of some organizational forms. This process consists of a crucial change in the cultural-cognitive frameworks that urged governments about their stake in science systems. Thus, in *Table 1.1*, I describe the institutional environment as a crosscutting concept, primarily pointing to the axioms of which actors engage in science policy schemes at the transnational level. The concept of organizational field, as “a field-level recognized area of institutional life” structured/structuring throughout this time, represents a specific institutional environment for science policy organizations. This field diffuses science policy concepts, organizational forms, also how science policy defines a policy problem while being structured around certain historically specific *institutional logics*. The organizational field, thus, creates field effects. As the early explanations of New Institutional theory suggest, these effects create a surface-level or field-level isomorphism via “rationalized myths”. *Institutional logics* are conceptualized as a multiple-level concept traversing various levels while carrying potentially conflicting cognitive schemas. In this specific case, I show institutional logics both at the level of fields and organizations. It is similar to the concept of organizational field as they both have historically structured properties. Thus, it is crucial to incorporate analysis to both levels: field and organizations. On the one hand, as a transnational organizational field, logics are constructed around dominant scientific traditions of specific countries while being derived from power relations i.e. hegemony in the international arena. However institutional logics is also present at the organizational level because of different national contexts, as local actors interpret, translate, and edit these certain field effects. Translation and editing processes then imply how *field-effects* are translated into organizations affecting intra-organizational matters. This conceptualization captures how certain field effects or institutional logics diffused via organizational fields, but also interpreted into national contexts. Zietsma & Lawrence and Berman show that “*practice selection*” and the recursive relationship between *boundary work* and *practice work* are important mechanisms in explaining institutional change and stability. This is a two-way process at both levels, intra-organization struggle over the means of national science policy, and deciphering field effects. For example, *boundary*

work may provide a stability phase due to existing traditions and professional codes while the changing institutional environment carries schemes for *practice work*. Mechanisms such as cataloguing and categorizing research types, and standardization of R&D statistics carried through the field may interfere, challenge, and eventually transform the very boundaries of an organization's role and activities.

In *Figure 1.1*, I show the relationship between the institutional environment, the organizational field, and the organization itself. In the following chapters, I discuss empirical data in terms of this integrated conceptual framework, narrating the historical changes as how the institutional environment changed during and after WWII, the emergence of an organizational field, and the introduction of science policy and its organization in Turkey.

Accordingly, this study enquires into the following research questions:

- How did science policy concepts and corresponding research organizations develop and what mechanisms emerged to influence and oversee the organizational field?
- How conflicting institutional logics of academy and policy are reflected in TUBITAK's organizational form?
- To what extent do the emerging field of research organizations through international regulatory mechanisms affect the historical development of TUBITAK?

1.6. Literature on TUBITAK

The literature on TUBITAK's history from a social science perspective is limited. There is only one unpublished doctoral thesis prepared at the Department of Science History, Istanbul University, under Ekmeleddin İhsanoğlu's supervision by Sevtap Kadioğlu. The thesis locates TUBITAK's place in Turkish scientific endeavor in general, and collects some of the important official documents, especially about the establishment of the council, its legislative process, and its later transformation in 1985.⁶⁰ Although valuable, Kadioğlu's work remains a descriptive study. The archival

⁶⁰ Sevtap Kadioğlu, *Türkiye Bilimsel ve Teknik Araştırma Kurumunun (TÜBİTAK) Kuruluşu ve Türk Bilim Hayatındaki Yeri*. Unpublished PhD Dissertation, Istanbul University: 1999.

data do not include, for example, NATO and OEEC/OECD documents, earlier inceptions before TUBITAK's establishment except for the United Nations Educational, Scientific and Cultural Organization (UNESCO) National Commission's study, and TUBITAK's Advisory Committee minutes. Şükran Şahin's book on TUBITAK, on the other hand, collects documents about Turkish science policy between 1963 and 1997.⁶¹

The rest of the literature belongs to former policymakers in the field of science policy. These authors provide a good amount of literature. Türkcan, one of the most important authors in the field, discusses Turkey's science policy in a vast volume, *Dünyada ve Türkiye'de Bilim, Teknoloji ve Politika*. Türkcan's book is a mix of a textbook on science and technology policies and a historical account of Turkish science policy, summarizing documents such as Advisory Committee minutes and an interview with Cahit Arf, the first chairman of the Science Committee of TUBITAK.⁶² Considering his role in initiating the establishment of Science and Technology Policy Studies (METU-TEKPOL) at METU, and a former student of Chris Freeman, Türkcan's texts are quite important in this study as sources. In addition to that, former policymakers and TUBITAK officials' accounts of science policy can be found in various other texts. *Türkiye'de Üniversite Anlayışının Gelişimi II (1961-2007)*, edited by İlhan Tekeli and Tarık Çelik, consists of an SPO official's account of science policy and Refet Erim's, former TUBITAK officials, memoirs about TUBITAK.⁶³

A critical review of the literature written by practitioners may be summarized as almost all of the authors argue for the "failure" of implementing a science policy in Turkey. Although he does not go into detail, Türkcan's explanations for this failure, for example, the coordination problems of research study groups, the lack of learning process of industry under import substitution, and a conclusive observation about the Turkish policymaking practices as *bureaucratic feudalism*.⁶⁴ Aykut Göker explains the problem as politicians' reluctance to emphasize science and research policies.

⁶¹ Şükran Şahin, *Türkiye'de Bilim ve Teknoloji Politikası: 1963-1997, Kurumlar ve Belgeler*. Göçebe Yayınları: 1997.

⁶² Ergun Türkcan. *Dünyada ve Türkiye'de Bilim, Teknoloji ve Politika*. İstanbul Bilgi Üniversitesi Yayınları: 2009.

⁶³ İlhan Tekeli and Tarık Çelik (eds.). *Türkiye'de Üniversite Anlayışının Gelişimi (1961-2007)*. TÜBA Yayınları: 2009.

⁶⁴ Türkcan, *Dünyada ve Türkiye'de Bilim, Teknoloji ve Politika*, 681-689.

According to Göker, SPO planners prepared programmes for science policy, for example, during Turkey's participation in OECD's Pilot Teams Project in the 1960s and political authority did not pay attention to this policy paper.⁶⁵ In the case of Nimet Özdaş's government paper titled *The Turkish Science Policy 1983-2003*, Göker also suggests that politicians did not adopt and give priority to science policy, even during Nimet Özdaş's Ministry of State in 1983.⁶⁶ The rest of the explanations revolve around the lack of industry demand for R&D and the lack of understanding of the importance of research in producing efficient results in technology-driven industries.

1.7. Research Material

The study of the organizational history of TUBITAK necessitates an extensive examination of official meeting minutes, documents, and reports produced by international organizations and TUBITAK. I formally applied to TUBITAK to access official archive documents, however unfortunately, my request became entangled in bureaucratic procedures and was subsequently lost despite further follow-ups. As a result, I could not reach the meeting minutes of the Science Committee which may be very illuminating. The minutes of the Advisory Committee are accessible in university libraries and the National Library in Ankara. A comprehensive collection of Advisory Committee documents is in METU TEKPOL's private archive, thanks to a donation from its founder and former TUBITAK Science Policy Unit specialist, Ergun Türkcan, facilitated by METU-TEKPOL faculty member Professor Semih Akçomak. I was able to gather the complete records of the Advisory Committee meetings, which took place between 1965 to 1985, two times a year, until when the committee was disbanded during the council's reorganization. This collection of Ergun Türkcan's private archives holds other valuable documents and official reports which are available at METU TEKPOL's library. This collection holds official reports, anniversarial texts of TUBITAK, some internal exchange of letters, and the minutes of Advisory Committee

⁶⁵ Aykut Göker, "Türkiye'de 1960'lar ve Sonrasındaki Bilim ve Teknoloji Politikası Tasarımları Niçin [Tam] Uygula[ya]madık?", *ODTÜ Öğretim Elemanları Derneği, Ulusal Bilim Politikası Paneli*, ODTÜ, Ankara, June, 2002 retrieved from: https://www.inovasyon.org/images/makaleler/ayk/AYK.ODTUog_uye_der_Haz_02.pdf Inovasyon.org collects various papers about science and technology policy including Göker's papers. See also his writings for industry and technology policy: Aykut Göker. *Bilim, Teknoloji, Sanayi Üçlemesi: Türkiye Üzerine Düşünceler*. Sarmal Yayınevi: 1995.

⁶⁶ Aykut Göker, "Türkiye'de 1960'lar ve Sonrasındaki Bilim ve Teknoloji Politikası Tasarımları Niçin [Tam] Uygula[ya]madık?", 6.

meetings. TEKPOL has a catalogue of these documents, and I was able to digitize some of these texts and reports.

TUBITAK itself digitized some of the copies of studies prepared by its research units in the online database called, APERTA.⁶⁷ I collected the titles of these reports and texts by using the website's API. Only partially, digitized versions of these documents are available in this online database, the rest of the entries are simple metadata of corresponding research units and their studies. The library of the former State Planning Organization (SPO), now known as the Presidency of Strategy and Budget's library, holds another collection encompassing not only science policy but also reports and translations from international organizations' documents. From the SPO library and TUBITAK-MAM's collection, I have accessed important reports of TUBITAK subunits. For example, the Science Policy Unit's report on doctoral students sent abroad is available at the TUBITAK-MAM library. Throughout my research, this library was relocating. MAM library officials provided scanned versions of these texts.

I bought a significant number of official documents, memorials, and texts from second-hand online bookstores. Anniversary editions on TUBITAK's activities, the Operational Research Unit's review of TUBITAK's research projects, Summer Conferences organized for TUBITAK's bursary students in high schools, as well as memoirs on TUBITAK-MAM, and the Council can be found on second-hand online bookstores. While APERTA's collection is valuable despite the limited number of documents that are digitized, university libraries and the National Library do not hold a private archive on Turkish science policy. As my request to reach TUBITAK's official archives was lost in the red tape of bureaucracy, the documents I have collected via these second-hand bookstores represent a good amount of this dissertation's archival material. In addition to that, I take advantage of an Erasmus+ Exchange program to access the *OECD Archives* located in its Paris Headquarters. This archive consists of official minutes of its sub-committees under the OECD Council and publications of reports and books stored as digitized microfilms. Some of the digitized microfilms are confidential due to the organization's policy of maintaining good relations with member countries. A local network also provides access to the OECD paper and book collection. Occasionally, it was possible to access physical copies of

⁶⁷ See: <https://aperta.ulakbim.gov.tr/> A separate collection of TUBITAK research units' projects is available on the website.

archived material under official supervision. I collected microfilms produced by related subcommittees of OEEC and OECD, spanning from the 1950s to the 1970s, which are crucial for understanding the dissemination of science policy during these years. These microfilms are cataloged as separate documents of OECD's working groups and committees. During my visit to Paris, I collected these microfilms and publications, which are pivotal for my study.

For the part on the military origins of science policy, I collected documents from NATO's online archives. Although mostly confidential, NATO archives hold a good number of documents related to the early development of science policy in international organizations. These documents can be found primarily in the Manpower Planning Committee, the Task Force on Further Action in the Field of Scientific Cooperation, and the Science Committee in NATO archives. Other than official documents, there are publications available on NATO's website. For example, the Advisory Group on Aeronautical Research (AGARD)'s history and brochures on scientific cooperation in NATO are available. The nature of NATO's science committee was collaborative rather than representing a military technology committee. Because of this, NATO's Science Committee documents are declassified by NATO. In contrast, the military part and defense research group minutes are not available in the NATO Archives. For the part of the legislation, I use the online database of Turkish National Assembly records. Some of the descriptive statistical data on scientific manpower, research expenditure, and specific information about TUBITAK are available in anniversary texts and reports as these are crucial for discussing the translation of institutional logics. I collected these statistical data from the corresponding review reports. I occasionally use these statistical data to show some trends and priorities given by TUBITAK authorities in respected research groups as part of the story of TUBITAK's organizational transformation.

1.8. Organization of Chapters

I have organized the chapters according to the theoretical framework and what insights they give about the main arguments of this study, i.e. TUBITAK's organizational transformation from an academic logic to policy-driven logic. Accordingly, the second chapter deals with a set of particular events that led to the establishment of the first science policy organizations in Britain. As I have employed the concept of *institutional*

environment in a rather unbounded way i.e. *before institutionalization*, I discuss specifically the elaboration of science's utilization in military, economic affairs, and social reasons in Britain. I argue that the invention of operational research, and the conduct of scientific methods, for example, finding aerial bombing patterns, have led to the transformation in cultural-cognitive frameworks about *the utilization of science in management*. In the following, I argue that this British propensity towards applied research and the application of operational research has been coupled with the issue of productivity at OEEC and OECD, because of the concentration of former British scientists' positions at these organizations. Thus, I show the historical development of science policy concepts and organizations and the birth of the *organizational field* of science policy in the first part. To do this, I employ a wide variety of articles published on the history of science, OEEC/OECD archives, and NATO archives.

In the second part, because of the primacy of military affairs in the process of the birth of science policy and the elaboration of the transnational organizational field, I trace this elaboration in OEEC/OECD, and the reception of these mechanisms at Turkish General Staff in the mid-1950s. To do this, I have employed the archives on OEEC/OECD, Turkish General Staff's Research and Development Department (ARGE), and the military Research Council, İlmi İstişare ve Araştırma Kurulu (ILAR). In the third part, I argue that the earlier developments concerning the Turkish military alongside the country's economic transformation to the planned economy on the one hand, and the scientific community's values on the other hand were both inscribed into the 1963 TUBITAK Act. To trace these developments, I analyze the legislation documents that took place at the National Assembly and the Senate. In this chapter, I propose three important changes in the institutional environment, the idea of utilization of science in societal, military, and economic matters during WWII, the invention of operational research and its coupling with management ideology and economic issues in the 1950s through OEEC, and their impact on shaping ideas of Turkish officials in the legislation process of TUBITAK.

In the third chapter, I propose a case of the prevalence of academic logic in the 1960s bureaucratic circles, when a scientific manpower crisis occurred through Americans' concern about the Soviet expansion, a number of policy initiatives have been developed through NATO and the OEEC. The reception of these developments did

not reflect a literal translation of these effects into the Turkish education system. On the contrary, I argue, TUBITAK officials cooperated with Ministry of National Education (MNE) bureaucrats to establish and develop a Science High School. I argue that this is a prevalent aspect of Turkish modernization, to raise a “favorable” youth instead of what policy initiatives suggest a total reformation of the education system. In this chapter, I use documents from NATO archives, OEEC minutes, and TUBITAK reports with a relevant history of Ankara Science High School.

In the fourth chapter, I discuss the inner politics of TUBITAK on the struggle to preserve or change the main orientation of the Council i.e. the interplay of academic logic and policy logic. To capture this struggle, I employ the concepts of *practice work* (e.g. new mechanisms for project management) and *boundary work* (e.g. statements on TUBITAK’s main values such as autonomy and freedom to research). In this chapter, I propose the first secretary-general, Nimet Özdaş, as the *institutional entrepreneur* who altered TUBITAK’s orientation towards policy logic, when he initiated the establishment of a higher council during his ministry of State, ending TUBITAK’s administrative autonomy via the Supreme Council of Science and Technology (SCST) in 1983, and the government paper, *Turkish Science Policy: 1983-2003*. In this chapter, I use various documents, from memoirs of corresponding parties to Advisory Committee minutes, and official documents of Turkish participation to an OECD project called Pilot Teams Project.

In the fifth and final chapter, I argue that a final controversy between the professors and the bureaucrats took place towards the end of the 1980s, and TUBITAK became a fully policy-driven organization after the 1990s. In this chapter, I revisit earlier developments to show, how science policy mechanisms and conceptualizations came into full circle in the 1990s. Then, I argue that TUBITAK’s transformation was mainly related to the overall change in economic policies of the country towards export-led market liberalization and the expansion of the Prime Minister’s office in considering a set of economic decision-making committees and funds set up during this period. I argue that this transformation also introduced a market logic into TUBITAK i.e. for example, directly subsidizing technology development projects. I conclude this chapter by showing the expansion of TUBITAK’s organizational structure towards the government’s needs in defense research, and the neoliberal turn funding export-led

economic growth. To do this, I use primarily the documents produced by the SCST, some memoirs, and official legislation documents.

Throughout the chapters, I create historical narratives as the complexity of the web of relations and the scope of archival documents require to tell them as a narrative. In the introduction and conclusion sections of chapters, I propose my argument about what these historical narratives talk about TUBITAK's organizational structure and the two conflicting logics i.e. academic and policy logic.



CHAPTER 2

INSTITUTIONAL ENVIRONMENT: THE ORIGINS OF RESEARCH MANAGEMENT AND ORGANIZATIONAL FORMS

We must work, expand, and develop [scientific and technical progress] rapidly, as only by this way others will follow you, and make Turkish inventions themselves. Our country's prestige and power only improve through this way. To do this, we expect a close cooperation between our military and civil research councils with our universities and academies, while our governments and private sector supporting them.

Cevdet Sunay, on Military Research Council – İLAR and TUBİTAK.⁶⁸

2.1. Introduction

In this chapter, I argue that the organizational structures of science policy have been created in a particular historical context during World War I. In addition to the creation of science policy organizations, several further mechanisms concerning the cooperation mechanism, research information systems, and statistical data collection were also developed during these years. Then during World War II, I argue that a further set of developments has become crucial after the war when science policy mechanisms, organizational structure, and policy review mechanisms are institutionalized. I argue that one of the major transformations was related to the invention of operational research leading to changes in probabilistic thinking and management systems. I show that these transformations have been institutionalized in OEEC/OECD studies on applied research and economic growth. As the source of these changes was related to the military, I show clear connections with the Turkish

⁶⁸ TUBİTAK. *Türkiye Bilimsel ve Teknik Araştırma Kurumu: 1966 Yılı Bilim Ödülü Töreni*, TUBİTAK (1967), 2.

military's R&D Department and some of the TUBITAK officials. In the third part, I argue that the legislative process of TUBITAK's establishment act has occurred around the military officials' desire for an executive science policy organization against the professors' wish to promote academic values. I show these corresponding logics embedded in the TUBITAK Act through an analysis of legislative action that took place at the National Assembly on the one hand, and at the Senate of the Republic on the other.

2.2. PART I - Institutional Transformation: Science Between the Two Wars

2.2.1. Research Council as an Organizational Form

The idea of a central organization responsible for science policy goes back to the debates on German scientific "superiority" and Britain's dependence on Germany for the import of chemical products during the First World War. These chemical products were dyestuff, optical glassware, synthetic drugs, and others, which British industry and military effort heavily relied on.⁶⁹ The "superiority" of German science, especially in chemistry, was related to Germany's independent research institutes. Kaiser Wilhelm Society, an umbrella organization for this type of institutes, the predecessor of the Max Planck Society, was established in 1911, under the presidency of Adolf von Harnack, and two directors of chemical research institutes, Fritz Haber and Ernst Beckmann.⁷⁰ These research institutes were very important for the development of Germany's chemical industry. However, the dependence of Britain on the German chemical industry opened up a debate amongst the scientific community and government circles at the beginning of WWI. The same debate will repeat itself later, during the Second World War, on the difference between pure research and applied research, as both the British scientific community and government circles desire to see the application of science in the military and industry. However, the First World War was also important as the first conceptualizations and organizational forms of science policy were formed in these years in the United Kingdom.

⁶⁹ Ian Varcoe, "Scientists, Government and Organised Research in Great Britain 1914-1916: The Early History of DSIR", *Minerva* 8, no. 2 (1970): 192-216. <https://doi.org/10.1007/BF01553212>.

⁷⁰ Historians indicate that the hesitancy of German governmental and non-governmental agencies documenting during the Nazi Regime prevented a full historical account of Kaiser Wilhelm Society overcome until 1990s. See Susanne Heim, Sachse, Carola & Walker, Mark (eds). *The Kaiser Wilhelm Society under National Socialism*, (Cambridge University Press, 2009): 5.

The problem of dependency urged the British government to take measures to overcome the shortages of chemical products, such as establishing *British Dye Limited* as a first step.⁷¹ The issue was taken to the *Board of Education* by the *Board of Trade*, as the number of scientists, primarily in the chemical industry, employed in Germany outnumbered the British scientists.⁷² Thus, a report was prepared by a committee, called *McCormick Committee*, suggesting to form a central body for the organization of scientific efforts and the supply of scientific manpower.⁷³ An Advisory Council was established under the *Privy Council*⁷⁴ titled *Committee of the Privy Council for Scientific and Industrial Research* in 1915. The duties of the *Advisory Council* were defined as "(i) instituting specific researches; (ii) establishing or developing institutions or departments for the scientific study of problems affecting particular industries; (iii) the establishment and award of Research Studentships and Fellowships".⁷⁵ This council took measures in certain sectors on the problems of industry, such as steel manufacturers' demands for the production of chemical glassware and pottery manufacturers' problems.⁷⁶ As these types of relations expanded on a cooperative basis with industry and government research bodies, a separate department for the organization of research was established in 1916, the *Department of Scientific and Industrial Research* (DSIR).

These two interrelated government agencies are the earliest forms of science policy organization. The establishment of the *Advisory Council* and DSIR can be understood in terms of the first wave of the proliferation of science policy organizations. In addition to that, this duality itself will also be influential, an advisory council coupled with an executive research department. Thus following the British model, similar organizations are formed in different countries, even under the same name, for example in British colonies and Commonwealth countries such as New Zealand and Australia.⁷⁷ These experiments concerning science policy during WWI will also be

⁷¹ Varcoe. "Scientists, Government and Organised Research in Great Britain 1914-1916", 195-198.

⁷² Varcoe. "Scientists, Government and Organised Research in Great Britain 1914-1916". 193.

⁷³ Varcoe. "Scientists, Government and Organised Research in Great Britain 1914-1916". 202.

⁷⁴ Privy Council is an interdepartmental government body of British State. It consists of ministers and senior government servants as councilors.

⁷⁵ Varcoe. "Scientists, Government and Organised Research in Great Britain 1914-1916", 207.

⁷⁶ Varcoe. "Scientists, Government and Organised Research in Great Britain 1914-1916", 211. See also Varcoe, Ian. *Organizing for Science in Britain: A Case Study*, (Oxford University Press, 1974).

⁷⁷ See the UNESCO Survey of National Research Council's document published in 1953. In her study, Kadioğlu cites the survey as one of the earlier documents that led to the establishment of TUBITAK. For example, Australia's Commonwealth Scientific and Industrial Research Organization on p. 6, New

influential in scientists' demand from the British government for the extension of applied research in the Second World War, recalling the war experience and German scientific superiority. But before going ahead, it is important to look at the influence of the establishment of the Advisory Council and DSIR, and how it is translated into the American context via scientific information exchange between the Allied forces during WWI.

As the war went on, military authorities and governments set up scientific bodies for research in armament, ammunition, and defense devices and mechanisms, first in France, and then in Britain. Military committees and ministries in relation to science became involved in coordinating the war effort, under higher governmental agencies. The request for scientific information exchange between the Allies came from France in 1915 and Britain accepted it in 1916.⁷⁸ The information exchange consisted of devices such as an "apparatus to detect submarines by ultrasonic waves" invented by French physicist Paul Langevin.⁷⁹ The United States was neutral during the first years of the war, but American scientists who paid visits to Britain and France, sympathized with the Allies.⁸⁰ Foreign Secretary of the National Academy of Sciences, George Ellery Hale, urged the government and American scientists to "offer its services [to the Allies] in the event of war... with Germany" in 1915.⁸¹ In the event of a U-Boat torpedoed a French civilian ship, Hale proposed to establish a National Research Council (NRC) with duties as:

[To] bring into cooperation existing governmental, educational, industrial and other research organizations with the object of encouraging the investigation of natural phenomena, the increased use of scientific research in the development of American industries, the employment of scientific methods in strengthening the national defense,

Zealand's Council of Scientific and Industrial Research and Department of Scientific Industrial Research on p. 49. In British Colonies, it was the second wave of the spread of research organizations, see India's Council of Scientific and Industrial Research on p. 28, Pakistan's Department of Scientific and Industrial Research on p. 54. UNESCO/NS/107. "Survey of National Research Councils for Pure and Applied Science in the Member States of UNESCO". 19 June 1953.

⁷⁸ Roy Macleod, "Secrets among Friends: The Research Information Service and the "Special Relationship" in Allied Scientific Information and Intelligence, 1916-1918", *Minerva* 37, No. 3, (1999): 205

⁷⁹ Macleod, "Secrets among Friends". p. 205

⁸⁰ Macleod, "Secrets among Friends". p. 206.

⁸¹ Macleod, "Secrets among Friends". p. 207.

and such other applications of science as will promote the national security and welfare.⁸²

NRC was established in the same year as the British DSIR in 1916. While the British were concerned with the “superiority” of German science, NRC was the outcome of American scientists’ close inspection of British measures about the war. As Macleod indicates, the situation was as follows, what American scientists and experts saw in Britain: “The British war establishment is the most perfect creation made by man, and the French are a good second and usually lead in technique”.⁸³ NRC’s first works were the appointment of a military committee and a division dedicated to anti-submarine research.⁸⁴ The more important function of the NRC was the establishment of the *Research Information Committee* (RIC) in 1917.⁸⁵ Scientific attaches were appointed in London, Paris, and Rome. The information exchange was related to weapon technology and anti-submarine devices, as in the case of Langevin’s invention. The close cooperation of the RIC with the army was extended when the military created a liaison office with the RIC in 1918, and the RIC became *Research Information Services* (RIS).⁸⁶ Macleod discusses at length the functions of RIC, the role of scientific attachés, and the Allied scientific information exchange during WWI. He also indicates that the establishment of the *International Research Council* (IRC) in 1919 was related to the American quest to override German dominance at the *International Association of Academies*. As the IRC was required to form a national research council for membership, the United States concerted a change in the international scientific arena.⁸⁷

After the war, RIS’s task was planned to be “[...]surveying the progress of research in various parts of the world... disseminating it [the information] to scientific and technical men and to institutions which can use it to advantage”.⁸⁸ Benoit Godin, a sociologist of innovation and R&D statistics, accepts the RIS’ early statistical reports

⁸²R.C. Cochrane. *The National Academy of Sciences*. (National Academies Press, 1978) as cited in Macleod, “Secrets among Friends”. 207.

⁸³ Macleod, “Secrets among Friends”. p. 208.

⁸⁴ Macleod, “Secrets among Friends”. pp. 208-214.

⁸⁵ Macleod, “Secrets among Friends”. p. 212.

⁸⁶ Macleod, “Secrets among Friends”. p. 222.

⁸⁷ Macleod, “Secrets among Friends” p. 225 and 228.

⁸⁸ *Annual Report of the National Academy of Sciences for 1918* p. 42 as cited in Macleod, “Secrets among Friends”. 229.

as the foundation of international R&D statistics which later would be handled by the OECD.⁸⁹ RIS' first reports and surveys were about industrial R&D laboratories, the number of doctorates, the allocation of research funds, fellowships, and collections of research organizations in the US and Canada in 1920.⁹⁰ This was followed by NRC's further surveys and statistical analyses in 1933 and 1941, which were later handled by the National Resources Board.⁹¹ Godin indicates that when Vannevar Bush prepared his famous report, *Science the Endless Frontier*, compiled statistics prepared by the early NRC studies.⁹² In the meantime, the President's *Science Research Board* collected data on R&D in different sectors with the categorization of research and employed the use of Gross Domestic Expenditure on Research and Development (GERD) for the projections on science policy.⁹³ In the same manner, some R&D statistics were collected by the DSIR and later by the Advisory Council on Scientific Policy⁹⁴ in Britain and, the Canadian National Research Council⁹⁵. Thus, technical information collection and documentation services became expanded throughout the leading countries in science and settled during WWII.⁹⁶

The importance of information exchange is twofold. On the one hand, it refers to documentation services, such as the collection of reports, publications, and books to supervise scientific development across the world, and in the case of war, the collection of intelligence about hostile countries. In addition to that, it is also important for exchanging models of, for example, collection of data, surveys of national scientific systems, and technology transfer. As will be seen, mutual weapon development programmes will be influential in NATO schemes, and the function of scientific cooperation itself will serve to uphold the organization's reputation.

⁸⁹Benoit Godin. "The Number Makers: Fifty Years of Science and Technology Official Statistics", *Minerva* 40, no. 4, (2002), 376-378.

⁹⁰ Godin, "The Number Makers".

⁹¹ Godin, "The Number Makers", 377.

⁹² Godin, "The Number Makers", 379.

⁹³ Godin, "The Number Makers", 379.

⁹⁴ This Council is the one which is established in 1947, not the Council which led to the establishment of DSIR in 1916, though there is no reason to think that it may also be patterned on the earlier one. See P.J. Gummett., Price, G.L. "An approach to the central planning of British science: The formation of the Advisory Council on Scientific Policy", *Minerva* 15, (1977): 119-143. <https://doi.org/10.1007/BF01096673>

⁹⁵ Godin, Benoit. "The Number Makers".

⁹⁶ The USSR and Germany established technical libraries in 1920. See Pamela Spence Richards. "Great Britain and Allied Scientific Information: 1939-1945". *Minerva* 26, no 2. (1988), 177.

The technology transfer during the First World War was related to the use of chemical bombs and detection devices using sonar technology against the U-Boats of Germany. In the Second World War, it was related to certain technologies such as radar, or the restriction on nuclear sciences concerning the atom bombs. Thus, as will be seen in the following sections, the most important scientific information exchange concerning mutual technology development was the Tizard Mission and the overall information exchange between the U. S. and the U.K. The British Scientific and Technical Mission to the United States was decided in 1939 and began in 1940. Tizard and a group of scientists carried both devices and scientific information during these missions, including radar prototypes. On the American side, there were National Defense Research Committee (NDRC)'s Vannevar Bush, and his deputy, James B. Conant who were quite influential for American science policy. These American and British scientists-administrators developed close relationships during the war and will be the policymakers of international organizations.⁹⁷

Thus, the two world wars created the first changes in the institutional environment concerning governments and science. Organizational forms i.e. the duality of advisory and executive research bodies, information exchange and scientific cooperation, and the first R&D statistics are created during the First World War. The U.K.'s DSIR and the Advisory Council served as an exemplary model for Americans leading to the establishment of a research council in the country and an international research council towards the end of the 1910s. The form of research council was an interface mechanism, between scientists and governments in the event of war, to develop weapons, transfer technology, and later for the collection of R&D indicators. Both DSIR and IRC's establishment which urged other countries to set up research councils created a wave to be adopted in other countries. The Second World War experience, on the other hand, expanded this relationship between governments and scientists.

The difference between the influence of WWI and WWII is related to the cognitive changes of government elites and scientists. As WWII contributed to the elaboration of what science meant for governments in the aftermath of the war, the specific

⁹⁷Ronald Clark, *Tizard*. (Methuen, 1965): 248-272. See also for NDRC and Office for Scientific Research and Development (OSRD), Bush and Conant on extension of contract research between American research universities and Federal agencies: Roger L. Geiger. *Research and Relevant Knowledge: American Research Universities since World War II*, (Routledge, 2004).

cognitive change amongst the government elites and scientists was the successful application of scientific methods to military affairs i.e. operational research. The British sentiment stemming from WWI repeated itself during WWII towards their governments, about the lack of appreciation of science in the army, economic development, and social welfare. The quest for the social function of science conceptualized as applied research, materialized with operational research's success during the war. A group of scientists' manifesto, *Science in the War*, written by Solly Zuckerman, John Desmond Bernal, and their colleagues and senior government officials who regularly met at a dining club called *Tots and Quots* published in 1940, collects 25 scientists' articles on how military and governments can benefit from science in distinct areas. In the same year, John Desmond Bernal's influential book, *The Social Function of Science* is also published, suggesting the utilization of science in economic and social welfare. The products of this sentiment towards the application of science will be influential in both short and long-term results. During WWII, Both Zuckerman and Bernal worked for the British military on the call by Henry Tizard. They have applied scientific methods to military operations which gave birth to operational research. The impact of operational research was profound. It integrated the quest for the utilization of science, and efficiency in the organization through quantification permanently elevated the status of science in the eyes of states.

2.2.2. Operational Research and the Efficient Organization

Operational research (OR) is a set of mathematical methods applied to military operations to identify patterns and foresee what to do next. It approaches situations with a holistic view concerning the relationship between units and limited resources. It is applied, for example, in the event of enemy aerial bombings, air raids, planning for logistics, and organizing the military unit to use existing sources effectively during WWII. Practitioners and scholars, retrospectively speaking, do not think that operational research was novel at all. Solly Zuckerman, a British zoologist, and a firm believer in applied research in the military and societal relations during WWII indicates "When I working outside the laboratory, I do not think that operational research was any more than the application of ordinary scientific method to the analysis of complicated and dynamic problem"⁹⁸ at the event of the Operational

⁹⁸ Solly Zuckerman, "In the Beginning – and Later", *Operational Research* 15, no. 4, (1964), 289

Research Society of Britain in 1964. For the time being, operational research was fully integrated into management education and military organizations, for which Zuckerman is credited for the invention of OR. Probabilistic thinking and quantification of operations have led to wider applications of systems thinking and systems engineering in the following years. The role of operational research in military planning thus became a part of the revolution in management sciences and risk planning, but also science policy schemes, economic development, and organizational efforts.⁹⁹

The revolution in management sciences, namely the application of operational research and further developments of systems research, coupled with the problem of the productivity gap between Western Europe and the United States after the war. When the Marshall Plan aimed to remedy the problems of European business and industry, and bring political stability, operational research represented the altered relationship between science and governments, a permanent change in the cognitive frameworks of scientists and bureaucrats that found ways to apply the same methods to industry, state enterprises, and business sectors. As the spread of operational research methods and the application of scientific methods into civilian matters have their roots in the British scientific community, it is useful to think of the intermingled relationship between British scientists' demand for the utilization of science and the uses of operational research in the following section.

2.2.3. British Propensity Towards “Applied Research”

During the First World War, it became apparent amongst the British scientific community to urge their governments to use science in economic development and military technology production having encountered the superiority of German science. This sentiment of British scientists that led to DSIR's establishment, and making the industry responsible for part of the problem, provided DSIR “a quite painless birth” in 1916.¹⁰⁰ Robert Rud's study delves into the traverses of conceptualizations of science in Britain that indicate the deep sentiments of the British scientific community about the utility of science as a remedy “to fears about a perceived future as full of risk”,

⁹⁹ M. Fortun et al., “Scientists and the Legacy of World War II: The Case of Operations Research (OR)”, *Social Studies of Science* 23, no. 4. (1993), 598.

¹⁰⁰ Varcoe, “Scientists, Government and Organised Research in Great Britain 1914-1916”. 216.

beginning from the middle 1850s.¹⁰¹ This movement, according to Rud, had its impact first on the debates of education in the country, corresponding to the developments in France, the United States, and especially in Germany.¹⁰² As Rud points out, the end of the nineteenth century presented the shift in focus from education to research policy with the establishment of the National Physical Laboratory in 1899, as a replica of German Physikalisch-Technische Reichsanstalt.¹⁰³ At the outbreak of war, as discussed earlier, the debates on pure science and applied research, as well as the role of industry, were settled by the establishment of the DSIR, Rud cites DSIR's first secretary's words: "on the one hand, to encourage pure research and on the other to organize applied research".¹⁰⁴

This deeply rooted feeling about the utility of science in the British scientific community, once again, had become important during WWII. Before the large numbers of scientists had become part of the war machine, scientists published a handful of books and manifestos, right at the beginning of the Second World War. Bernal's book, *The Social Function of Science* is one of them.¹⁰⁵ Bernal's book was published after he participated in a conference on the history of sciences, which Russian scientists also attended. Andrew Brown, a Bernal biographer indicates the impact of Boris Hessen, a Russian philosopher of science who attended the conference, paper on Bernal, which argued that Newton "[...]was not living his life in a vacuum, but responding to the needs of seventeenth-century entrepreneurs..."¹⁰⁶ In the context of the British debate on science and its applications, as a Marxist scholar, Bernal expanded this ideal to use science for societal welfare. The other book was a

¹⁰¹ Robert Rud. "Categorizing Science in Nineteenth and Early Twentieth-Century in Britain" in *Basic and Applied Research: The Language of Science Policy in the Twentieth Century*, edited by. Desiree Schauz and David Kaldeway, (Berghan Books, 2018), 43.

¹⁰² Rud. "Categorizing Science in Nineteenth and Early Twentieth-Century in Britain." 37-44.

¹⁰³ Rud, "Categorizing Science in Nineteenth and Early Twentieth-Century in Britain", 47. German Metrology Institute, established in 1887, to meet the demand for accurate measurement for governmental issues. See the Institute's brochure for a brief history: Physikalisch-Technische Bundesanstalt, PTB and PTR: History of an Institution. Retrieved from https://www.ptb.de/cms/fileadmin/internet/presse_aktuelles/broschueren/geschichte_ptb/PTR_and_PT_B_History_of_an_Institution.pdf on 23th November, 2024.

¹⁰⁴ Frank Heath. "The Government and the Organisation of Scientific Research." *Journal of the Royal Society of Arts* 67, no.3457 (1919): 206–219 as cited in Rud, "Categorizing Science in Nineteenth and Early Twentieth-Century in Britain", 47.

¹⁰⁵ Rud, "Categorizing Science in Nineteenth and Early Twentieth-Century in Britain.", 53. In the same paragraph, Rud points out the influence of social anthropologist Bronislaw Malinowski on British intelligentsia about "social functions".

¹⁰⁶ Andrew Brown, *J.D. Bernal: The Sage of Science*, (Oxford University Press, 2005), 106.

collaborated one, *Science in War*, anonymously published as a manifesto in 1940. Amongst the authors there were Bernal, his close friend Solly Zuckerman, another British biologist J.B.S. Haldane, and some senior government officials. The idea of the utilization of science now become an urgency. Right after the book's publication both Bernal and Zuckerman will join the military efforts themselves to apply their scientific talent.

2.2.4. Application of Science and the Operational Research

Science in War, as a manifesto of scientists and some government officials, lays out different examples of the uses of science in military technology, social welfare, and economic development, it also foresees some developments concerning science policy. As the book is Zuckerman's dining club's product, he recalls in his memoir, that key members of this dining club were mostly scientists where discussions were held on "the social responsibility of scientists".¹⁰⁷ The members of the dining club included John Desmond Bernal, self-educated scientist J. B. S. Haldane, other prominent guest members from the circles of senior government officials, and other scientists. As Zuckerman recalls, a general tendency on the issue of the problems of organization of science in war conditions was prominent on other occasions as well, amongst the scientific community.¹⁰⁸ Thus the idea during one of the meeting clubs to write a book about the problems of science and the responsibility of scientists materialized with this anonymous manifesto. As Zuckerman recalls, Bernal and he drafted the book. The book was published in 1940, and representing its success as Zuckerman recalls, reviewed by an author, the same year in the famous scientific journal, *Nature*.¹⁰⁹

In the introduction, the authors open their case by stating the urgency of the situation and the use of science in determining "[...]what the problems are and what is their orders of importance" in contrast to merely using science for solving problems.¹¹⁰ On the same page, it states the difference between fundamental science and applied

¹⁰⁷ Solly Zuckerman. *From Apes to Warlords: The Autobiography (1904-1946) of Solly Zuckerman*. (Hamish Hamilton, 1978), 109.

¹⁰⁸ Zuckerman. *From Apes to Warlords*, 109.

¹⁰⁹ Zuckerman. *From Apes to Warlords*, 398.

¹¹⁰ Anonymous, *Science in War*, (Penguin Special, 1940), 7.

science is only a matter of time interval.¹¹¹ Fundamental science is a bargain concept of British scientists translating “pure science” into their context, but here it connotes something different, as the authors suggest, both types of research contribute when they are applied in one way or another, except in different time-spans. The book consists of examples, from Germany both showing the evils of science but also technologically most developed ones in the military, historical examples of the First World War, and the societal matters about how science can be useful. The main difference, as Fortun and Schweber suggest, in the exceptional role of operational research during these years, is the quantitative methods for problem-solving and stochastic thinking in determining patterns of any kind of operation to forecast potential risks. For example, after stating that the country does not possess any “statistical bureau where information is collected every war problem”, authors indicate that:

What is lacking, however, is not the ability to foresee to deal with these ad hoc problems as they arise, but the ability to foresee them and to have solutions ready, so as to obviate as far as possible the inevitable delays of research and development.¹¹²

After stating the main cause of this manifesto, chapters are organized around the examples of the application of science, and the relationship between fundamental research and applied research in some examples. These cases vary from the treatment of diseases, blood transfusion, the use of science in war conditions, and even the case of military morale regarding the application of psychology and sociology. Nitrates as they are applied in both agriculture and the production of explosives, the magnetic mine problem for ships and its remedy of creating a magnetic field on ships, the study of aerodynamics in airplane production, calorie-based and vitamin-supported food rations were other examples throughout the book.

In the chapter titled, “Science in the Conduct of War”, the authors anticipate the development of operational research as a distinct set of methods in military affairs without naming it. According to the authors, science had been utilized to develop weapons, transportation, and communication, but “it has hardly been used, [...] on the

¹¹¹ *Science in War*, 7

¹¹² *Science in War*, 9.

more general, and the more vitally important question of strategy and tactics.”¹¹³ Here they emphasize how the efficiency of organization and operations can be increased:

The waging of warfare represents a series of human operations carried out for more or less definite ends. Seeing whether these operations actually yield the results expected from them should be a matter of direct scientific analysis.¹¹⁴

As an example of this, authors suggest a rational policy of shelter can be drawn by studying the patterns of aerial bombings, and the nature of explosions i.e. studying the type of bomb and identifying the patterns of the influenced area in each case. This is what Zuckerman and Bernal would be doing during WWII, surveying the German air raid patterns in France and Britain, quantifying the influence of bombs on land, and collecting data on the nature of explosions. Following the publication of the book, Bernal and Zuckerman were appointed to the *Research and Experiments Department of the Ministry of Home Security* at the beginning of the war.¹¹⁵ Their studies of bombing surveys were used for the deployment of infantry at specific areas, and the Medical Research Council’s study on the wounds caused by German air raids. *Science in War*, as a manifesto, concludes by stating the “intelligent direction” of war efforts, instead of a mechanical one.¹¹⁶ They emphasize the importance of the utilization of science by indicating “What we are calling for, not as an ideal, but as an urgent practical need in a desperate situation, is the effective utilization of scientific method, scientific advice, and scientific personnel”.¹¹⁷ The book represents a crucial change in the minds of the scientific community in Britain, it also hints at the developments concerning quantitative analysis, probabilistic thought, the birth of operational research, and systems thinking, what the 1950s will encounter as a revolution of management sciences.

Operational research is not mentioned as a term and a distinct set of methods in *Science in War*, despite hinting at the differences of what they advocate from former methods of scientific management such as. Taylorism, as they named operational research as

¹¹³ *Science in War*, 33.

¹¹⁴ *Science in War*, 33

¹¹⁵ Zuckerman, *From Apes to Warlords*, 113.

¹¹⁶ Zuckerman, *From Apes to Warlords*, 144.

¹¹⁷ Zuckerman, *From Apes to Warlords*, 142-143.

“intelligent direction” in contrast to Taylorism’s mechanical one. Moreover, the rise of operational research was not limited to the work of Zuckerman and Bernal. The origin of operational research also lies in the British efforts to develop radar, and more prominently in the work of Henry Tizard during the war. Tizard, as mentioned earlier about his mission to Washington during WWII, can be considered the main protagonist of the British conceptualization of science policy considering the rise of operational research. Scholars even define his influence as the “cults of Tizard” in the circles of British science policy with the appropriation of operational research in policy schemes.¹¹⁸ The writer of *Two Cultures*, English novelist and physicist, Charles Peirce Snow in his lectures, *Science and Government*, dedicates this book to British high politics and the rivalry between Tizard and another important figure, physicist Frederick Lindemann, who was the scientific adviser to Winston Churchill during the WWII.¹¹⁹

Tizard’s career as an administrative government scientist began with his appointment to DSIR in 1920.¹²⁰ He served on the committees of the Air Ministry and Royal Air Forces for the development of radar, and duties such as developing a policy of bombing German fronts during WWII. He became the chairman of the Advisory Council on Scientific Policy, established again in 1947, right after the war. The miracles of operational research were not limited to bombing surveys, but it was also used to determine where to place radars. Tizard and his team shared the developments concerning the radar and other technological devices with the Americans through the Washington mission starting in 1940. Fortun and Schweber address the development of radar increased the effectiveness of British air defense by ten times¹²¹, while Snow gives a more detailed account of Tizard’s work on the formation of radar systems in *Science and Government*.¹²²

¹¹⁸ William Thomas, “Bureaucratic reformism and the Cults of Sir Henry Tizard and operational research” in *Scientific Governance in Britain, 1914-1979*, (Manchester University Press, 2016): 45-62. <https://doi.org/10.7228/manchester/9780719090981.003.0003>

¹¹⁹ C.P. Snow, *Science and Government*, (Harvard University Press, 1961).

¹²⁰ Clark, *Tizard*, 57

¹²¹ Fortun et al, “Scientists and the Legacy of World War II: The Case of Operations Research (OR)”, 601.

¹²² Snow, *Science and Government*, 33-38.

The introduction of operational research in the United States was accomplished by the National Defense Research Committee (NDRC) where Vannevar Bush was the head of the committee, and James Conant was the second. Although operational research was employed similarly in Britain after the war, it gained a stronghold in the United States at some of the Institutes of Technology and Universities. Fortun and Schweber discuss the role of the University of Columbia.¹²³ The adoption of operations research in the United States, for example, led to the establishment of a global think tank, RAND Corporation, after the military project titled Project RAND. Practically, operational research is integrated within the management education schemes which have a massive influence over Europe's productivity measures. The British, on the other hand, dispersed operational research techniques for civilian use and industry. For example, Imperial Chemical Industries (ICI), established in 1926 as an outcome of the developments in the First World War, adopted new techniques and operational research methods.¹²⁴ Advisory Council for Scientific Policy prepared seminars such as "Technology and Operational Research", "Import Substitution", "Human Factors in Industry" and "Technical Information Services".¹²⁵

The trajectory of operational research afterward is twofold. On the one hand, through British influence, especially with Alexander King¹²⁶, who was the British delegate of the Anglo-American Productivity Council and later Co-Director of the European Productivity Agency (EPA), the use of operational research, human factors studies, and the management education coupled with Europe's productivity problem. On the other, NATO was influential in dispersing the operational research techniques to member countries through the Advisory Group for Aerospace Research and Development (AGARD), under the leadership of Theodore Von Karman, a renowned aerodynamics researcher who previously advised to American Army. AGARD and other scientific bodies of NATO, such as Defense Research Directors, and later the Science Committee organized seminars on operational research. On the other hand,

¹²³ Fortun et al, "Scientists and the Legacy of World War II: The Case of Operations Research (OR)", 603.

¹²⁴ Alexander King. *Let the Cat turn Round: One Man's Traverse of Twentieth Century*, (CPTM, 2006), 183.

¹²⁵ King, *Let the Cat turn Round*, p. 188.

¹²⁶ King calls himself as the protégé of Tizard. Tizard's role was quite important in King's career as he appointed King as his secretary during his chairman of Advisory Council for Scientific Policy. See Alexander King. *Let the Cat Turn Round*, 172.

OEEC integrated operational research into its applied research policy work. After the re-establishment of OEEC, King became the director of the *Directorate of Scientific Affairs* at OECD. He was continuing his duty when for example, Turkish planners participated in an OECD project called *Pilot Teams Project* developed for peripheral countries to help draw national science policy schemes in 1963, the same year TUBITAK was established. Von Karman, on the other hand, visited Turkey in 1955, as part of a NATO mission.

At the end of the war, British scientists' call for the application of science in military affairs became a widely accepted practice through operational research, both in the United Kingdom and the United States. The same programmes developed for British industry by Advisory Council, such as human factors, applied research, and technology information services will be seen in the EPA schemes. Americans will develop further and integrate operational research into management education. NATO, on the other hand, will be more direct in its effect as will be seen in the following sections. But from all these experiences, the end of WWII represents a full-scale transformation in the institutional environment concerning the relationship between science and governments. Through OEEC, applied research as a substitution for research policy will be important in the first step. Then, the OECD will take its course through a full conceptualization of science policy and quantification of evaluation systems of research through its manuals.

2.3. PART II - The Birth of the Organizational Field of Science Policy: The European Productivity Agency, NATO, and the OECD

During the mid-1950s to 1960, the EPA served both as a forum to disperse new management techniques and efficiency-driven policies that tried to enable the increase in productivity after the war. Some of the themes EPA dealt with were, for example, human factors studies, as part of its management education activities, and large forums that brought university professors, research organization administrators, and industrialists together to draw a policy on applied research. As Boel indicates, EPA was the operational arm of the OEEC, its budget oscillated between %38,5 to %48,1 of the total OEEC budget.¹²⁷ The overall work of the EPA focused on the dispersion

¹²⁷ Bent Boel. "The European Productivity Agency, 1953-1961" in OECD Historical Series: Exploration of OEEC History, (ed) Richard Griffith, (OECD, 1997), 113. Retrieved from:

of management education. Burgi states that EPA's %30 of its budget is dedicated to human factors studies, which are business management programmes, and %5 of its budget is to themes related to applied research.¹²⁸ Its summary report, between 1954 and 1955, indicates that EPA worked in five areas respectively: research, information, training, education, and assistance to other productivity bodies.¹²⁹ In all these areas, EPA remained as an educational forum, to influence the decision-making processes of member countries via bringing policy-makers, union representatives, and industry together, and in the case of applied research, university professors and research organization members to share different points of views for forming a national research policy. Because of this, EPA itself did not initiate technical research, it only created liaisons between related bodies that would do technical research.¹³⁰ In the work of EPA, the key person was Alexander King, first as the British delegate of the PRA Committee (Productivity and Applied Research), later as co-director of EPA, with his French counterpart Roger Gregoire.

2.3.1. EPA on Stimulating Applied Research¹³¹

The productivity gap problem between the United States and Europe became a condition to overcome to access Marshall Funds by applying management reform following EPA's leadership. In the case of science policy, the OEEC first created an *ad hoc* committee, Working Party No. 3, and then, the Committee for Scientific and Technical Matters and Technical Assistance Group for the operations of increasing productivity in Europe. These operations consist of visits to the United States to learn new business management techniques, policy on applied research, and the use of technology in production.¹³² These OEEC Committees later combined under the

https://www.oecd.org/content/dam/oecd/en/publications/reports/1997/04/explorations-in-oeec-history_g1ghb2ed/9789264067974-en.pdf on 23 April, 2024, For statistics, see endnote 2 in Boel. "The European Productivity Agency, 1953-1961", 122.

¹²⁸ Regula Burgi, "Learning Productivity: The European Productivity Agency – An Educational Enterprise" in *The OECD's Historical Rise in Education: The Formation of a Global Governing Complex*, (ed.) Christian Ydesen, (Palgrave Macmillan, 2020), 27

¹²⁹ EPA, *European Productivity Agency: Second Programme of Action, 1954-1955*, (OEEC, 1954), 16

¹³⁰ EPA, *European Productivity Agency: Second Programme of Action*, 16-17.

¹³¹ As Boel puts, EPA's full archives were not present at OECD's digital microfilms inventory in Paris. Only some of its documents on industrial sociology, agriculture committee and reports were available. Thus, this section discusses the EPA's final reports, instead of inner workings of its committees. See Boel's book: Bent Boel, *The European Productivity Agency and Transatlantic Relations, 1953-1961*, Museum Tusculanum Press, (2003), 20.

¹³² Daniel Barbezat. "The Marshall Plan and the Origin of the OEEC", in *Explorations in OEEC History*, 39. See also Bent Boel, *The European Productivity Agency, 1953-1961*, Museum Tusculanum Press, (2003).

Productivity and Applied Research Committee (PRA) in 1952. After one year, the European Productivity Agency (EPA) was established in 1953. EPA was a semiautonomous agency of the OEEC while being operated under the PRA committee.

As the names of these committees suggest, EPA represents the integration of the management education revolution, applied research, and technology in Europe in terms of the practical problem of increasing productivity. For the Americans, as Boel states, the overall European Recovery Programme attempted to restore economic stability to achieve political stability in Europe, against the upsurges of any socialist movements.¹³³ In its activities on applied research, EPA organized technical missions to some of the European countries, the United States, and Canada under the title of Technical Mission No. 81 and No. 82 beginning in 1951. These missions included senior government officials from member countries, and representatives of the correspondent agencies who visited national research establishments, laboratories, large industrial enterprises, which do research themselves, as well as national bodies responsible for coordinating research. During the first mission, EPA also started a conference series on various aspects of applied research. This first conference took place in London during the visits of Mission no. 81. The conferences were held on, for example, the organization of applied research¹³⁴, the problems of training scientific manpower¹³⁵, and recruitment of researchers which integrated “human factors study” for research organizations. The most important output of these missions is collected in a three-volume report on applied research published in 1954.¹³⁶

The first report, *Applied Research – A Comparative Study Volume I*, discusses the themes of “national research policy”, “the internal structure of applied research”, the

For a detailed account, see Boel’s book *The European Productivity Agency and Transatlantic Relations 1953-1961*. Boel gives a full account how productivity drive is Europeanized by the ongoing negotiation through OEEC and its executive branch European Productivity Agency.

¹³³ Boel, *The European Productivity Agency and Transatlantic Relations, 1953-1961*, 12. Boel’s words: “The politics of productivity were supposed to depoliticize social and economic issues.”

¹³⁴ OEEC, *The Organisation of Applied Research in Europe, Project No. 191: Proceedings of the Conference held at Nancy, 11th-13th October, 1954*, (OEEC, 1955). See part II in this report, for example of a human factors study: “The Human Factor in Research and Team Work”.

¹³⁵ OEEC, *Scientific Manpower for Applied Research, Project No. 361, Third International Conference on the Organisation and Administration of Applied Research, Vienna, 8th-12th October, 1956*, (OEEC, 1957).

¹³⁶ As will be seen in the following sections, this three-volume is translated into Turkish General Staff in 1960, and the first volume by an ITU professor, Bedri Karafakıoğlu in 1963, who also served at the OEEC committees in a limited time period.

administration of research organizations, and examples from the United States, Britain, and other countries. The report is very comprehensive, but also short in pages in each volume probably because its audience is policymakers as it is organized to serve as a guide to decision-making. Each section deals with a certain aspect of national research policy, for example, the responsible bodies of research in certain countries, the degree of centrality and freedom of doing research, the problems of recruitment of scientific manpower, information exchange within the organization, and inter-governmental departments, and the balance between applied research and fundamental research.¹³⁷ It integrates observations made by the missions with examples of different countries and gives a whole picture of the situation of research organizations and research policies of countries. After summarizing these aspects, each section includes some recommendations about the remedies to the issue or makes suggestions to establish appropriate mechanisms if there is no responsible body. The themes that occurred throughout the early experience of the relationship between governments and science, in countries such as Britain and the United States, are sustained in the report. The rationale behind the missions is as follows:

Research is an important factor in maintaining and increasing the standard of living. It can, however, only work through increased productivity. The applied research effort has to be organised, the research programme has to be formulated. The work has to be carried out and the results used in such a way that the impact on productivity is as large as possible.¹³⁸

The first recommendation of the report is forming national research policies. As the observations point out, almost all countries established research councils in a trend following the formation of the British “Advisory Council on Scientific and Industrial Research”.¹³⁹ This research policy must determine priorities in terms of different

¹³⁷ I should note that I use the terms *fundamental research* and *basic research*, in line with the documents. However, as will be recalled, *fundamental research* is a term originating the British scientific circles, while *basic research* is appropriated by American scientists and post-war American scientific foundations, especially the pioneer of the concept, National Science Foundation (NSF). These two terms are related to *pure science* or *pure research* originating the German research university. But as Schauz work puts it clearly, both of these concepts are bargain concepts to overcome the issues related with scientific boundaries. See Schauz for further detail: Desiree Schauz, “What is Basic Research? Insights from Historical Semantics”, *Minerva* 52, no. 3, 2014: 273-328.

¹³⁸ OEEC, *Applied Research: A Comparative Study Volume I - Report of the Technical Missions Nos 81-82-83*. (OEEC, 1954a), 3

¹³⁹ OEEC, *Applied Research: A Comparative Study Volume I*, 15.

research areas. It contrasts the situation in the United States, as the American experience already paid greater attention to applied research in government departments and its industry, the establishment of the National Science Foundation in 1950, shows the desire to support fundamental research. But in contrast:

[...] conditions in Western Europe are not normal. It is an economic necessity for the O. E. E. C. Member countries to raise their productivity. Part of this increase might be secured by learning from the United States, a further part by using knowledge already available in Europe. Western Europe cannot, however, attain its full development without a far greater effort in applied research and development.¹⁴⁰

Thus, the report connects the issue of applied research i.e. stimulating end-products of research in industry through its legitimization of increasing productivity rates in Europe. For doing this it suggests that applied research must be encouraged, and a “climate of research” in both industry, universities, and institutes of technology must be improved. This connects with the most urgent problems identified by government circles during this period originated in American concerns: the shortage of scientific manpower.¹⁴¹

We believe that a rapid expansion of research activities is desirable in all countries. The most serious obstacle is likely to be the shortage of qualified personnel and this problem should be given immediate consideration. The problem has two aspects the awakening of an active interest among young people and the widening of the facilities for an education qualifying for participation in research. The first aspect should be handled by use of enlightened propaganda, by strengthening the science curricula in schools and by talent searches [...]. The latter involves in particular a strengthening of the administration of universities and institutes of technology and the provision of sufficient means for these institutions to be able to educate a sufficient number of suitably trained personnel.¹⁴²

¹⁴⁰ OEEC, *Applied Research: A Comparative Study Volume I*, 17.

¹⁴¹ “The problem of scientific manpower” is first issued by NATO via an American Memorandum, which indicates concerns over the expansion of Soviet Union’s training of scientists and engineers. I will discuss its historical development in the chapter on Scientific Manpower.

¹⁴² OEEC, *Applied Research: A Comparative Study Volume I*, 20

The desire to form research policy in member countries and the government-science relationship requires tackling, the other most important problem of allocating resources to research. Almost all documents of EPA, OEEC, and later OECD indicate the need to create reliable data on research expenditure. This necessitates strict definitions of research, a taxonomy that distinguishes fundamental/basic research, industrial research, government research, or for example, oriented or directed research. These documents suggest that a sound policy must be based on solid data from R&D statistics to allocate resources and evaluate whether these resources are spent correctly or not. Collecting R&D statistics is also important for further comparisons between national efforts. As mentioned before, the National Research Council of the US and UK accomplished earlier data collection of R&D statistics, but as Godin points out, it was Bernal's *The Social Function of Science* that first incorporated these statistics.¹⁴³ These early documents shape a certain definition of applied research, which substitutes the desire to exploit research in terms of its economic worth. The documentation and information services are discussed in a separate conference held in London at DSIR headquarters.¹⁴⁴ Gradually the emphasis on applied research will become a background work as EPA documents and OECD reports define different types of research in connection with a general science policy. The major problem will be the collection of R&D data and the evaluation of research. Eventually, the problem of evaluation will be resolved by the introduction of the Frascati Manual. The signs of the evaluation problem are apparent in the report, *Applied Research – A Comparative Study Volume I*, as it encourages collecting data on research expenditure, as detailed as it can be.¹⁴⁵ It indicates that research expenditure can be calculated by considering its share of the gross national product (GDP) or in the total investment budget.¹⁴⁶ The rest of the report gives detailed information on contract research, a common American experience during and after the Second World War.

¹⁴³ Benoit Godin, "The Making of Statistical Standards: The OECD and the Frascati Manual, 1962-2002", *Project on the History and Sociology of STI Statistics, Working Paper No. 39*, (2008), 8.

¹⁴⁴ OEEC, *Report on the First Meeting on Technical Information Officers*, (OEEC, 1955). The document includes speeches given by British and American experts, for example on Question-and-Answer Services, provided to industry, documentation of new techniques for Industrial Research Associations, and the OEEC's role in technical information services.

¹⁴⁵ OEEC, *Applied Research: A Comparative Study Volume I*, 65-67.

¹⁴⁶ OEEC, *Applied Research: A Comparative Study Volume I*, 21.

On the organization of research, it emphasizes the establishment of central coordinating bodies, specifically national research councils. As the report contrasts the situation in America and Europe, it rightly assesses the United States' difference as in this country research establishments work based on contracts, issued by federal departments and industry, i.e. a strictly decentralized organization. Nevertheless, the report suggests establishing a central coordinating body in any case, if there is not already:

In countries where no central body exists for the coordination of research such a body should be constituted. It need not and probably should not carry on research itself but should ensure the coherence of national research activities, prevent duplication and promote co-operation and the fullest exchange of information between research establishments.¹⁴⁷

As the emphasis is put on applied research, the report encourages to establish semi-autonomous research agencies dedicated to applied research such as Netherland's *Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (Netherlands Organization for Applied Research) (TNO)*¹⁴⁸, and describes the characteristics of a proper administrator of these organizations: "Appointing a professional administrator, knowledgeable in and sympathetic to research, to deal with administrative matters of policy and procedure and giving the scientists an adequate secretarial staff"¹⁴⁹. The section on "Internal Structure of Applied Research" goes into detail about how to handle creative scientific talent, and administrative qualities of research organizations, as well as the issue of information exchange within the organization and at the inter-organizational level.

A section on research councils is also reserved in the report as the general pattern of research organizations in Europe consists mostly of research councils. This section summarizes the role of research councils, by indicating the parties involved as governments, industry and science in general, and research councils themselves as coordinating bodies:

¹⁴⁷ OEEC, *Applied Research: A Comparative Study Volume I*, 26.

¹⁴⁸ As will be seen, TNO will be the most important model during the establishment of Marmara Scientific and Industrial Research Institute in 1970.

¹⁴⁹ OEEC, *Applied Research: A Comparative Study Volume I*, 27.

Research councils, in whatever form or field they are set up, should accurately reflect the views of science, industry and Government. Their functions should be to ensure that research programmes are adequate and research organisations sufficiently flexible to meet the needs of science, industry and Government with efficiency and reasonable economy; to co-ordinate research work and foster co-operation; to act as a nursery for long-term research projects of national importance; to stimulate the national research climate, and in particular to promote a better understanding between science and industry.¹⁵⁰

The second volume summarizes the first conference on applied research organized by EPA with general remarks on the organization of research. This volume is a survey of national research organizations specifically formed for applied research, their estimates of research expenditure, and the situation of research in a respected country. Sections provide the list of laboratories, research institutes, and higher education facilities with a brief historical remark as well as an organizational chart of how these organizations are connected to government machinery.¹⁵¹ This survey is similar to UNESCO's 1953 survey of research organizations, much cited by scholars about TUBITAK's establishment. The difference is the emphasis on applied research and numbers on research expenditure with remarks on the cooperation with industry. The third volume of the report is dedicated to applied research in the United States and Canada. The NRC for Mutual Security Agency (MSA) prepared this volume.¹⁵² It discusses contract research and the decentralized research organization in the United States. The importance of this volume is that NRC's detailed data, in comparison to other examples, on distinct aspects of research expenditure taking into account government research, basic research, and industrial R&D. Once again, this report also stresses the problem of evaluating research in terms of its applicability and economic return.¹⁵³

¹⁵⁰ OEEC, *Applied Research: A Comparative Study Volume I*, 44.

¹⁵¹ OEEC, *Applied Research in Europe Volume II: Report of the Technical Missions Nos 81-82-83*, (OEEC, 1954b).

¹⁵² Mutual Security Agency (MSA) is the parent organization of the United States, responsible for the activities formerly managed by Economic Cooperation Administration concerning Marshall Funds. It is later reorganized as Foreign Operation Administration (FOA). As these organizations names were brought constantly in the early documents of OEEC, I thought it is useful to describe these umbrella organizations as a side note. OEEC, *Applied Research in the United States and Canada Volume III: Report of Technical Mission Nos. 81-82-83*, (OEEC, 1954c).

¹⁵³ OEEC, *Applied Research in the United States and Canada Volume III: Report of Technical Mission Nos. 81-82-83*. 29-30.

Considering the EPA conferences mentioned before, the second conference on the organization of applied research is important, which brought together a good number of representatives from universities, industry, and government officials to discuss the “practical organisation of applied research”, “the human factor in research and teamwork”, “the dissemination of results of research and their implementation”, and “research and patents”.¹⁵⁴ This report is quite comprehensive, as each section incorporates all three perspectives of university, industry, and government. It documents the discussions as well. The conference on *Scientific Manpower for Applied Research*, on the other hand, deals with the educational connection of the question of research policy. As mentioned earlier, the task of surveying scientific manpower in member countries was issued by the United States through NATO and Mutual Security Agency (MSA) to OEEC in 1953.¹⁵⁵ As the conference took place after this task issued by NATO, the report integrates earlier results of its survey. Before the advent of scientific manpower is accepted as a major and a general problem under the auspices of NATO, this report does not raise that issue with strong sentiments, except for example, Norway’s reliance on foreign universities for training its scientists, but also indicating Austria’s surplus of qualified manpower.¹⁵⁶ Three working groups studied different aspects of the problem for the conference: education and training of research workers, supply and recruitment, and the position of research worker in the applied research organization.¹⁵⁷ The first section, for example, discusses shortages of teachers and whether a curriculum reform is needed in secondary schools or not. Except for mathematics education, the report does not suggest a whole educational reform in secondary schools, instead, they should aim for a strong basic education for all pupils.¹⁵⁸ On the part of higher education, the increasing relationship between industry and university is accepted as an opportunity to train researchers while assisting financially the facilities of higher education institutes.¹⁵⁹ The report suggests an expansion of higher education systems and a reformation of training methods towards producing research workers.¹⁶⁰ The last section deals with researchers in

¹⁵⁴ OEEC, *The Organisation of Applied Research in Europe, Project No. 191: Proceedings of the Conference held at Nancy, 11th-13th October 1954*, (OEEC, 1955).

¹⁵⁵ M/M(53)3, OEEC Manpower Committee – Summary Record of Proceedings at the 21st Session held in Paris, 7th-10th July 1953, 7.

¹⁵⁶ OEEC, *Scientific Manpower for Applied Research*, 8-9.

¹⁵⁷ OEEC, *Scientific Manpower for Applied Research*, 8.

¹⁵⁸ OEEC, *Scientific Manpower for Applied Research*, 15.

¹⁵⁹ OEEC, *Scientific Manpower for Applied Research*, 17.

¹⁶⁰ OEEC, *Scientific Manpower for Applied Research*, 17-18.

applied research organizations making suggestions such as refresher courses for older researchers, the technical staff that deals with regular activities, and the employment of women.¹⁶¹

EPA's activities on research policy lay out the basis for later developments of the organizational field of science policy: research for economic development, university-industry relations, scientific manpower, and government allocation of resources to research and its evaluation. These problems will continue throughout the formation of science policy concepts even in our times. The emphasis on applied research will be replaced with refined elaborations of different types of research in universities, research organizations, and industry. The OECD's main task will focus on this issue. In the meantime, NATO will provide the political reasoning for further expansion of the organizational field, as now the issue is the possibility of Soviet superiority in science. These transformations are the first steps to the institutionalization of the organizational field of science policy. The earlier concerns over national defense, and economic and social welfare now become default issues for national policies.

2.3.2. OECD and the Directorate for Scientific Affairs: Evaluating Research

During its reorganization, the OECD set up a directorate for undertaking the EPA and OEEC committees' work on research and science policy. The first step was the Wilgress report, prepared by a former Canadian Ambassador to NATO and OEEC. The report suggested combining the Committee for Applied Research and the Committee for Scientific and Technical Personnel under a joint body.¹⁶² This is accomplished by the establishment of the Directorate for Scientific Affairs (DAS), under the chairmanship of Alexander King. DAS' work consists of ministerial meetings on science, pilot projects for developing countries, reports and conferences but most importantly the evaluation of research via the Frascati Manual. It should be noted that the bulk of these documents, reports, and individual papers on science and research policy have only become meaningful when these reports respond to "a crucial

¹⁶¹ OEEC, *Scientific Manpower for Applied Research*, 21-28. This suggestion on the employment of women comes from NATO reports, as Soviets employ women equally at all levels of scientific organizations.

¹⁶² Committee on Scientific and Technical Personnel was established to take up the scientific manpower surveys. Dana Wilgress. *Co-operation in the Field of Scientific and Technical Research*, (OEEC, 1960). 36-37.

problem” perceived by the heads of governments. Thus, the Wilgress report is one of them, prepared when NATO demanded further international cooperation on scientific affairs following the problems of scientific manpower, the launch of Sputnik by the Soviet Union in 1957, and the formation of NATO’s Science Committee. The Wilgress report combines these concerns and translates them into the European context. It does not include, for example, statistical data, rather it pursues urging the heads of governments to take measures about science policy. The report’s rationale as Wilgress writes:

1. To discuss with Government authorities as well as with senior representatives of national administrations, science and industry, measures already taken or planned to intensify the scientific and technical resources of each Member country.
2. To make those in high authority aware of the importance which scientific research and technological development is likely to have on the future economy.
3. To propose measures on the national or international level to increase technological resources and to favour the establishment of common action for more rational use.¹⁶³

Willgress’ report consists of urgencies against the rise of the United States and the USSR while depicting the European situation as alarming:

This is an attitude the European countries no longer can afford to adopt. Each European country has an interest in assuring that Western Europe as a whole does not fall behind in the race for scientific advance between North America on the one hand and Russia and China on the other.¹⁶⁴

Thus, Wilgress’ report is more of a political statement rather than a technical report insisting on international cooperation. The rest of the report documented the need to cooperate with the scientific bodies of international organizations, namely OEEC’s Committee for Scientific Research and NATO’s newly established Science Committee. The report pointed out other problems such as manpower, organization of research, the expansion of higher education facilities, and annual measurement of research efforts to keep track of scientific and economic development. As indicated

¹⁶³ Wilgress, *Co-operation in Scientific and Technical Research*, (OEEC, 1960), 10.

¹⁶⁴ Wilgress, *Co-operation in Scientific and Technical Research*, 12.

before, the report is important because it is presented to the heads of governments at the Council of Europe, as the published version of the Wilgress Report includes speeches given by Quintin Hogg (Lord Hailsham) of Britain and Ole Bjorn Kraft of Denmark.¹⁶⁵

DAS activity was developed in the same manner, aiming to influence government officials at the top through three ministerial conferences on science, organized in 1963, 1966, and 1968. The Directorate and an *Ad Hoc* Group on Science Policy prepared the agenda of these conferences. Several background papers were prepared by the DAS and Ad Hoc Group for the conferences. The report titled *Science and the Policies of Government* discusses the general trend, as the Preparatory Committee accepted the themes as “National Science Policy”, “International Science Policy” and “Science Policy and Economic Growth”.¹⁶⁶ The report collects views and presents them in a general manner issued by delegates’ special papers on these themes. *Ad Hoc* Group consists of names such as Pierre Piganiol, Robert Major, and Pierre Auger, who can be met in almost every DAS committee. One of the members of the group was Theodore W. Schultz, a famous American economist of Human Capital Theory. The other background paper is prepared by the working group on R&D statistics. This report, *Science, Economic Growth and Government Policies* is prepared by the expert group including, Christopher Freeman¹⁶⁷, Raymond Poignant, and Ingvar Svenilson. This second report was the culmination of the meeting held in Frascati for methods to evaluate national science policies. In these times, it was popular that the idea of economic development is dependent not only on capital improvement and efficiency of production via technology but also related to “residual factors”, such as investment in education and science as approximately % 50 percent of economic growth depends on these factors. The report, *Science, Economic Growth and Government Policies* opens with this discussion on residual factors and Keynesian revolution in economics. It also introduces the famous indicator GERD, gross domestic expenditure on R&D

¹⁶⁵ Wilgress, *Co-operation in Scientific and Technical Research*, 39-45.

¹⁶⁶ DAS/CMS/63.1 “Annex B”, 5-6.

¹⁶⁷ Christopher Freeman was the pioneer of the studies on the evaluation of R&D statistics and the Frascati Manual. He was also PhD supervisor to Ergun Türkcan, TUBITAK’s Science Policy Unit’s one of the first policy experts. In a video, Freeman discusses John Desmond Bernal’s influence on science policy, and his first encounter with Bernal’s courses on the social function of science when he was a student at London School of Economics in the same year Bernal published his famous book. See the video here: <http://vega.org.uk/video/programme/86>

with a graph comparing countries' research expenditure at the top, the United States with %3, and at the bottom, India with almost %0.2 from 1950 to 1961.¹⁶⁸ The first section of the report is dedicated to these measurement methods that were later appropriated in the Frascati family of manuals. The second section of the report repeats the early statements of OEEC publications such as cooperation, the multiple science policies at different levels, concrete examples of expenditure on applied research but also the importance of fundamental research, and so on. The most important aspect of the report is that it singles out R&D activities from the rest of the types of research activities. The authors state that, for example, "R & D as at present measured is not of course synonymous with what is generally understood by "advance of knowledge" concerning the discussion on the statistics and measurement methods.¹⁶⁹ This is a common theme of evaluation methods, developed with OECD Frascati manuals, as Godin suggests that the problem was the boundaries between what is research and non-research, defining R&D and fundamental research, and non-research such as are routine activities of research organizations testing and calibration, and teaching in general.¹⁷⁰ This problem of evaluation of research activities for a "solid national research policy" continued for further elaboration of Frascati Manuals throughout the years of singling out R&D from other types of research as Godin points out.¹⁷¹

The taxonomy problem will be apparent in the following background papers for the Second Ministerial Conference on Science, as the paper, *Government and Allocation of Resources to Science*, now proposes different types of fundamental research to make resource allocation in terms of different levels of scientific departments with respect to different levels of authority. For example, the report distinguishes programmatic fundamental research and establishment fundamental research as the former consists

¹⁶⁸ OECD, *Science, Economic Growth and Government Policies*, (OECD, 1963), 21-22. This report is also the first OECD publication that mentions innovation, as a distinct concept at least to my knowledge, defining characteristics of a research-intensive industry. Godin identifies the system approach as the originator and further development of National Innovation Systems in 1990s by Freeman and Lundvall, while mentioning early NSF studies of measurement of technological innovation. See Benoit Godin, "National Innovation System. The System Approach in Historical Perspective", *Project on the History and Sociology of STI Statistics, Working Paper No. 36*. (2001): 21. Retrieved from https://www.csiic.ca/PDF/Godin_36.pdf on 24th April 2024.

¹⁶⁹ OECD, *Science, Economic Growth and Government Policies*.

¹⁷⁰ Godin. "The Making of Statistical Standards: The OECD and the Frascati Manual, 1962-2002", 15.

¹⁷¹ Godin. "The Making of Statistical Standards: The OECD and the Frascati Manual, 1962-2002" as Godin cites FM (1981), on page 13. He also shows that OECD appropriated the concept of innovation as the equivalent of R&D in the same page.

of “big science” type of research while the latter is simply academic research.¹⁷² These distinctions are present in other contexts as well, such as oriented research or *drigé* research which can be found in the debates, for example, at the Advisory Committee of TUBITAK. As discussed earlier, these descriptions refer to a process between governments and science systems. DAS and OECD’s work, in this sense, represents the institutionalization of earlier developments concerning science, military, governments, and industry as an organizational field. As the first background paper on economic growth prepared by the Freeman group suggests at the end of the report:

This kind of long-term programming for science and technology has been farther advanced in military applications and in certain aspects of public policy than in industry. The relevant methodologies - operational research, systems analysis, technological forecasting - bring together the knowledge of several disciplines, such as natural sciences, social sciences, management sciences, and enable us to construct qualitative and quantitative models of a variety of possible systems. Modern aids, such as computers, facilitate the making of choices designed to improve the system of, say, transportation or communication for the future from the economic, social and technological viewpoints. There is no reason why these methodologies, developed for military purposes but already used with success in such fields as communication and energy, could not be adapted to the needs of civilian industrial technology.¹⁷³

As the quote suggests, the early impetus on productivity and applied research, as well as the methods of operational research and management techniques, now is translated as economic growth and the quantification of research activities in a holistic national science policy.

2.3.3. NATO and the AGARD: The Impact of Operational Research

NATO’s influence on the Turkish context is much more important than OEEC/OECD in the mid-1950s. This can be explained by the direct effect of NATO on the organization of the army, for example, cataloguing inventory following NATO

¹⁷² OECD, *Government and the Allocation of Resources to Science*, (OECD, 1966), 17. This expert group also includes Freeman, but also Harvey Brooks from Harvard University, Dean of the Faculty of Engineering and Applied Physics who will prepare the 1971 report, *Science, Growth and Society*, which is also known as *the Brooks Report*.

¹⁷³ OECD, *Science, Economic Growth and Government Policies*, 73.

standards, modernization of weapons, and the spread of operational research. Historically speaking, the Turkish context was always very responsive to military technological developments. One of the foundational questions of Turkish modernization has its origins in the perception of defeatism amongst the Ottoman military cadre against the West. For example, the roots of Istanbul Technical University go back to the establishment of the Imperial School of Naval Engineering (Mühendishane-i Bahr-i Hümayûn) in 1773. Accordingly, Turkey's NATO membership has had direct effects on the establishment of research bodies in Turkish General Staff. In 1954, a department on research and development (İlmi İstışare Araştırma Kurulu Müdürlüğü) was established. In 1958, this department was named as Department of Research and Development (Araştırma Geliştirme Daire Başkanlığı - AR-GE)¹⁷⁴. In 1959, a coordinating research council, the Advisory Board of Scientific Research (İlmi İstışare ve Araştırma Kurulu - İLAR) was established under the Ministry of National Defense, and AR-GE became its secretariat. From the very beginning, these developments correspond to NATO research bodies, especially the Advisory Group for Aerospace Research and Development (AGARD). NATO's civil research organization, Science Committee was established in 1958. A similar research body like AGARD was already present amongst the cadre of the U.S. Air Force, and it was established in 1952 as a NATO research body dedicated to the study of aeronautics.

Aeronautics is a discipline that studies the behavior of objects under the pressure of air, rapid movements of these objects, and surface materials. The infamous wind tunnels, similar to the Ankara Wind Tunnel that began to be constructed in the 1940s and finished in 1950, are established in several countries to study this specific discipline. Thus, the establishment of AGARD is connected with a prominent aeronautics scientist, Theodore von Karman. Von Karman was already a renowned scientist in his field during the time, as the authors of *Science in War* recall the political oppression of the Nazis made him flee away to America.¹⁷⁵ In the United States, von Karman was appointed to establish the California Institute of Technology's

¹⁷⁴ R&D in Turkish.

¹⁷⁵ Anonymous, *Science in War*, 26.

aeronautics courses and Guggenheim Aeronautics Laboratory.¹⁷⁶ Under a committee of the National Academy of Sciences established in 1938, von Karman directed the Jet Propulsion Laboratory for the U.S. Army.¹⁷⁷ He became a permanent consultant to the U.S. Air Force beginning in 1939.¹⁷⁸ He served as the chairman of the Scientific Advisory Board to the Chief of Staff of the U.S. Air Force until 1954.¹⁷⁹

AGARD was established under the NATO Research and Development Committee's verdict to continue these studies on an international scale.¹⁸⁰ It is safe to assume that Americans saw aeronautical research as a strategic scientific area that should be supervised via an international research body, similar to nuclear sciences and the development of the atomic bomb, which led to the clash between France and the United States later in 1966, withdrawal of the French from NATO, and the relocation of NATO headquarters in Brussels from Paris. AGARD's mission was as follows:

- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Exchange of scientific and technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field.¹⁸¹

¹⁷⁶ See for a detailed biography of von Karman: S. Goldstein, "Theodore von Karman, 1881-1963", *Royal Society: Biographical Memoirs of Fellows of the Royal Society* 12, (1966): 340-341.

¹⁷⁷ Goldstein, "Theodore von Karman, 1881-1963", 342

¹⁷⁸ Goldstein, "Theodore von Karman, 1881-1963", 343.

¹⁷⁹ Goldstein, "Theodore von Karman, 1881-1963", p. 343. See also chapter 1 in NATO Research and Technology Organization, *The AGARD History 1952-1997*, (ed.) Jan Van der Blik, (SPS Communications, 1999).

¹⁸⁰ NATO RTO, *The AGARD History 1952-1997*, 2-2.

¹⁸¹ NATO RTO, *The AGARD History 1952-1997*, iv.

AGARD held its first meeting in 1952 with its delegates from member countries. Turkish delegate was Air Lieutenant Colonel Fuat Uluğ. There is little information about Fuat Uluğ, despite his lifetime delegation to AGARD¹⁸² between 1952-1969, and his influence on the establishment of the research and development department at Turkish General Staff, and later the establishment of ILAR.¹⁸³ Born in Istanbul in 1908, Uluğ graduated from Naval Academy in 1927. He must be one of the students sent abroad to study, in the early years of the Republic as he got his degree from Technische Hochschule Berlin in 1936. He worked at Kayseri Airplane Factory and was a liaison officer in Cairo during the Second World War. He is mentioned as the head of the purchasing committee in London.¹⁸⁴ This must be related to the delivery of warplanes bought from the United Kingdom in 1942¹⁸⁵, for which, he was issued a private passport.¹⁸⁶ His MSc in Aeronautical engineering must be from Technische Hochschule Berlin. Because of his qualifications, he was appointed as a technical consultant to Permanent Turkish Delegates to NATO, and as a delegate to AGARD, from the establishment of AGARD in 1952 to Uluğ's death in 1969. As Omay indicates, it was the reason that Uluğ and von Karman developed close relations through AGARD, that led to the establishment of the R&D department at Turkish General Staff, right after von Karman visited Turkey, the General Staff in 1954.¹⁸⁷

¹⁸² As AGARD operated through panel studies such as Flight Mechanics Panel between 1954-1959, Fluid Dynamics Panel between 1955-1963, Structures and Materials Panel between 1956-1957, and Technical Information Panel between 1954-1957. See his name in the Annex of The AGARD History, p. A5-12, A5-14, A5-25, A5-27.

¹⁸³ Cezmi Güner Omay, *Ankara Üniversitesi Gözlemevi'nin Kurucusu ve Eğitim Gönüllüsü Prof. Dr. Egbert Adriaan Kreiken*, (Bilim ve Teknik Araştırma Vakfı 2011), 12. Omay tells that the establishment of Ankara University Observatory is carried out by NATO's support through Mutual Weapons Development Programme (MWDP). Omay himself was probably part of the early studies of Turkish General Staff R&D department as he was also the first students of Kreiken, the Dutch scientist who Omay dedicated this book. He cites another study on research activities at Turkish General Staff when he mentions Uluğ's name, published by General Staff. However, I could not reach this Omay study and his other book on operational research in Turkish military.

¹⁸⁴ These biographical informations are collected from *Who's Who in Turkey 1958*. Afşin Oktay (ed.), (Kültür Matbaası 1958), a newspaper column about his death and his relatives' obituary notice. See, Cumhuriyet Gazetesi. (4 March 1969), page 5 and Cumhuriyet Gazetesi. (6 March 1969), page 3. From these newspaper columns, we learn that he is also brother to Naşit Hakkı Uluğ, a member of parliament for the Republican People's Party between 1931-1939.

¹⁸⁵ Başbakanlık, Kararlar Dairesi, Karar No. 2-19354.

¹⁸⁶ Başbakanlık, Kararlar Dairesi, Karar No. 2-19467.

¹⁸⁷ Omay, *Ankara Üniversitesi Gözlemevi'nin Kurucusu ve Eğitim Gönüllüsü Prof. Dr. Egbert Adriaan Kreiken*, p. 12. A paper published online for AviationTurkey by Emir Öngüner on von Karman's visit to Turkey in 1955 with documents from the Karman's personal archives at CalTech and Turkish Newspapers. As Omay gives an exact date, 19th of August 1954, this must be the second visit of Karman to Turkey or Omay recalls the incident incorrectly. See Emir Öngüner, "Theodore von Karman's Visit to Turkey in 1955 and Its Reflections on Local Press - Part 1", (2020). retrieved from: <https://www.aviationturkey.com/files/news/5f763d033c9df.pdf> on 20th August, 2024. For the Part II: <https://www.aviationturkey.com/en/content/theodore-von-karman-s-visit-to-turkey-in-1955-and-its->

From the newspapers, Karman's visit was probably related to the construction of an underground hangar for the deployment of nuclear bombs at Incirlik Base.¹⁸⁸

By the Third General Assembly held in 1953 in London, AGARD was influential in spreading operational research methods to other NATO members, as Karman himself also was very interested in that matter.¹⁸⁹ In the fifth assembly, it was decided to expand AGARD's activities in the field as the scientific adviser to the Supreme Allied Commander of Europe (SACEUR), H. P. Robertson suggested.¹⁹⁰ In 1957, AGARD organized a conference on operational research, which the proceedings published as a book. In the opening of the book, General Lauris Norstad (SACEUR) writes:

Operational Research, by revealing methods for more effective utilisation of our manpower, our skills, our material and other resources, is making a significant contribution to the military potential of the Atlantic Alliance. This is of utmost importance, for our strength depends not alone on what we have but to a large extent on what we do with what we have. I am gratified, also, by the promise these new techniques offer for application in non-military fields. They should serve to stimulate and strengthen the economies of the NATO nations. As a military commander, and as a citizen of the Atlantic community, I welcome publication of this book.¹⁹¹

At the time, the Turkish military, probably Fuat Uluğ himself, requested special consultancy from NATO about operational research methods.¹⁹² After the operational research conference, the AGARD book indicates that "a Turkish Operational Research Group is established for the first time".¹⁹³ This special consultancy was accomplished via AGARD's Consultant and Exchange Programme and this consultant must be Glen

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515#:~:text=von%20Karman%20came%20to%20Turkey,to%20Soviet%20Russian%20industrial%20centers.

¹⁸⁸ Cumhuriyet Gazetesi. (13 January 1955) "Türkiye'de Muazzam Bir Yeraltı Hava Üssü Kurulacak". 1 & 7. The column mentions the deployment of atom and hydrogen bombs, and the rising strategic importance of Turkey because the country is forefront to Soviet Russia.

¹⁸⁹ NATO RTO, *The AGARD History*, 3-6.

¹⁹⁰ NATO RTO, *The AGARD History*, 3-10.

¹⁹¹ NATO RTO, *The AGARD History*, 3-13. Lauris Norstad, fourth Supreme Allied Commander of Europe to NATO himself participated the making of bombing strategies via operational research by Solly Zuckerman during the War, 1941 when he was colonel. See Zuckerman, *From Apes to Warlords*. Beginning with the page 173.

¹⁹² NATO RTO, *The AGARD History*, 3-12.

¹⁹³ NATO RTO, *The AGARD History*, 3-15.

D. Camp. In a letter to the Journal of *American Operations Research Society* (ORSA), Glen D. Camp writes:

Large strides in engineering and science have been one of the products of modernization program started in Turkey by Ataturk. [...] About 18 months ago, this program significantly advanced by the formation of the Turkish General Staff Operations Research Group, with NATO advice and assistance. Originally staffed by about a dozen young reserve officers...permanent civilian engineers and scientists are now being added. Meanwhile, ‘graduates’ of the TSG-ORG are joining other civilians in the application of OR to nonmilitary problems in the economic ministries and in industry, again with NATO advice and assistance.¹⁹⁴

Camp continues his letter by crediting Uluğ’s “vision” and contributions. He mentions his consultancy to Turkey via NATO missions in 1956 and 1958 for the military and non-military applications of operational research, and in his letter, he asks for ORSA members to send their studies’ copies, if possible with extras, to Uluğ’s office in Ankara, to the directorate of Scientific Advisory and Development Board at Turkish General Staff. Glen D. Camp was also Halim Doğrusöz’s PhD advisor, who would be the founder of the Operational Research Unit at TUBITAK, a graduate programme for operational research at METU, right before the relocation of the Unit from METU to MSIRI’s campus at Gebze in 1970.¹⁹⁵ From the limited testimony of Doğrusöz, it is not clear whether Camp’s words on the “graduates of the TGS-ORG” include Doğrusöz or not.¹⁹⁶ However, both Süleyman Demirel and Turgut Özal were appointed

¹⁹⁴ Glen D. Camp. “Letter to the Editor – Literature to Turkey”, *Operations Research* 6, no. 1, (1958): 131-132. Another letter to ORSA by Thornton Page on the studies of OR at NATO mentions Glen Camp as a Melpar consultant during the NATO special missions to Greece, Italy, and Turkey, as Page himself, one of the practitioners. Melpar was a private contractor to US Army in several areas including high technology devices and radars. The only valid information I found on the company is the Wikipedia page of Melpar: see: <https://en.wikipedia.org/wiki/Melpar> Retrieved on 6th September 2024. For Page’s letter, see: Thornton Page, “Letter to the Editor – Military Operations Research in NATO”, *Operations Research* 4, No. 4, (1956): 482-484.

¹⁹⁵ Doğrusöz’s contributions are not limited to operational research and industrial engineering. He was both influential in both METU and TUBITAK’s later developments. Additionally, he was one of the members of the Military research council, İLAR, between 1968-1991. Doğrusöz’ operational research unit and his other impact will be more important in the following sections, as this unit will produce research that will demarcate the boundaries of the academic logic of TUBITAK towards a more policy-oriented logic.

¹⁹⁶ Halim Doğrusöz, *Yöneylem Araştırması Serüvenim*, (Yöneylem Araştırma Derneği, 2009), 13.

to the Turkish General Staff's R&D department, while they were only visiting it to get their paychecks, continuing their work at ministries.¹⁹⁷

NATO Science Committee was established in 1958. It was the culmination of events that NATO authorities decided to expand cooperation in non-military fields. The extent of supervision of the Committee over AGARD must be limited. I will discuss the Science Committee's story in detail in the chapter dealing with the problem of scientific manpower. In contrast to the Science Committee's cooperative role in civilian fields, AGARD was part of defense research programmes of NATO, such as the Mutual Weapons Development Programme (MWDP), Training Centre in Experimental Aerodynamics in Brussels, and Panels that related to aircraft production and design. AGARD was also influential in the Science for Stability Programme that aimed to support solely developing countries of NATO: Turkey, Greece, and Portugal in 1979. Both AGARD and the Science Committee developed programmes for exchanges and fellowships, but Science for Stability Programme contributed directly to research projects developed in corresponding countries, as in Turkey's case, it was allocated to MSIRI. This programme was thought to be related to Nimet Özdaş's efforts as he served in NATO research bodies between 1973-1979, at the Science Committee itself, the Committee on the Challenges of Modern Societies, and the AGARD.

The information about the department established at Turkish General Staff is again quite limited. However, the continuity of the connections between NATO, the Scientific Advisory Board of General Staff, and TUBITAK officials suggest a strong pattern about the preferences of the military and government and Özdaş and Doğrusöz's influence on the transformation of TUBITAK. Furthermore, the activities Scientific Advisory Board (which will be AR-GE later) and ILAR must also have been influential in shaping civil government officials' ideas about what science policy consists of and what is research and development. As will be seen, the first research

¹⁹⁷ Mehmet Karavelioğlu, *50 Yıl Karavana*, (Çukurova Üniversitesi Basımevi, Unknown), 303. As a military official, Karavelioğlu was a teacher in the army. He was appointed to AR-GE via his connections as Karavelioğlu was Cahit Arf's student during his BA, and Ratip Berker was the chairman of ILAR at the time being. Later Karavelioğlu worked for TUBITAK as well. The book is maybe the most detailed account of AR-GE, but not in a systematic way, as it is only Karavelioğlu's autobiography. See page 297.

activities at AR-GE involved, for example, an electronics lab. A few years later, the State Planning Organization (SPO) identified one of its objectives to establish an electronics sector in the 1960s.

2.3.4. AR-GE of Turkish General Staff, and the ILAR

Turkish General Staff's R&D department was established in 1954, as mentioned before. Although archival material is limited in the department, we learn that it was renamed as Scientific Advisory and Development Board (İLGE) in 1957, while the provisions of the establishment of the Advisory Council (İLAR) under the Ministry of National Defense. This department's name became AR-GE¹⁹⁸, an office for research and development.¹⁹⁹ After the establishment of ILAR in 1959, AR-GE became its executive branch and secretariat. It is known that AR-GE published a series of magazines, which was called *AR-GE Bulletin* itself. In the mid-1950s, after Uluğ's initiation, it is also clear that the department translated and published some of the NATO Defense College courses, AGARD Panel papers, some operational research courses, and a catalogue of Turkish civilian scientists.

The first publication must be H. P. Robertson's conference at NATO Defense College titled *The Impact of Science on Military Thought, Organization and Operations* delivered in 1954 and translated into Turkish in 1956. The first pages of this small booklet include the order of the Chief of Staff to the Scientific Advisory Board, about the publication of SACEUR's Science Advisor Robertson's conference and its distribution to relevant departments. Robertson was one of the pioneers of OR methods' transfer to the United States, due to his experience in Britain during WWII.²⁰⁰ He also continuously served in the American Military, especially in OR units, one of the largest ones such as the Weapons Systems Evaluation Group, which dealt with all three branches of the army's weapon systems. Robertson's conference was to the point of showing the rationale of the government's stake in science concerning its military application. He dedicated a part of his conference to scientific

¹⁹⁸ Abbreviation of R&D in Turkish, i.e. "Araştırma-Geliştirme". İLGE refers "ilim", the older Turkish version of science.

¹⁹⁹ A brief history of AR-GE can be found in a brochure prepared to introduce the department. See: Milli Savunma Bakanlığı, AR-GE Başkanlığı, *Tanıtım Broşürü*, (Ongun Kardeşler Matbaası, 1966). I will return to this brochure in the following sections.

²⁰⁰ M. Fortun et al, "Scientists and the Legacy of World War II", 603. Zuckerman also mentions his close friendship after Robertson's visit in 1941 to Britain. See Zuckerman, *From Apes to Warlords*, 129.

progress, the technical opportunities it served, and why it was crucial to prevent the delays of the military applications of science.²⁰¹ He gives examples of how science and technical progress were accelerated under emergency times as the “spur of the moment”, recalling the WWII experiences asked, “should we wait to work, until the feeling of the spur of the moment?”²⁰² In his speech, he proceeds to give examples of early physics studies that had foreseen the development of radar, and the failure to apply it before the Japanese attacks on Pearl Harbor.²⁰³ Throughout his conference, he gives examples of contract research that bring American research universities and professors together, such as the Hartwell project for anti-submarine research.²⁰⁴ He also details information about the OR units in the American Army and contracts between the military and universities, such as the cooperation between the Armed Forces and Johns Hopkins University about the impact of atom bombs on the organization of the army, U.S. Navy’s contract to Massachusetts Institute of Technology (MIT), and the RAND Corporation, developed under a contract as a non-profit consultancy corporation for the U.S. Air Force, as one of the largest OR studies.²⁰⁵

The other translation of AR-GE was Glen D. Camp’s course on operational research published in 1957. This must be the special NATO mission of Camp to Turkey, which he addressed in his letter to the ORSA journal on operational research and its military applications. In this booklet, Camp discusses OR's application to other disciplines such as business management, industrial engineering, and systems engineering.²⁰⁶ The book gives clear definitions of operations indicating that they can be carried in any kind of area, as they all share a structure and similarities between these structures which can be operationalized through imaginative and mathematical models.²⁰⁷ On these definitions, Camp indicates the principles of OR as:

²⁰¹ H. P. Robertson, *Askeri Düşünce, Organizasyon ve İlmin Harekate Nüfuzu*, (E.U. Basımevi, 1956), 8.

²⁰² H. P. Robertson, *Askeri Düşünce, Organizasyon ve İlmin Harekate Nüfuzu*, 9. In Turkish: “‘Mutlak ihtiyacın mahmuzu’ ile hakikaten böyle bir sürat elde edilebildiğine göre, işe başlamak için harbin sıcak nefesini üzerimizde hissedinceye kadar beklemeli miyiz?”

²⁰³ H. P. Robertson, *Askeri Düşünce, Organizasyon ve İlmin Harekate Nüfuzu*, 10.

²⁰⁴ H. P. Robertson, *Askeri Düşünce, Organizasyon ve İlmin Harekate Nüfuzu*, 12.

²⁰⁵ H. P. Robertson, *Askeri Düşünce, Organizasyon ve İlmin Harekate Nüfuzu*, 17-18.

²⁰⁶ Glen D. Camp, *Harekat Araştırması: Genelleştirilmiş Strateji ve Taktik İlmi*, from the series of E. U. Rs. İlmi İstişare ve Geliştirme Kurulu Başkanlığı, (E.U. Basımevi, 1957), 2-3.

²⁰⁷ Glen D. Camp, *Harekat Araştırması: Genelleştirilmiş Strateji ve Taktik İlmi*, 8-9.

1)As all operations have structures, they are subject to systemic quantitative laws. These laws can be discovered with the same general methods of physicists who study the behavior of atoms. 2) Because of the similarities of structures of operations, a private study of an operation may also help other operational studies. Thus, an operational research unit which studies a special problem for prolonged time, may reach valuable results very quickly even without any experience in the area.²⁰⁸

This perceived characteristic of OR, the similarities of operations of any kind, is the reason that OR became very influential in management education and systems engineering i.e. the quantification of administrative functions. It must be perceived as a very special set of methods, which Camp even mentions some of the mathematical models are not published due to commercial and military interests. The quote above shows that OR is appropriated as a specific interpretation of logical positivism, quantification of operational mechanisms, and discovering the universal laws of their structure similar to physics. Thus, OR became a dedicated area at AR-GE through AGARD and special NATO missions.²⁰⁹

In the same year of ILAR's provision, before its establishment, AR-GE published a Scientific directory of Turkish Civilian Scientists in 1957. As the General Staff's and Ministry of National Defense's order indicated, this directory was prepared to maintain the Ministry's "rationalization through scientific cooperation", as the directory compiled Turkish scientists' names to be addressed in the possibility of cooperation.²¹⁰ Fuat Uluğ had written a preface to the directory. He stated the value of the directory and announced that the directory would be developed with new names in terms of the National Library's taxonomy of scientific areas. The directory consists of three general

²⁰⁸ In Turkish, it is translated as structure but can also be translated as patterns: "1) Bir yapıları olduğundan hareketlar, sistemli kantitatif kanunlara uyarlar. 2) Sık sık mevcut olan yapı benzerliği dolayısıyla, bir hareketin tetkikinden elde edilen bilgi diğerlerinin etüdünde de işe yarar." And it continues "Böylece, özel bir harekât alanında uzun zaman çalışmış şahıslardan mürekkep bir hareket araştırma tim'inin, daha evvelden hiç tecrübeye sahip olmadığı bir hareket alanında dahi çok kısa zamanda kıymetli neticeler elde etmesi mümkündür." Glen D. Camp. *Harekat Araştırması: Genelleştirilmiş Strateji ve Taktik İlmi*, 11-12.

²⁰⁹ Thornton Page also mentions Uluğ's "vision" as an "ardent student of OR", See: Page, "Military Operations Research at NATO", 482.

²¹⁰ In the first pages of the directory, "No. 9901.10-2 57. Subject: Directory of Turkish Civilian Scientists. Turkish General Staff – Scientific Advisory and Development Board, Signed by the Deputy Minister Şem'i Ergin" See: Milli Savunma Bakanlığı, *Türk Sivil İlim Adamları Rehberi*, (E.U. Basımevi, 1957).

areas, namely physical sciences, biological sciences, and sociological sciences. It represents an earlier form of TUBITAK's publication of *Catalogue of Turkish Scientists* published in four volumes.²¹¹

2.3.5. AR-GE Activities

One of the key publications highlighting the Turkish Military's research and development efforts is a promotional brochure from 1966. At that time, Brigadier General Enver Demokan, an engineer with a master's degree, was the chairman of the department. This brochure outlined what AR-GE does, its brief history, how it was organized, personnel numbers, budget, and its research projects. This brochure also introduced the idea of collaboration between military and university professors as a type of contract research in several projects. The brochure defined the main tasks that AR-GE is responsible:

For developing and rationalizing National Defense activities in the light of science and technology:

- a. To make scientific and technological proposals to the Ministry of National Defense and the Chief of General Staff in order to determine defense research and development policies and fields of activity,
- b. In order to realize this policy and field of activity and to ensure innovations and developments that will increase the combat capability of the Armed Forces, to collect problems related to research and development from the Force Commands and to conduct research on all kinds of weapons, vehicles, equipment and ammunition,
- c. To encourage, coordinate and control the scientific effort within the Ministry of National Defense in close cooperation with the Ministry of National Defense and the Planning, Program and Coordination Groups and Departments of the General Staff and the Technical Departments of the Force Commands,
- d. To encourage universities and other institutions to increase interest in defense research and to direct some of their scientific capabilities for the benefit of the Armed Forces by giving them projects.
- e. To solve the problems of the Armed Forces concerning the weapons evaluation, supply and organization via the methods operations research,

²¹¹ TÜBİTAK Bilim Politikası Ünitesi, *Türk Bilim Adamları Katalogu, Cilt I-II-III-IV*, (TÜBİTAK Yayınları, 1981).

- f. To investigate the principles of increasing and developing the defense manpower,
- g. To conduct research on nutrition and food issues and to investigate ways to increase the combat power of the Armed Forces,
- h. To classify and identify non-aid and national vice material according to NATO Cataloguing principles,
- i. To determine, in cooperation with the Force Commands, the issues to be submitted to the examination of the Scientific Advisory and Research Board (ILAR) of the Ministry of National Defense, which was established in accordance with Act 7279, to act as the General Secretary of the Board in meetings and to present the results of the decisions taken to the Ministry of National Defense and the Chief of General Staff.²¹²

It is understood that AR-GE was small in scale with a budget of 1 Million Turkish Liras to 2,5 Million Turkish Liras²¹³, and reinforced with reserve officers, which Süleyman Demirel and Turgut Özal were one of them, as it was not functioning with full capacity, despite the organizational chart consists of various departments and laboratories. Under the directorate, there were an operational research unit, manpower research unit, documentation services, and cataloguing unit.²¹⁴ Biological and chemical war research laboratories were established in 1962.²¹⁵ In the same year, the Nutrition Institute was attached to the directorate. The chart is too large to put in here, but the laboratories consist of an instrumental chemical laboratory, a weapon research laboratory, a full range of biological and chemical research labs, electronics, aerodynamics, materials research, and guided missile research laboratories.²¹⁶ The electronics laboratory, for example, was mentioned in the brochure as producing prototypes of radio communication devices and researching possibilities of mining quartz crystal in Turkey, which is widely used in electronic circuits and radio devices. In collaboration with various laboratories, at the time being, AR-GE has had research on guided missiles, proper materials for components, attack boats, and an amphibious landing craft which was one of the research projects that was directed by a university

²¹² Milli Savunma Bakanlığı, AR-GE Başkanlığı, *Tanıtım Broşürü*, 2

²¹³ Milli Savunma Bakanlığı, AR-GE, *Tanıtım Broşürü*, 10. The department cites NATO Science Committee's call on increasing the expenditure on R&D by %1-%15 percent of National Defense budgets, see NATO Defense Research Directors' document: C-M(59)10, p. 11

²¹⁴ Milli Savunma Bakanlığı, AR-GE, *Tanıtım Broşürü*, 6.

²¹⁵ Milli Savunma Bakanlığı, AR-GE, *Tanıtım Broşürü*, 4.

²¹⁶ Milli Savunma Bakanlığı, AR-GE, *Tanıtım Broşürü*, 10.

professor. Through MWDP, AR-GE established Ahlatlibel Observatory with a contract for 69.500 US Dollars, an Oceanography project for Turkish coastal waters for 470,000 USD, and several other small-scale research projects.

AR-GE's small-scale projects must be influential in deciding TUBITAK's MSIRI research units and institutes. SPO's provisions for the electronics sector are mentioned before. In addition to that, TUBITAK formed a core electronics research unit at METU in 1968, which will be one of the first research institutes of MSIRI. Guided-missile research must also be the foundation of MSIRI's research institute for Guided Device Technologies and Testing Institute (GATÖM) established in 1972, which today operates as a full Defense Industries Research and Development Institute (SAGE – DIRD). Operational Research Unit was formed in 1965 at METU. These developments and direct connections between influential figures of TUBITAK and the military must have been quite influential during the legislation of TUBITAK in 1963.

The consensus on the part of military and bureaucratic cadre shows a clear pattern that TUBITAK was thought to be a quite functional research organization undertaking specifically government research in the construction area for economic growth, through Building Research Institute established in 1969; electronics research, operational research and defense research for establishing research-intensive industries in Turkey. These developments must be important for the military and bureaucratic circles which represent the policy logic that permeates the Council from the very beginning, in contrast to TUBITAK's Science Committee's strong belief in pure science ideals. The legislation process showed a back-and-forth game between these logics. As will be seen, it ended with compromises on the positions of a strong Secretariat but also a Science Committee as quite autonomous as a decision-making organ of TUBITAK.

TUBITAK was established through informal meetings consisting of Colonel Sami Küçük and a group of professors, including Erdal İnönü, Bahattin Baysal, and Cengiz Uluçay. There is some controversy regarding where the original idea to establish a research council came from in the literature. It is also thought that the Ford Foundation's representative in Turkey, Eugene Northrop must be influential in coining the idea. However, as earlier developments indicate, Turkish authorities were already

debating to establish a science policy organization from the early 1950s, as the Ford Foundation Office in Ankara was formed in 1960 with Northrop.

As Kadioğlu suggests and Sami Küçük confirms in his memoir, the professors preferred a research council while Küçük offered to establish a national academy of science which also thought to include social sciences.²¹⁷ During the preparation phase, various government officials, including Süleyman Demirel and Turgut Özal²¹⁸, were involved in shaping the Council's study groups, budgetary and legal autonomy, and its organization under the Prime Ministry rather than other ministries. Kadioğlu also shows that the UNESCO Turkish National Committee.

2.4. PART III - TUBITAK Act at the National Assembly and the Senate of the Republic

Earlier attempts to establish a science council related to the UNESCO National Committee seem to be diverted with the establishment of an R&D department at the military in 1954 and later ILAR in 1959. It was related probably to the military's more direct influence. After the 27th of May Coup in 1960, the military government seemed to have a consensus on various policy fields: the establishment of TUBITAK, SPO, and educational reforms concerning Science High Schools. TUBITAK negotiations began between NUC member Colonel Sami Küçük and the professors after the coup in 1961. During its first year, the military government established a Constituent Assembly. This Assembly legislated Act 91 to form SPO. TUBITAK Act was also thought to be legislated, but the military government limited itself to its rule only for one year to prepare a new constitutional law and led the country to a general election one year after the coup.²¹⁹ This, however, does not mean that the military government lets every legislation process to the elected civil government. A higher representative assembly, the Senate of the Republic was established in 1961. NUC Members were appointed as natural members of this senate, while some of the NUC members were sent to exile which is known as the Event of Fourteens. Some of the NUC members

²¹⁷ Sevtap Kadioğlu. *Türkiye Bilimsel ve Teknik Araştırma Kurumunun (TÜBİTAK) Kuruluşu ve Türk Bilim Hayatındaki Yeri*, 25-33. See also Sami Küçük, *Rumeli'den 27 Mayıs'a: İhtilalin Kaderini Belirleyen Köşk Harekatı*. Mikado Yayınları, (2008): 181.

²¹⁸ This must be the years that Özal and Demirel were reserve officers that were employed by ARGE, but continued their work at bureaucracy, and probably participated in preparing the draft bill.

²¹⁹ Küçük, *Rumeli'den 27 Mayıs'a*. 182-183.

advocated for a longer military rule rather than electing a civil government one year after the Coup. Thus, these fourteen members of the NUC were sent to various countries, such as Alparslan Türkeş to India, and Mustafa Kaplan to Portugal.

In her study, Kadioğlu discusses the legislation process of the TUBITAK Act in length. She interviewed with Sami Küçük. She discusses the earlier informal meetings between Sami Küçük and Erdal İnönü with other professors Cengiz Uluçay and Bahattin Baysal at Küçük's home. According to Kadioğlu, Küçük invited university professors and got their views. As the Constituent Assembly let the civil government take the rule in 1961 as promised by the rest of the NUC members after the incident of 14s, the TUBITAK Act was left to be dealt with by the National Assembly and the Senate of the Republic. Despite her lengthy discussion and interviews, Kadioğlu does not consider the part of the TUBITAK Act, which was thoroughly discussed at the Senate of the Republic. Neither party openly shares their views in their memoirs. Kadioğlu's work takes into account the informal meetings and the role of Ford Foundation representative Northrop, and some of the minor details about the TUBITAK Act but overlooks that TUBITAK Act was significantly changed by the Senate's National Education Commission and Ad Hoc Commission. The parliament records and the discussions held at the Senate represent crucial differences between the positions of the military and the professors. In addition to that, the legislation was interesting not because of the debates that took place at the Senate and the Assembly, but because both draft bills were changed via Commissions. The debates at the Senate and the Assembly, for example, consisted of objections of parliamentarians and senators about the financial status of TUBITAK but did not affect the Act itself, other than spelling errors and grammar checks. As will be seen, the legislation process incorporated the two conflicting logics from the very beginning of TUBITAK's story.

2.4.1. TUBITAK Act at National Assembly

TUBITAK Act No. 278 was presented to the National Assembly on 13th June 1962 as a government bill.²²⁰ This draft bill was sent to National Education Commission, and Budget and Treasury Commissions. This first bill was quite different in terms of defining the duties of TUBITAK. Before any meetings were held on the articles of the

²²⁰ *Millet Meclisi Tutanak Dergisi*, Cilt 5, 13.06.1962, 101. Birleşim, 574.

act at the assembly, Turhan Feyzioğlu, as deputy prime minister, issued a memorandum to give priority to the act and establish an *Ad Hoc* Commission consisting of members from the National Education and Budget and Treasury Commission on 14th November 1962.²²¹ As the deputy prime minister suggested, this was accepted at the Assembly. Sami Küçük recalls the act was sent in two ways as “On the establishment of Scientific and Technical Research Council by Sami Küçük and his 12 Friends”²²² and as a government bill “On the establishment of Scientific and Technical Research Council”. Sami Küçük explains this proposition of two drafts because the government proposals tend to be legislated quickly, that’s why he asked the government to send it separately.²²³

Sami Küçük and his 12 friends’ draft bill was also sent to the Temporary Commission by the National Education Commission on 21st December 1962 as it was the same draft bill.²²⁴ On 18th January 1963, the two drafts were accepted to be legislated as one at the Assembly.²²⁵ Three days later, the Temporary Commission suggested the meetings to be held on the Act before the other works but was not accepted at the Assembly.²²⁶ On 22nd March, the National Assembly decided to hold meetings on the act but did not do so, because the Temporary Commission was not present.²²⁷ Then, on 1st April, the meetings could not be held because this time government members were not present.²²⁸ On 8th April 1963, finally, the draft bill was negotiated at the Assembly.²²⁹ Fethi Ülkü, the chairman of the *Ad Hoc* Commission, explained the reasons for establishing a Research Council and also indicated that a Science High School was also established attached to the council.²³⁰ Some parliamentarians objected to why TUBITAK was exempted from auditing and taxation, but without any significant changes other than

²²¹ *Millet Meclisi Tutanak Dergisi*, Cilt 9, 14.11.1962, 5. Birleşim, 121

²²² This first draft is actually slightly different in Turkish. Sami Küçük’s proposal is in older Turkish as scientific as “ilmi” and council as konsey. The government proposal calls scientific as bilimsel and council as kurum, as in institution.

²²³ Küçük, *Rumeliden 27 Mayıs’a*, 183-184.

²²⁴ *Millet Meclisi Tutanak Dergisi*, Cilt 10, 21.12.1962, 20. Birleşim, 346.

²²⁵ *Millet Meclisi Tutanak Dergisi*, Cilt 11, 18.01.1963, 32. Birleşim, 155.

²²⁶ *Millet Meclisi Tutanak Dergisi*, Cilt 11, 21.01.1963, 33. Birleşim, 220.

²²⁷ *Millet Meclisi Tutanak Dergisi*, Cilt 14, 22.03.1963, 61. Birleşim, 456

²²⁸ *Millet Meclisi Tutanak Dergisi*, Cilt 15, 01.04.1963, 65. Birleşim, 99.

²²⁹ *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim, 128-176

²³⁰ *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim, 180.

spellings, the National Assembly legislated the first version of the TUBITAK Act on the 8th of April.

This first draft bill legislated TUBITAK to be affiliated with the Prime Minister, not the Prime Ministry or the Cabinet as defined in the first article. Its legal entity was designed to be autonomous in terms of its administration and financial matters. The first article and the rest of the articles that specified TUBITAK's affiliation with the Prime Minister, namely the 10th, 11th, and 12th articles specifically kept TUBITAK from being audited and inspected by the country's main auditing organ, the Turkish Court of Accounts (SAYIŞTAY). Instead, TUBITAK was legislated to be inspected by a special inspection committee formed by the Prime Minister, which later submitted its report to a Higher General Inspection Board. The 10th article also defined TUBITAK's position in detail, differentiating it from the other State Enterprises which were regulated by *Act No. 3460*, and refrained the Council from the general procurement law as defined by the *Act. No. 2490*.

Thus, the TUBITAK draft bill uniquely defined the Council to be established. The informal negotiations between the professors, university representatives, military officials, and bureaucrats gave full financial and administrative autonomy. These exclusive articles that the government gave TUBITAK had repercussions both at the National Assembly and later at the Senate of the Republic. However, the main controversy between the Senate and the Assembly was not related to the auditing of the Council as these articles were not changed. In the end, TUBITAK is legislated as a fully autonomous organization.

During its legislation on the 8th of April, the *Ad Hoc* Commission made some changes such as adding the Scientific and Technical Research Council "of Turkey" and correcting some grammar and spelling errors. It also specified the qualities of the Secretary-General to be elected by the Science Committee as a person experienced in technical sciences in Article 4, subclause 4th, which defined the election process of the Science Committee and Secretary General. *Ad Hoc* Commission made another important rearrangement about the specific article that defined the status and duties of the Secretary-General in *Article 6*. The Government bill authorized the Science Committee to elect a Secretary-General without any higher approval. However, the Temporary Commission rearranged the appointment of the Science Committee's

candidate for Secretary General so that both the Prime Minister and the President of the Republic could approve. This rearrangement was important in representing the distinct views between the government's position and the professors as the First Secretary General, Mehmet Nimet Özdaş, would handle the later transformations of the Council. As I mentioned earlier, these distinctions are not explicitly discussed by both Erdal İnönü and Sami Küçük in their memoirs. However, this rearrangement and later Senate's intervention suggest that contradicting *institutional logics* had been inscribed into TUBITAK before its establishment. The debates at the National Assembly were also important as the TUBITAK Act was unique in contrast to other negotiations which the National Assembly dealt with regularly during this time. Considering this unique position, the Assembly finally held meetings on the TUBITAK Act on the 8th of April 1963.

The debates mostly went on TUBITAK Act's articles on exempting it from taxes and auditing. The first article which defined TUBITAK's establishment purpose was accepted right away at the National Assembly. Some of the parliament members requested an explanation on why a council that was about to spend 1-2 percent of the country's GDP was not subjected to any control and taxation acts.²³¹ Turhan Feyzioğlu, as the representative of the government, and other persons i.e. the members of the Temporary Commission refuted the criticisms of parliament members, indicating that the Council and scientists need to handle their research without bureaucratic formalities. Asım Eren reminded that there was a military council pointing ILAR, similar to TUBITAK, and asked why the TUBITAK Act had been tried to be legislated in such a hurry and also why there was not any indication in the preamble about the military cooperation.²³² Turhan Feyzioğlu reminded that the act also legislated an Advisory Committee attached to the council, wherein representatives from the Ministry of National Security would be present, and said that ILAR and AR-GE under the Ministry of National Security were something similar to the Hygiene Institute under the Ministry of Health or Mineral Research and Exploration Institute under Ministry of Energy and Natural Resources.²³³ With slight corrections on the

²³¹ *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim, 144.

²³² *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim, 137.

²³³ *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim, 138.

grammar and spelling, the TUBITAK Act was legislated first on 8th April 1963 at the National Assembly.

The first article that was legislated by the National Assembly and later changed by the National Education Commission of the Senate is as follows:

Article 1. The Scientific and Technical Research Council of Turkey is established to develop and promote basic and applied research in positive sciences. The Council has legal entity, administrative and financial autonomy, and is affiliated to the Prime Minister.

The Council is subject to private legal provisions, if otherwise not shown in this Act. The headquarters of the Council is in Ankara.

2.4.2. TUBITAK Act at the Senate

The Senate of the Republic was established as a supervisory organ and a buffer mechanism to regulate the Assembly's legislation in terms of the military government's views. Practically, it works in the same way as the National Assembly. When a bill was legislated at the National Assembly, it was sent to the Senate of the Republic, and the Senate was authorized to draw its Commissions as what National Assembly did at the time. After corrections made by the commissions, if it is needed, the draft bills arrived at the Senate to be negotiated and legislated to later sent back to the Assembly. TUBITAK Act arrived at the Senate on 11th April 1963, right after the National Assembly legislated it.²³⁴ One day later, Sami Küçük gave a memorandum to set up an *Ad Hoc* Commission consisting of members from the Financial and Economic Affairs Commission and Budget Commission, to give TUBITAK act priority.²³⁵ During the negotiations about why setting up the *Ad Hoc* Commission, the President of the Senate asked about the views of the National Education Commission, and Küçük replied that the National Education Commission had already made its corrections.²³⁶ During this time, the Senate was busy with the legislation of other important acts, such as the Union Act and the establishment of the State Statistics Institute. As the Senate and the National Assembly would be on vacation in less than two months, these legislations should be handled quickly.

²³⁴ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 10, 11.4.1963, 58. Birleşim, 590

²³⁵ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 11, 12.4.1963, 74. Birleşim, 522.

²³⁶ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 11, 12.4.1963, 74. Birleşim, 522.

On Küçük's request, the reports prepared by the Temporary Commission and National Education Commission arrive at the Senate on 27th June, and the Senate takes the TUBITAK Act in its meeting list.²³⁷ On 3rd July 1963, the head of the Temporary Commission, Cahit Okurer requested the act to be given priority to negotiate it 4th of July, in between the negotiations on the Union and Collective Labour Agreement Act, as the Senate itself would be closed due to vacation.²³⁸ Both acts were decided to be given priority as the Senate will be recessed in 15 days.

Two Commissions of the Senate, National Education Commission and Ad Hoc Commission reported their views and corrections on the act legislated by the National Assembly. The report of the *Ad Hoc* Commission was read to open discussions.²³⁹ The report indicated that the Commission took the National Education Commission's report as its base to make minor regulations. The most important regulation made by the National Education Commission was related to the first article of the TUBITAK Act which defines the duties of the organization. This article was expanded as it authorized TUBITAK not only to support research but also to coordinate and regulate the research effort of the country in positive basic and applied sciences. The coordination task is vastly different from what the National Assembly legislated on the 8th of April 1963, and the further debate on why TUBITAK did not carry this task would be the foundation of transformations. This regulation is as follows:

Article 1. The Scientific and Technical Research Council of Turkey is established to develop promote, regulate, and *coordinate* basic and applied research in positive sciences. The Council has legal entity, administrative and financial autonomy, and is affiliated to the Prime Minister.

The Council is subject to private legal provisions, if otherwise not shown in this Act. The headquarters of the Council is in Ankara

As the Temporary Commission accepted the National Education Commission's regulation as its base, the report and regulations prepared by the National Education Commission were quite important. This report was not read at the Senate, but it was attached to the records with a table presenting the first version of the act legislated by

²³⁷ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 27.06.1963, 81. Birleşim, 190.

²³⁸ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim, 601-686.

²³⁹ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim, 601

the National Assembly, and the version accepted by the Senate. The regulations and their justifications were presented in this report prepared by the National Education Commission.²⁴⁰ Thus, this text and the corrections made by the Senate are the most important ones shaping the eventual form of the TUBITAK Act during its establishment.

The National Education Commission explained the reason for changing the first article as TUBITAK was also expected to coordinate and regulate research rather than just promote and develop it. Ad Hoc Commission, as read at the Senate, accepted this on the condition to preserve academic freedom to research in basic and applied sciences.²⁴¹ In the Second Article, the Commission added a new subclause, which the original Government bill included about establishing institutes to do research and get research done, but not included in the Assembly version. The Commission recalled this bill and added the new subclause in Article 2, subclause A. as follows: “Article 2. The Scientific Research and Technical Council of Turkey’s duties are as follows:

- a) To conduct, commission, and promote basic and applied research in positive sciences, to establish institutes for doing this.”

The National Education Commission regulated another subclause which clarified the educational function of TUBITAK to train scientists and technical manpower, not only during their education but in a lifetime as indicated in the *subclause E*.²⁴² This should be thought with the establishment of Science High School, TUBITAK Scholarships, the reports on the *1416 Act* which gives authority to the Ministry of National Education to train faculty members abroad as well as TUBITAK’s later studies on finding jobs for its bursaries. As will be discussed in the third chapter on Scientific Manpower, this shows the high hopes placed on the project of Science High School and the overall educational reform in secondary schools following this project.

The earlier regulation made by the Assembly’s *Ad Hoc* Commission on the tasks and status of the Secretary-General was made explicit by the National Education

²⁴⁰ Türkiye Bilimsel ve Teknik Araştırma Kurumu kurulması hakkındaki kanun tasarısının Millet Meclisince kabul olunan metni ve Cumhuriyet Senatosu Millî Eğitim ve Geçici Komisyon raporları (M. Meclisi 1/219, 2/220; C. Senatosu 1/213) attached to *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim.

²⁴¹ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim, 601. Which can be also found in the reports attached to the records.

²⁴² *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim.

Commission of the Senate. In the original draft sent to the National Assembly, the secretary-general was not described as one of the members of the Science Committee, and its appointment was delegated to the Science Committee itself. *Ad Hoc* Commission of the Assembly regulated this to clarify amongst whom the secretary-general would be elected, and how he or she would be approved, which is now designed in the same way as the Science Committee members.²⁴³ Accordingly, the Assembly version defined a secretary-general to be elected amongst the well-known scientists²⁴⁴, either within the Science Committee or appointed externally. In addition to this, the National Education Commission of the Senate clarified the status of secretary-general as one of the members of the Science Committee in *Article 4*. After elaborating on the status of the secretary-general, the National Education Commission of the Senate made further regulations on *Article 6*, which defined the Secretary-General and his/her duties specifically. In the first version, the Secretariat was defined as a regular executive organ of the Science Committee, despite its head being considered to be a member of the Science Committee. However, later changes made by the Senate's Commission, elevated the Secretary-General to comparably a higher status besides its duty of execution, as now the head of the secretariat is separately mentioned as a member of the Science Committee in *Article 4*. In addition to that, the Secretary-General was now authorized to select its personnel, which was not present in the Assembly's legislation in *Article 6*. This additional specification will be important later because, in the final legislation, there was not any indication that a unit for science policy would be formed apart from research groups and training scientists' groups. Further expansion of the secretariat and the tacit authorization of Mehmet Nimet Özdaş in the establishment of MSIRI in the name of the Science Committee should also be considered as part of this regulation.

The other important regulation made by the Senate's National Education Commission was about the appointment of the Science Committee members. The Act regulated the

²⁴³ *Millet Meclisi Tutanak Dergisi*, Cilt 16, 08.04.1963, 68. Birleşim.

²⁴⁴ This regulation in Turkish describes the secretary-general as "...fen adamı" which "fen" means natural sciences consisting of physics, mathematics, chemistry and biology. National Education Commission of the Senate will change this into scientists as "bilim adamı" in which "bilim" means sciences in general. The Commission explains this as throughout the Act it is called "bilim" and "bilim adamı", so "bilim adamı" i.e. scientist is more appropriate for here. This might be meaningful about the election of Mehmet Nimet Özdaş who is an engineer as the first Secretary-General. But also, might not be meaningful as Cahit Arf contacted Özdaş in the first place, and appoint him without waiting his full approval.

number of Science Committee members as eleven: five members from mathematics, physical, and biological sciences, four members from applied sciences, one from the state enterprises, and one from the private sector, a renowned industrialist. Temporary articles 1 and 2 describe the first appointment process in detail. The discrepancy between distinct positions, however, was also apparent in these regulations. The first version legislated by the Assembly mandated the Prime Minister to appoint five members of the Science Committee amongst the candidates nominated by universities and MoNE. In this version, three candidates would be nominated by the universities and five candidates will be nominated by the MoNE. However, the Senate's Commission changed this article into three candidates from the universities but not necessarily a faculty member of a university, three from the MoNE, and three candidates amongst the ones nominated by the Ministry of National Defense, Ministry of Public Works, Ministry of Health and Social Welfare, Agriculture, and Industry. After the appointment of these five members, the election of the rest of the Science Committee was left to these five members' majority voting.

In the first version, the Prime Minister was designated as the patron of the science in the TUBITAK Act. The budget, auditing, and the approval of Science Committee members were thought to be regulated by the Prime Ministry. The articles regulated the financial and budgetary affairs and gave a certain financial autonomy and exemption from existing tax laws. Both Senate commissions did not change the financial and budgetary autonomy of TUBITAK in its regulations. Science Committee's position and administrative autonomy were also preserved to a point with some modifications made on the status of Secretary-General. However, the Senate's National Education Commission made a further regulation about the administrative affairs of TUBITAK in Article 4. During the first organization Science Committee's members were left to be appointed by the Prime Minister amongst candidates through Temporary Article 1, the Senate's commission changed Article 4, about later appointments. The election of Science Committee members was now subject to the approval of both the Prime Minister and the President of the Republic, instead of only the Prime Minister's approval. While the National Education Commission changed this article into indicating the "approval of the Prime Minister and the President", the Temporary Commission of the Senate gives the final shape by changing "approval" to "answering":

Article 4. Science Committee

a) Organization :

The Science Committee consists of 11 members and the Secretary-General. Five of the members shall be from the fields of mathematical, physical, and biological sciences and four from the fields of applied sciences, and shall be members who are well-known for their works, research, and inventions. Of the remaining two members, one shall be elected from among the State Enterprises and the other from among those who have distinguished themselves by their outstanding representation or applied research in Private Industry.

Science Committee shall elect a Chairman and a Deputy Chairman from among its members for a term of two years. The duties and powers of the Chairman and Deputy Chairman shall be specified in a directive.

b) Duration of membership:

The term of membership of the Science Committee is four years. Members shall be elected by the Committee by secret ballot and with the majority of the total number of members. A member whose term expires may only be elected for one more term. New members shall be elected for vacancies due to reasons such as resignation or death in accordance with the above principles. However, the member so elected shall complete the term of the member he/she replaced. The election of members of the Scientific Council shall be answered within one month by a decree signed by the Prime Minister and the President.

The Senate's National Education Commission made another regulation on Article 5, which chose the members of the Advisory Committee. The Advisory Committee was thought to include members from various organizations such as Ministries of National Defense, Foreign Affairs, Agriculture, Education, universities, SPO, private sector, Institutes of Mineral Exploration and Electrical Power Resources Survey Department, and others. The Commission simply expanded this by adding members from the Chamber of Medical Doctors and the Chamber of Pharmacists, and the *Ad Hoc* Commission also added one member from the Chamber of Veterinary Surgeons. The rest of the regulations made by the Senate's commissions were related to the formalization and clarification of the articles. One other regulation can be regarded as

important in Article 8, which regulates the affairs of the research groups. National Education Commission authorized the research groups to consult local and foreign advisors, if necessary, through this article. The other was about the patent rights of the products from the resulting research projects which delegated TUBITAK as the owner, but in the case of further production shares 30 percent of the income with the inventor. The rest of the regulations were relatively minor corrections either expanding the scope of research groups or making some grammar and spelling corrections. Temporary Commission put a written caution about the universities' independence of doing research in technical areas about the First Article as mentioned above. It also made explicit its wishes for the awaited establishment of the Social Sciences Research Council by indicating that development efforts do not only depend on positive sciences.

The Commissions of Senate's changes rest on an ideal function of the Council, in the eyes of the Military government, expecting a more active status, rather than only promoting research, as SPO was already partaking a quite active role in the economic development. The changes in the first article reflect this position. The rest of the changes were also related to the anticipated power balance in the Council itself. The status of the Secretary-General, the election of Science Committee members with a dual decree signed by the President and Prime Minister, and the possibility to populate the Committee after a two-year trial are important changes representing the crucial differences between the supporters of full autonomy of science and the military government's preferences about a more centralized organization, specifically in terms of applied research and economic development.

The negotiations at the Senate, on the other hand, were quite different in terms of the disputed articles. In contrast to the pace of the legislation at the Assembly, Senators discuss every important article at length, specifically the ones that gave financial autonomy to TUBITAK and exemption from tax laws and auditing from SAYIŞTAY. One of the members of the Temporary Commission, Hüseyin Kalpaklıoğlu reported a minute of dissent on TUBITAK's exemption from general auditing of Sayıştay.²⁴⁵ Other debates were about the autonomy of universities secured by the Constitution,

²⁴⁵ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 602.

and whether TUBITAK would intervene in the independence of the universities so that the Act conflicted with the Constitution.²⁴⁶ One of the objections was about the appointment of Science Committee members, some senators think that the Cabinet's approval would be more proper.²⁴⁷ In addition to this, the Advisory Committee's role was negotiated about its members, but more importantly its scientific authority in contrast to the Science Committee. If Advisory Committee consists of members so much more representative than the Science Committee in scientific terms, this means that "TUBITAK was already crippled", said Fikret Turhangil.²⁴⁸ Senators who place their objections during the negotiations include Hüseyin Kalpaklıoğlu, Fikret Turhangil, Niyazi Ağırnaslı and others. They issued their version of articles to be voted on at the Senate about tax and auditing exemption, the Cabinet's role in approving the members of the Science Committee, and the Advisory Committee's composition. However, none of these statements are accepted other than the corrections offered by Sami Küçük and Temporary Commission. Minister of National Education of that time, İbrahim Öktem and Cahit Okurer, spokesperson of the Temporary Commission answered the questions and disputes put by confronting Senators. Cahit Okurer, for example, was aware of other examples that have higher status advisory councils in other countries, probably the British model of the Advisory Council for Scientific Policy, but said the amount of scientific manpower in Turkey was limited, that's why the Advisory Committee's role was diminished in TUBITAK Act.²⁴⁹ İbrahim Öktem, on the other hand, refuted the criticisms about the tax exemption and auditing by indicating that TUBITAK would be able to spend a very limited budget which "would never allow misconducts"²⁵⁰

İbrahim Öktem's words about the budget indicate that from the military government's perspective, TUBITAK was established under certain conditions, as if it was on a trial period via budget control. These government officials anticipated the secretariat's role and the establishment of TUBITAK's applied research branch, the MSIRI. In the end, this revised version of the Act by the Senate was sent to the Assembly and legislated

²⁴⁶ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 602.

²⁴⁷ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 607.

²⁴⁸ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 613.

²⁴⁹ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 617.

²⁵⁰ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 626.

once more without any disputes on the 17th of July, 1963.²⁵¹ It is published in the Official Gazette on 24th of July 1963, and TUBITAK is officially established. The negotiations at the Assembly and the Senate show that the TUBITAK Act was uniquely designed by a consensus amongst the government. Despite harsh criticisms about its tax exemption and auditing, these concerns had never impacted the Act. The real dispute was between the positions in the organization and the tasks of TUBITAK, which was meticulously designed by Commissions, and at times, by-passed via Ad Hoc Commissions. Thus, TUBITAK was established with a strong Science Committee, represented by top Turkish Scientists as the sole decision-making organ with full administrative and financial autonomy, but also with a strong Secretary-General, as a delegate to the Science Committee, authorized to select its own personnel and establish research units, and also approved by a dual decree signed by Prime Minister and President. The duty of the Council is designed not only to support the free spirit of research in the country but also to coordinate research efforts. These two conflicting logics will be the basis for all further transformations of TUBITAK. On the one hand, there was the Secretariat, MSIRI, Science Policy Research Unit, and OR unit, and on the other hand, there was the Science Committee's strong adherence to the principles of pure science.

Some of the senior government officials were quite influential when these Commissions debated the articles of the Act. As the Temporary Commission's report was read to open negotiations at the Senate, the report indicated that Günhan Arkan, head of the Technical Department of Law and Resolutions of Prime Ministry, Zekai Baloglu²⁵², from the Ministry of National Education, were consulted about the TUBITAK Act's articles.²⁵³ This report reveals the positions of the various parties that were interested in shaping the TUBITAK Act. The conflicting positions will also be important implicit research policies of corresponding sub-units of the Council.

TUBITAK did not directly adopt any existing research council model, national academy, or DSIR model. It seems that while TUBITAK incorporated some aspects of the Advisory Council of the United Kingdom, these models were translated very

²⁵¹ *Millet Meclisi Tutanak Dergisi*, Cilt 20, 17.07.1963, 117. Birleşim, 11-16.

²⁵² As will be seen in the Chapter IV, Baloglu was a prominent figure in the Training Scientists' Group's works in relation to Science High School from the MoNE.

²⁵³ *Cumhuriyet Senatosu Tutanak Dergisi*, Cilt 1, 04.07.1963, 86. Birleşim. 601.

differently. The negotiations between the government and professors were more relevant shaping the power balance in the organizational form of TUBITAK. The two predominant models, DSIR and Advisory Council dual mechanism of the U.K., and the American National Science Foundation (NSF) were not only products of different institutional environments but also were different in terms of their tasks and authorizations. For example, the NSF was strictly restricted to establishing laboratories and institutes, while the DSIR was situated in a web of Industrial Research Associations.²⁵⁴ The question of similarity or modeling itself does not do justice to national contexts and overlooks more important aspects of the issue as in the case of TUBITAK, but the closest example to TUBITAK's first organizational form would be a mix of Canadian and American National Research Councils, as Canadian NRC was authorized to do industrial research while American NRC's task was to promote research spirit.²⁵⁵ The UNESCO survey notes that following the establishment of the Advisory Council and the United States National Research Council, 28 countries adopted similar research council models, reflecting a broader global trend towards organizing and centralizing scientific research efforts.²⁵⁶ The survey gives details by categorizing these research organizations as "governmental," "administrative," "non-governmental," and "advisory." It also provides information on their legal status—whether they were connected to government or not—main research areas, and any associated laboratories and research institutes. For instance, the Department of Scientific and Industrial Research (DSIR) and the National Science Foundation (NSF) are both classified as advisory, governmental, and administrative. In contrast, the National Research Council (NRC) and the National Academy of Sciences (NAS) in the US are categorized as non-governmental and advisory.

TUBITAK's legislation incorporates characteristics of both governmental and non-governmental research councils, as well as administrative and advisory features. It had financial and administrative autonomy and was free to elect its members of the Science Committee independently until 1983. In contrast to the NSF and NRC, TUBITAK was

²⁵⁴ This reflects the long debates about the form of NSF, before its establishment between the parties that supports Vannevar Bush's proposal of an autonomous body with Harry Kilgore's more central organization that would coordinate all government research effort. See: Vannevar Bush, *Science: The Endless Frontier*, Princeton University Press, (2020).

²⁵⁵ UNESCO/NS/107. "Survey of National Research Councils for Pure and Applied Science in the Member States of UNESCO". 19 June 1953

²⁵⁶ UNESCO/NS/107. "Survey of National Research Councils for Pure and Applied Science in the Member States of UNESCO". 2.

authorized to establish independent institutes and research groups. On the other hand, DSIR reflects a more central character and has laboratories, research councils, and industrial research associations under its coordination. However, the two conflicting logics must be more influential in shaping TUBITAK's organizational form.

2.5. Preliminary Conclusion

In this chapter, I first showed the historical changes in the *institutional environment* during WWI and WWII in Britain, before the institutionalization of science policy at OEEC/OECD circles. These changes were firstly the initiative to establish a dual mechanism for science policy in Britain during WWI i.e. an executive branch that dealt with industrial research under the Department for Scientific and Industrial Research (DSIR), and an advisory council attached to the government. These were the first examples of science policy organizations. During WWI, an exchange of research information services was also formed between the Allies, the United States of America, Britain, and France. During the Second World War, I argued that a change in the cultural-cognitive framework of what both scientists and bureaucrats understood by the utilization of science in military, economic, and social affairs took place when operational research was introduced in the military's undertaking of the war. Later as I argue, the idea of what operational research represented about *managing* operations in a probabilistic way was incorporated into OEEC and NATO circles. In this chapter, I showed the initial connections between NATO officials and the Turkish General Staff about the operational research and its impact on the creation of the General Staff's R&D Department. I argued that these changes represented the policy logic in which both national and transnational organizations were influential. Thus, in the third part, I show the differences between the Senate, which consisted of former military officials of the 1960 May Coup, and the earlier National Assembly version of the TUBITAK Act. In contrasting these differences, I argued that in the Senate, military officials strived for a more executive science policy organ by strengthening the position of secretary-general, while the professors tried to preserve an academic logic.

CHAPTER 3

THE PREVALENCE OF ACADEMIC LOGIC: A CASE OF TUBITAK'S INVOLVEMENT IN THE ESTABLISHMENT OF SCIENCE HIGH SCHOOL (1964-1982)

3.1. Introduction

In this chapter, I argue that further international development has led to the elaboration of the problem of scientific manpower, mainly originating from the United States' concern about the Soviet's higher education system's expansion, which initiated the undertaking of statistical data collection of highly qualified manpower in NATO and OEEC member countries. Accordingly, I show that a number of policy initiatives were developed among the OECD circles to urge countries to reform their education system towards producing more scientific and technical personnel. In contrast, the translation of these developments in Turkey, specifically TUBITAK's programme for training scientists via its dedicated unit Scientists Training Group (Bilim Adamı Yetiştirme Grubu – BAYG - STG)²⁵⁷ is turned into raising a limited number, but also highly talented students into scientists via Ankara Science High School. I argue that the occurrence of the Scientific Manpower problem was another part of the elaboration of science policy mechanisms through transnational organizations *during the emergence of the organizational field of science policy*. As I will show in the following sections, although some of the circles in Turkish bureaucracy participated in these international policy initiatives concerning the overall educational reform, the officials of the Ministry of National Education and TUBITAK's BAYG group have decided to develop science education in the country on the model of Ankara Science High School. I argue that the establishment of Science High School reflects what I discuss in the introduction of this thesis about Turkish modernization's propensity towards

²⁵⁷ I left the Turkish correspondence Bilim Adamı Yetiştirme Grubu- BAYG, instead of Scientists Training Group – STG, throughout the text.

reproducing the “right type of minds” in an era when education policies were still associated with nation-state ideologies.

3.2. International Developments on “Scientific and Technical Manpower Problem”

In the mid-1950s, scientific and technical manpower issues became a problem in transnational organizations, when American concerns focused on the gradual increase in Soviet educational output. This issue was subsequently incorporated into science policy frameworks, where the numbers of scientific and technical personnel continue to play a crucial role. The political reasoning was the Soviets outnumbering the American and Western European countries in scientific and technical personnel. A series of reports funded and prepared by the National Science Foundation (NSF) through the social scientific equivalent of organized research units employed in physical sciences.²⁵⁸ This was in line with the developments for promoting basic research and science in education that began right after WWII, characterized by Vannevar Bush’s report, *Science the Endless Frontier*, that urged to maintain government support for basic research and science in education that led to the establishment of NSF.²⁵⁹ In the Cold War conditions, scientific progress became an issue of national prestige through military technology, mainly between the United States and the Soviet Union. NATO adopted first, scientific and technical manpower as an urgency, and then proceeded to establish a Science Committee for encountering Soviet educational and technological developments.

3.2.1. NATO’s Adoption of the Scientific Manpower Problem

NATO’s Working Group on Labour Mobility, established in 1952, was tasked with addressing issues related to manpower shortages, particularly in the context of defense production and wartime management of labor mobilization. The group focused on planning and discussing strategies to manage and mitigate the effects of labor

²⁵⁸ Nicholas De Witt, *Soviet Professional Manpower: Its Education, Training, and Supply* (New York: McGraw-Hill, 1955). A member of Harvard University’s Russian Research Center prepared this report. Roger Geiger describes the Russian Research Center as an interdisciplinary organized research unit, extending the traditional boundaries of disciplines and evaluates it as the prototype of Area Studies. See: Geiger, *Research and Relevant Knowledge*, 50-51.

²⁵⁹ NSF is established for “a national policy for the promotion of basic research and education in science”. see. Rush D. Holt, “The Science Bargain”, in *Science the Endless Frontier*, (New Jersey: Princeton Press, 2021[1945]), 7.

migration at the time and ensure the continuity of defense-related production and planning during times of crisis.²⁶⁰ On February 17th, 1953, the United States delegation issued a memorandum for the discussion of the Working Group, titled *Scientific Manpower Problem*, stating excerpts from the 1952 Annual Report of the NSF. According to these excerpts, developing scientific knowledge at a growing pace was “indispensable for good economics and military purposes of the nation”.²⁶¹ The note continued with “the number of engineers graduated from our schools has declined in recent years and is expected to reach a low of about 15,000 graduates in 1955 [...]” while the USSR’s “[...] goals for 1955 call for nearly 50,000 engineering graduates”.²⁶² Setting the scene, the memorandum continued with a graph comparing the USSR’s growing capacity and the declining numbers of graduation in the United States, representing the first attempts to alert NATO members to act on the perceived problem of scientific and technical manpower. In the meantime, the OEEC was also working on the manpower issue, thus, some of the delegates at NATO’s Working Group suggested inviting an OEEC representative and collecting the results of relevant studies of the OEEC.²⁶³ Accordingly, NATO’s committees and working groups decided to wait and consult OEEC’s questionnaire on scientific manpower, which would include country statistics other than those of NATO members.²⁶⁴

Through the Mutual Security Agency (MSA)²⁶⁵, the US also urged the OEEC Manpower Committee to consider preparing a questionnaire on the shortages and/or surpluses of highly qualified manpower in OEEC countries.²⁶⁶ This was the OEEC activities mentioned in NATO documents. This questionnaire was prepared and

²⁶⁰ NATO/AC/36-D/2. NATO’s Working Group on Labour Mobility. *Note by Secretary* on 30th October 1952.

²⁶¹ NATO/AC/36-D/9. NATO’s Working Group on Labour Mobility. *Scientific Manpower Problem. Note by the US Delegation* on 17th February 1953, 2, citing the *Annual Report of 1952 National Science Foundation*.

²⁶² NATO/AC/36-D/9. NATO’s Working Group on Labour Mobility. *Scientific Manpower Problem. Note by the US Delegation* on 17th February 1953, 2.

²⁶³ NATO/AC/36-R/5. *Summary Record of a meeting held at the Palais de Chaillot, Paris on Friday, 27th February. 1955 at 10.30 a.m. and 2.30 p.m.* on 10th March 1953.

²⁶⁴ AC/36-R/7. *Summary Record of a meeting held at the Palais de Chaillot, Paris on Monday 28th September 1953 at 3. p.m.* on 1st October 1953.

²⁶⁵ One of the parent agencies of the United States responsible for the Marshall Funds and military cooperation, MSA is formed to provide economic and military assistance to European countries between 1951-53.

²⁶⁶ OEEC/MO(53)36. OEEC Manpower Committee. *Shortage of Scientific and Technical Manpower – Possibility of OEEC undertaking a Study.* on 27th July 1953, 7.

circulated in 1954.²⁶⁷ The questionnaire included nine questions with detailed directions concerning the output of scientists and engineers graduating from universities and equivalent higher education facilities. The data asked, if possible, should begin from 1938 to 1954, and reports would include further predictions about the trends of university graduation. Science categories provided in the questionnaire to make the data detailed are “Agricultural Group”, such as agriculture and forestry; veterinary science; “Pure Sciences”, such as biological Sciences; chemistry; physics; earth sciences, such as geology; and mathematics. Under “Applied Sciences”, all engineering branches were included.²⁶⁸ The questionnaire sections provided directions for governments to provide information about the general conditions of university graduates, the output of higher education facilities, and the employment conditions of graduates. The survey urged governments to assess whether there were shortages or surpluses in specific branches and to inquire about the nature of these shortages and surpluses, employment services or the lack of it, possible future expansion of higher education institutions, and the reasons, for example, why specific country assessed the situation as shortages or surpluses.²⁶⁹ The questionnaire, including Turkey’s responses, was gathered in 1955. However, some of the governments, such as Luxemburg, who were not familiar with the methods of collecting data on scientific personnel, gave feedback about the difficulties of collecting such data in contrast to countries such as the United States, Canada, the United Kingdom, and the Netherlands, which were already collecting statistical data occasionally on manpower through mechanisms during the WWI, as discussed in the third chapter.²⁷⁰

On the OEEC part, the results of these surveys were integrated into EPA’s conference series on applied research during these years.²⁷¹ Although the focus was applied research in the mid-1950s, the collection of data on R&D personnel became important for the development of the Frascati Manual and in terms of educational planning for economic growth. On the NATO part, the scientific manpower problem opened a series of events that led to the establishment of the NATO Science Committee, while

²⁶⁷ OEEC/MO(54)25). OEEC Manpower Committee. Shortages and Surpluses of Highly Qualified Scientists and Engineers – Questionnaire on 30th April 1954.

²⁶⁸ OEEC/MO(54)25), 3-4.

²⁶⁹ OEEC/MO(24)25, 5

²⁷⁰ OEEC/C(55)160. “Shortages and Surpluses of Highly Qualified Scientists and Engineers”, 4.

²⁷¹ OEEC/C(55)160, 4.

there were already defense research mechanisms such as AGARD. Scientific manpower problem was regarded as a very significant problem through NATO, especially the report prepared by the Committee of Three on possible ways for non-military cooperation.

3.2.1.1. Non-Military Cooperation in NATO

In 1956, the NATO Council requested a report to be prepared by the ministers of Italy, Canada, and Norway on ways of enhancing political unity within NATO and fostering cooperation in non-military fields. This working group gathered responses from member countries on potential areas for non-military cooperation, including economic, cultural, social, scientific, and technological areas. The report was significant because, not only it addressed the problem of scientific manpower and research policy in general, but it also underscored the need for heightened attention from government heads. Although the committee's primary goal was to enhance political unity among NATO members, the emphasis was placed on scientific and technical cooperation as a key area for non-military collaboration. Its recommendations were directed to heads of governments, reflecting the critical role that scientific and technological cooperation was to play in the broader context of NATO's objectives.²⁷² The early concern about the USSR's capacity to produce scientists and engineers was the major theme in the *Committee of Three's* work. One significant report, prepared by Robert Major²⁷³, a consultant to *Committee of Three*, presented the scientific manpower problem as particularly a NATO problem. The report titled "Recruitment and Training of Scientists, Engineers, and Technicians in NATO Countries and The Soviet Union" opened its case by introducing the growing importance of science and technology, and its application for industrial growth and military power in recent decades.²⁷⁴ The OEEC questionnaire was used as the statistical basis of this report, comparing NATO member countries' capacities of training scientists and engineers, including Turkey. In Major's report, Nicholas De

²⁷² NATO/CT-WP/7 (Draft) *Report of the Committee of Three on Non-Military Co-operation in NATO: A report to NATO Council*. October 23, 1956.

²⁷³ Robert Major was the chairman of Norway's Council for Scientific and Industrial Research at the time. One of his speeches given at a symposium held in 1958, published in the journal, *Science*, in 1959 titled as "Organization of Scientific Activities in Norway". See: Robert Major, "Organization of Scientific Activities in Norway", *Science*, 129, (1959): 694-700. DOI: [10.1126/science.129.3350.694](https://doi.org/10.1126/science.129.3350.694)

²⁷⁴ C-M(56)128. "Recruitment and Training of Scientists, Engineers, and Technicians in NATO Countries and The Soviet Union – Report by Robert Major, Consultant to Committee of Three" on 26th November 1956.

Witt's study, the NSF report mentioned before, on Soviet expansion of scientific manpower was also referred to in the report. Major provided a table comparing the numbers of graduates as scientists and engineers in member countries, and the total numbers of NATO Europe and NATO North America²⁷⁵, evaluating that the Soviet Union was training more engineers than the total of all NATO countries, while graduates in basic sciences were outnumbering the NATO Europe countries²⁷⁶, as shown in the reproduced tables below.

Table 3.1. *Major Report – Statistical Data on Scientific Manpower*²⁷⁷

Country	Population in thousands	Scientists	Engineers	Total Number of Degrees	Total No. of Degrees per Mill. inhab.
Belgium	8800	282	411	693	79
Denmark (1)	4380	58	433	491	112
France	43000	1614	4158	5772	134
Germany	47700	1705	3269	4974	104
Greece (1)	8220	270	305	575	70
Iceland	150	?	?	?	-
Italy	47220	2320	2320	4640	98
Luxembourg	300	?	?	?	-
Netherlands (1)	10550	434	681	1115	106
Norway	3370	82	428	510	151
Portugal	8060	?	?	?	-
Turkey (1)	23200	124	448	572	25
United Kingdom	50950	5096	2986	8082	159
NATO Europe (2)	247390	11849	14985	26834	-
NATO Europe	255900	12000	15200	27200	106
Canada	15000	753	1505	2258	151
USA	161100	22866	22589	45455	282
NATO North America	176100	23619	24094	47713	271
TOTAL NATO	432000	35619	39294	74913	173

“Country statistics shown with 1 in the brackets are from 1953 data.”

Table 3.2. *Comparison of NATO Europe, NATO North America, and the USSR*

	Population (Mill.)	Scientists	Engineers	Total

²⁷⁵ C-M(56)128. “Recruitment and Training of Scientists.”, 3

²⁷⁶ C-M(56)128. “Recruitment and Training of Scientists”.

²⁷⁷ Table 3.1 and Table 3.2 are reproduced from C-M(56)128.

Table 3.2. *Comparison of NATO Europe, NATO North America, and the USSR(Continued)*

NATO Europe	255,9	12,000 (47)	15,200 (59)	27,200 (106)
NATO North America	176,1	23,600 (134)	24,100 (137)	47,700 (271)
TOTAL NATO	432	35,600 (82)	39,300 (91)	74,900 (173)
USSR	200	15,000 (75)	60,000 (300)	75,000 (375)

“Note: The figures in the brackets are numbers of degrees per habitants.”

These statistics and Major’s report can be considered as the ground base for the *Committee of Three’s* final recommendations to the NATO Council on scientific cooperation. It was specifically designed to urge NATO’s European countries to take urgent measures regarding scientific manpower and the application of science and technology. In response to Major’s report, a sub-section on *Science and Technological Cooperation* was included in the *Committee of Three’s* report.²⁷⁸ This section referred to international scientific cooperation, but almost all of its theme was related to scientific manpower problems.²⁷⁹ As the report suggested a conference be organized, these recommendations on further scientific cooperation were echoed at the NATO Council for the establishment of an *ad hoc* working group or a task force to find further ways to enhance scientific cooperation.²⁸⁰ This working group was called “Task Force on Action by NATO in the Field of Scientific and Technical Cooperation,” chaired by Joseph B. Koepfli.²⁸¹ At the first meeting of this task force, Major’s report was adopted as one of the basis for the activities of the group. At the second meeting, delegates elaborated on the problem of scientific manpower and ways of cooperation in NATO. Solly Zuckerman and his French counterpart prepared brief papers on scientific manpower for planning and surveying statistical data to identify what NATO can contribute besides OEEC and EPA activity in the field.²⁸² The suggestions on the

²⁷⁸ NATO/CT-WP/7(Final)Ottawa Revision, “(Draft) Report of the Committee of Three on Non-Military Cooperation in NATO” on 23rd October 1956, 23-25.

²⁷⁹ NATO/CT-WP/7(Final)Ottawa Revision, (Draft) Report of the Committee of Three on Non-Military Cooperation in NATO, 24-25. Especially the statements numbered 9 and 10.

²⁸⁰ NATO/C-M(57(50). “Further Action by NATO in the Field of Scientific and Technical Co-operation” on 1st April 1957, 1-2.

²⁸¹ Joseph B. Koepfli was a chemistry professor took part in one of the organized research projects dedicated to developing antimalarial drugs, supported by the U.S. Federal Government during the WWII. Another example of the trend which American and British scientists were populating the OEEC and NATO science committees. See: “Joseph B. Koepfli,” *California Institute of Technology Archives*, accessed on 30 March 2024, <https://collections.archives.caltech.edu/agents/people/211>

²⁸² NATO/AC/132-R/2. “Annex I - Scientific Manpower by Solly Zuckerman” “Annex II – Scientific Manpower – Note par M. Henri Longchambon”. on 27th August 1957.

manpower problem included regular national surveys of scientific personnel similar to OEEC activity, setting a “defense research manpower target”, and comparable data on the manpower situation in member countries while addressing issues about possible educational reform and effective employment of existing manpower with a specific reference to women’s recruitment that can be handled nationally.²⁸³ Task Force’s report also suggested a permanent central office for scientific and technical cooperation at NATO.²⁸⁴ While the task force finalized their recommendations by this second meeting on 23rd July 1957, the Soviet Union launched the first Sputnik on October 4, 1957. In an interview, Koepfli described the event’s influence by indicating that without the impact of Sputnik, their report “would have just been another one of those 10,000 pieces of paper that bureaucracies put together and are received and filed and put away—nothing would have happened, absolutely nothing.” The launch of Sputnik significantly heightened the urgency of the task force’s work and underscored the critical need for enhanced scientific and technical collaboration within NATO.²⁸⁵ The Task Force’s final report was presented at a meeting of heads of government in December 1957, which was initially scheduled as a ministerial conference before the launch of Sputnik.²⁸⁶ This report laid the groundwork for the establishment of a permanent Science Committee and the appointment of a scientific advisor to the Secretary-General of NATO. The debates over the Science Committee’s scope and tasks varied among country delegates. For instance, French delegates advocated for the creation of a joint Western Science Foundation and envisioned a central body to manage funding and coordinating Western research efforts in response to Soviet scientific advancements.²⁸⁷ These debates took place in the first meeting of NATO’s Science Committee in 1958. Senior officials of NATO were present at this meeting, including NATO Secretary-General Paul-Henri Spaak, members of Production and Logistics, Scientific Adviser to Supreme Allied Commander Europe (SACEUR), and

²⁸³ NATO/AC/132-r/2 “Annex V – List of Specific Suggestions Put Forward For NATO Action” on 27th August 1957, 1-2.

²⁸⁴ NATO/AC/132-R/2 “Annex V”,. 3.

²⁸⁵ “Joseph B. Koepfli”. Interview by Elizabeth Hodes. Santa Barbara, California, October 25, November 1, 8, and 15, 1983. Oral History Project, California Institute of Technology Archives. Retrieved 30 March 2024 from the Web: http://resolver.caltech.edu/CaltechOH:OH_Koepfli_J,109. Koepfli goes into detail about how the Task Force’s report was accepted by NATO’s political and military authorities in the interview.

²⁸⁶ “Joseph B. Koepfli,” Interview by Elizabeth Hodes, 109.

²⁸⁷ NATO/AC/137-R/1. Science Committee. Summary Record of the first meeting Held at the Palais de Chaillot, Paris, on 26th, 27th, 28th March 1958, 28.

executive secretary of AGARD in addition to country representatives.²⁸⁸ Despite French delegates' efforts²⁸⁹, the committee never turned out to be a central and large organization that distributed funding and coordinated military and civil research efforts. The committee instead, introduced NATO scholarships at the graduate level for natural and technical sciences, organized courses and summer schools in specialized fields, and continued funding already existing institutes such as *Advanced Studies Institutes*, and those on aeronautical research in Belgium. While coordinating only a smaller portion of military research, such as the construction of the Anti-Submarine Research Center in Italy and the Mutual Weapons Development Programme, the NATO Science Committee largely limited its activities to scholarly issues such as fellowships and summer schools.²⁹⁰ It primarily served as a forum for encouraging governments to take action in specific areas, and disseminating concepts and ideas, while coordinating limited advancements in military technology.²⁹¹

The mid-1950s scientific manpower problem circulated among the transnational organizations was quickly integrated into larger scientific cooperation programmes, and research policy frameworks, through OEEC's and NATO's earlier activities. NATO and the United States' impact was to provide political reasoning, such as promoting a perception of the Soviet's expanding capacity in higher education. On the

²⁸⁸ These delegates were mostly prominent scientists of their respective countries, including Turkish representative physicist Cavit Erginsoy. Solly Zuckerman. I. I. Rabi, one of the most famous physicists in Manhattan Project, and Howard P. Robertson, SACEUR's adviser mentioned in the second chapter about his operational research course at NATO Defense College translated by Turkish General Staff's ARGE.

²⁸⁹ An "Ad Hoc Working Party on the Western Science Foundation" was formed in 1958, for the possibility of creating a central organization, however concluded that there was no need to establish a central organization due to administrative difficulties and high costs of projects. See the final report of the *Ad Hoc* group: NATO/AC/137-D/11. "Report by the Ad Hoc Working Party on Western Science Foundation" on 23rd May 1958, 1.

²⁹⁰ John Krige, "NATO and the Strengthening of Western Science in the Post-Sputnik Era" *Minerva* 38, (2000). Krige indicates that NATO Science Committee's work remained in the limits of non-military cooperation, emphasizing the summer courses, scholarships, and fellowship programmes without mentioning Mutual Weapons Development Programme, and the construction of Anti-Submarine Research Center against the developments of submarine forces of the Soviet Union. In any case, countries were reluctant to share their authority in military research, despite French efforts. It is also possible because of NATO archives are partly confidential, it is difficult to assess Science Committee's involvement in military research and cooperation with other military research bodies of NATO. For example, NATO has a dedicated subgroup called Defense Research Directors, including a representative from the Turkish Army, Brigadier Fuat Uluğ, from the research council of Turkish General Staff (İlmi İstişare ve Araştırma Kurulu-İLAR), but the documents are not open to public, except one document. See AC/137-(DR)R1. Science Committee and Armaments Committee – Defense Research Directors.

²⁹¹ In terms of military research, NATO have already had established bodies that govern research in strategic areas at that time. Established in 1952, Advisory Group for Aerospace Research and Development (AGARD) is one of the most important research bodies of the Council that worked in the area of air defense, aeronautical research etc.

other hand, as discussed in the second chapter, the European Productivity Agency's (EPA) specific emphasis on applied research later developed in two ways, concerning the Turkish responses to these developments. The first one was the coupling of economic growth targets with manpower forecasting techniques via economic theories developed during these years, such as *residual factor* and *human capital* theory. The second one was related to improving science education.

For educational planning to economic growth, a series of OEEC activities was developed through the Office for Scientific and Technical Personnel (OSTP). These were related to the elaboration of the concept of "residual factor" in considering a nation's economic output, arguing that, not only the formation of capital and the modernization of production units were responsible for economic growth, but the educational capacity i.e. qualified personnel and technological development were also important for economic growth. After OEEC's reorganization, an OECD project was organized solely for developing countries, called *The Mediterranean Regional Project* which represented the most comprehensive one for educational planning. From Turkey, the first planners of SPO and some senior government officials participated in this project and published a country report with a 15-year perspective of projecting manpower needs. While the project did not have an impact on educational policies in Turkey except for a number of reasons, such as the resignation of SPO's first planners, although rather weak, these reports reflected the *policy logic* in educational planning.

3.2.2. OEEC/OECD Work on Scientific Manpower

The OEEC established a distinct office to address the challenges related to scientific and technical manpower. In response to earlier developments and the Sputnik shock, the Office for Scientific and Technical Personnel (OSTP) was formed in 1958. This office's origins go back to the *Ad Hoc Working Party No. 25*, which was initiated in response to the OEEC Council's specific request on scientific and technical manpower issues. This initiative not only focused on studying the scientific manpower problem but also drew inspiration from the Soviet approach to economic planning and development, as noted by Boel.²⁹² Its activities were later integrated into the Directorate for Scientific Affairs (DAS) after the reorganization of the OECD. OSTP's

²⁹² Boel, *The European Productivity Agency*, 74. See also footnote 77 in Boel's book, about the Soviet planning experience.

main activities were focused on what earlier OEEC activities on scientific manpower pointed to educational planning and educational reform. The *Mediterranean Regional Project* (MRP), on the other hand, was prepared as an experimental study of forecasting the educational needs of developing countries. In the context of earlier OSTP consultants' visits to Turkey, the MRP represented a turn in the understanding of the educational policies of countries.

3.2.2.1. The First OSTP Visit²⁹³

Before the implementation of the Mediterranean Regional Project in 1961, there were some visits by OEEC consultants paid to Turkey towards the end of the 1950s. A document of OSTP's governing committee discussed the draft operational programme i.e. prospective activities that may be developed in the coming year in 1960 including brief descriptive statistical data derived from the visit of Jean Capelle to Turkey in 1959.²⁹⁴ The assessment made by the STP governing committee highlighted the pressures of the rapid industrial expansion on the demand for scientific and technical professionals in Turkey.²⁹⁵ As the report indicated, this imbalance could be remedied through improved planning for manpower supply.²⁹⁶ It also indicated that Turkish authorities have shown interest in joining *the Mediterranean Regional Project*, which focused on evaluating the need for specialized personnel in economic development.²⁹⁷ This assessment was made to explore how OSTP may contribute to educational policy formation in Turkey. Thus, the Governing Committee's review consisted of recommendations, if any further activity would be developed for Turkey, this activity should include a study of the imbalance, the country's need for scientific and technical personnel, and a special plan on the expansion of higher education institutions.²⁹⁸ It also highlighted the immediate need for teachers and instructors at both university and

²⁹³ In the OECD archives, OSTP documents do not include the year 1959. As the focus in this chapter on the Mediterranean Regional Project and how it started in the first place, these documents would be valuable to assess the origins of educational planning in the OEEC and Turkey. However, as the year 1959 is absent, except certain programmes on Mathematics education, from the OECD Archives on OSTP documents, it is difficult to assess the context, how the MRP started, and what other visits paid to Turkey, and programmes for the country were developed during these years. This section describes an earlier visit of an OECD consultant to Turkey before the MRP began in 1961.

²⁹⁴ OEEC/STP/GC(60)54, "Governing Committee for Scientific and Technical Personnel, Annual Review – Follow-up by Operational Programmes Turkey" on 15th September 1960, 10.

²⁹⁵ OEEC/STP/GC(60)54, "Governing Committee for Scientific and Technical Personnel", 2.

²⁹⁶ OEEC/STP/GC(60)54, "Governing Committee for Scientific and Technical Personnel", 2.

²⁹⁷ OEEC/STP/GC(60)54, "Governing Committee for Scientific and Technical Personnel", 2.

²⁹⁸ OEEC/STP/GC(60)54, "Governing Committee for Scientific and Technical Personnel", 3.

secondary school levels, the shortage of technicians, and a thorough analysis of technical education improvements.²⁹⁹ Another key issue identified in the report was the salary differences between industry positions and teaching and researcher posts. For example, the report stated that “starting salaries for chemists in the industry reached as high as 3,000 Turkish liras at the time, while beginner university teaching roles offer around 800 liras, with little improvement when these instructors became professors”.³⁰⁰ As Turkey’s main manpower problem was the shortage of secondary school teachers, it was indicated in the report as well, the lack of 22,000 thousand teachers. For this reason, Turkey participated in OEEC’s *STP Project 8*, called “The Supply, Recruitment, and Training of Science Teachers at the Secondary School Level” during these years.³⁰¹ The report noted that Turkish authorities were implementing an “ambitious 12-year school-building initiative” aimed at fostering a literate and skilled workforce.³⁰² A central effort such as district planning, and finding ways through building research on reducing costs was also suggested.

The overall tone was focusing on the imbalance between the industry’s pressure on the supply of technical personnel and university graduates and its result in the shortages of teachers and instructors. An earlier visit by Jean Capelle, a French educationist, provided evidence to this report on school enrollment rates, for example, presenting data that by the age of 17, the schooling rate dropped to 3% at the time.³⁰³ For the part of university expansion, the report recalled the presence of 3,500 Turkish science students studying abroad, which may contribute to the country’s solutions to the manpower problem of the country, however again alerted the issue may be worsened when these students join in the brain-drain.³⁰⁴

In the international scene, these OEEC activities represent the first steps of how a highly qualified manpower problem was transformed into a *policy issue*. OSTP’s activities, in addition to EPA’s programmes for the promotion of applied research in economic growth, represent the second aspect of science policy frameworks. Before

²⁹⁹ OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 6-8.

³⁰⁰ OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 6.

³⁰¹ OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 3.

³⁰² OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 11.

³⁰³ OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 10.

³⁰⁴ OEEC/STP/GC(60)54, “Governing Committee for Scientific and Technical Personnel”, 8-9.

Turkey participated in OEEC's Mediterranean Regional Project, this earlier report set the scene for a policy logic on educational planning in Turkey.

3.2.2.2. OSTP Seminar for Policy for School Science in Istanbul

The seminar, as part of the *STP project no. 13*, took place in Istanbul in 1961 to address the educational needs of developing countries.³⁰⁵ It aimed to reassess educational policy goals considering recent scientific advancements and the future needs of the economy and society. The seminar advocated for adopting new approaches to traditional teaching methods and better utilization of both human and material resources. To effectively forecast educational needs across all levels, sectors, and regions, it is recommended that each country should establish a central planning and statistical office within its Ministry of Education.³⁰⁶ This office would create a comprehensive “educational map” and collect data that was essential for the formulation and execution of development plans in the education sector as a whole.³⁰⁷

In line with enhancing science and mathematics education in schools and improving technical education, the seminar also proposed the establishment of a Council for Scientific and Technical Education in each country.³⁰⁸ This council was suggested to represent the scientific, cultural, and industrial interests of the nation, to become a central office in science and technical education, while dealing with practical problems of teacher training, curriculum reform in sciences, and the provision of laboratory equipment and materials.³⁰⁹

In line with other specific programmes by the OSTP, for example, on mathematics education, the seminar suggested further educational reforms.³¹⁰ This included the seminar's recommendation on modernizing science teaching methods by reference to the developments in the United States such as the Physical Science Study Committee

³⁰⁵ OECD, *Policy for School Science: Report on the Seminar Organized by the Office for Scientific and Technical Personnel – Istanbul 14-23rd September 1961*. (Paris OECD, 1962). This was the second conference organized for “school science” following the Brussels conference on countries with advanced schooling systems. See page 7.

³⁰⁶ OECD, *Policy for School Science*, 9.

³⁰⁷ OECD, *Policy for School Science*, 9.

³⁰⁸ OECD, *Policy for School Science*, 10.

³⁰⁹ OECD, *Policy for School Science*, 23-24.

³¹⁰ OEEC/OSTP/TM/59.5. “Seminar on New Thinking in School Mathematics” on 15th September 1959.

(PSSC). Following this, the seminar suggested that science courses should be well-integrated, reflecting their interconnections with other educational objectives originating from citizenship rights.³¹¹ Specialization in courses should be introduced during the second cycle of education, with increasing time commitments as the curriculum progresses, but it should also prevent students from making premature choices.³¹² As there were also other problems related to school buildings and equipment, the seminar also called for the establishment of a “National Center for Science Equipment” in participating countries.³¹³

Key conclusions of the seminar emphasized the need to develop school and vocational training systems to meet the requirements of industries in developing countries with additional measures such as taxes on industry for the apprenticeship of technical students and industry’s contributions to school equipment.³¹⁴ It was deemed essential to foster close collaboration between industry and education systems to create coordinated and mutually beneficial development policies. Lastly, the seminar strongly advocated for systematic school orientation and observation, promoting guidance instead of selection to prevent premature choices of studies of children in earlier years of their schooling.³¹⁵

The seminar took place right after Turkey’s participation was secured by the visit of newly appointed OECD consultant, Frederick Harbison. A labour economist from Princeton’s Industrial Relations Section, Harbison joined the MRP and visited Madrid and Ankara in 1961, and the MRP national teams were also assigned, Necat Erder, SPO’s Social Planning Department’s head as the chairman of the Turkish national team.³¹⁶ Harbison’s initial report did not give any detail about the visits attached to this document except stating practical issues about the periodic meetings with national teams, as well as his expectation about the developing countries’ need for “imports” of managerial, scientific, and technical personnel in the future years.³¹⁷

³¹¹ OECD, *Policy for School Science*, 18-19.

³¹² OECD, *Policy for School Science*, 35-37.

³¹³ OECD, *Policy for School Science*, 62.

³¹⁴ OECD, *Policy for School Science*, 22-32.

³¹⁵ OECD, *Policy for School Science*, 83-87.

³¹⁶ OECD/STP/GC(61)25. “Mediterranean Regional Project (STP-22)”, 2.

³¹⁷ OECD/STP/GC(61)25. “Mediterranean Regional Project (STP-22)”, 8.

The MRP represents the OECD's efforts to implement quantification methods on educational planning similar to research evaluation schemes finalized with the Frascati Manual in 1963. OECD included a fellowship programme in the MRP programme, where young experts would be trained in educational forecasting techniques by participating in the preparation of country reports.³¹⁸ Even a training course was organized for the 20 MRP fellows who were deemed as "human resources strategists" at Frascati, Italy in 1962, under the auspices of Herbert S. Parnes, the expert who prepared the MRP forecasting techniques.³¹⁹

The methodology of MRP's forecasting techniques was prepared by Parnes, who was a visiting researcher to Harbison's department at Princeton Industrial Relations Section, considering the recent developments in the assessment of education and technological development's contribution to economic development. These developments show that earlier emphasis on "human factors" now became "human capital", management of human resources i.e. unaccounted sources of economic growth as a "third" or "residual factor", following the concerns of the mid-1950s about the shortage of highly qualified manpower.

Parnes' manual was published in 1962 by the OECD. As the training course itself was organized at Frascati, it is obvious that educational forecasting techniques were thought to be part of the development of data standardization about research which was later accomplished in the Frascati Manual. These data were expected to be comparable enough internationally to track developments in educational planning. Recalling what NATO's earlier reports suggested on international cooperation via standardization of data to urge countries, Parnes' attempt stood for the educational planning part of the general tendency. Considering this, Parnes' manual included recommendations for manpower forecasting as follows:

³¹⁸ OECD/STP/GC(61)25. "Mediterranean Regional Project (STP-22)", 4.

³¹⁹ Alexander King, "Foreword" in *Planning Education for Economic and Social Development*, edited by Herbert S. Parnes, (OECD Paris: 1962). This training course includes one lecture from Necat Erder titled "Forecasting Occupational Structure of the Turkish Labour Force" simply delineating SPO's educational planning techniques. See Necat Erder "Forecasting Occupational Structure of the Turkish Labour Force" in the same edition. 139-147.

- a) Prepare an “inventory” of manpower for the base year (e.g., 1960) classified by branch of industry and occupation, using an occupational classification system that differentiates as far as possible among occupations requiring different levels of education and, at the highest levels, between “ scientific” and “ general “ education.
- b) Forecast the size of the total labour force for the “target” year (e.g., 1975) and for the intervening period at five-year intervals.
- c) Estimate total employment in each sector and branch for the forecast years.
- d) Within each sector and branch, allocate total employment for the forecast years among the various categories of the occupational classification system/ Aggregating the requirements for each occupational category in all sectors and branches gives the total “stock” of manpower required for the forecast years classified by occupational category.
- e) Convert the data on requirements by occupational category into data on requirements by educational qualification. This is necessary because the several broad occupational categories cannot be expected to be homogeneous with respect to required educational qualification.
- f) Estimate the anticipated supply of personnel with each major type of educational qualification for the forecast years on the basis of:
 1. present stocks;
 2. anticipated outflows from the existing educational system; and,
 3. losses due to death, retirement and withdrawal from the labour force.
- g) Compute the change in annual outflow from the various levels and branches of the educational system necessary to create balance in the forecast years between (e) and (f).
- h) Calculate enrolments in each level and branch of the educational system necessary to achieve the required annual outflows.³²⁰

As the five-year economic development plans were prepared for a 15-year projection, the manual suggested forecasting the estimates of the formation of labour demographics. The classification of occupations and economic activity was prepared using the existing classification systems with slight modifications. For the industrial classification system, differentiating the type of economic activity, the manual stated that national directors agreed to use the *International Standard Classification of All*

³²⁰ Herbert S. Parnes, *Forecasting Educational Needs for Economic and Social Development*. (OECD Paris: 1962). 21-22.

Economic Activities of United Nations.³²¹ For the occupational structure, the manual suggested using the International Labour Office's classification system i.e. *International Standard Classification of Occupations*.³²² Occupational classification systems were divided into four broader classes, following Harbison's suggestion at a National Directors Meeting:³²³

"Class A: All occupations for which a university education or an advanced teachers' college degree, or its equivalent, would normally be required."

"Class B: Occupations for which two or three years of education beyond the secondary level (12 years) may be required."

"Class C: Occupations for which a secondary school education (either technical or academic), or its equivalent, would normally be required."

"Class D: All occupations not included in Class A, B, or C ". Furthermore, Class A occupations should be sub-divided into those that normally require scientific or technical education and those that require general academic education."³²⁴

The manual went forward with the possible ways to estimate employment trends in each sector, occupational structure, economic activity, and future trends of their contribution to national economic growth (i.e. share of gross national domestic product), and corresponding educational needs of these sectors in all classes of occupations mentioned above. The *Turkish Country Report of the MRP* prepared by Necat Erder, incorporated these classification systems with SPO's first five-year development plan, which already calculated growth numbers in each sector with appropriate manpower needs. The country report was published in 1965.³²⁵ İbrahim Öktem, Minister of Education at that time, wrote a preface to the report as the MRP inspired some further SPO projects including the preparation of scientific and technical manpower inventory and a simulation model on the Turkish educational structure, and a reform of university entrance system.³²⁶

³²¹ Parnes, *Forecasting Educational Needs for Economic and Social Development*, 24.

³²² Parnes, *Forecasting of Educational Needs for Economic and Social Development*, 25.

³²³ Parnes, *Forecasting of Educational Needs for Economic and Social Development*, 26. See Footnote 1, referring the OECD's Directorate for Scientific Affairs document called OECD/DAS/MRP/61.4.

³²⁴ Parnes, *Forecasting of Educational Needs for Economic and Social Development*, 26

³²⁵ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*. (OECD Paris: 1965).

³²⁶ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 11-12. İbrahim Öktem can be recalled from the TUBITAK legislation process at the senate in the second chapter, and the position of the MNE's worded opposition on preventing TUBITAK's interference on academic freedom to do research.

3.2.2.3. Turkish Country Report of the Mediterranean Regional Project

Turkey's participation in the *Mediterranean Regional Project* represents the rather weak *policy logic's* introduction to Turkish national education policies. As this report incorporated earlier developments concerning the data collection of research personnel and the attempts to forecast the future development of the outcome of educational systems, it is obvious that the trajectory of science policy review mechanisms was developing in a much more integrated way during these years. In accordance, one of the first planners of SPO, Necat Erder wrote this rather comprehensive report, but probably because of the prevalence of an academic logic leaning towards reproducing the "right kind of minds" did not consider this project.

The report examined educational challenges in terms of forecasting manpower needs of economic and social development which was debated earlier among the OECD circles and later accomplished by Herbert Parnes' Manual, as discussed above. To give a historical context, Erder also provided a social and historical context influencing Turkey's educational system at the time. For example, he analyzed the educational demands of different social strata by employing Daniel Lerner's modernization theory, which identified three different categories of "traditionals", "transitionals" and the "moderns". Erder discussed these categories within the perspective of the ongoing modernization process to provide explanations of the educational demands of each category.³²⁷ After pointing out the problematic aspects of such categorization, whether how to define who were the traditionals and moderns³²⁸, Erder discussed the "traditionals'" educational demand in terms of regional differences, the values they attributed to education in contrast to paternal inheritances, and religious values. "Traditionals" were the rural population of the country, the peasants consisting 77 % of the population at the time. He went on to describe the practical positioning of this

³²⁷ For example, Erder discussed the "moderns" attitude towards possible career paths and thus educational preferences on the rising "prestige of engineering" in contrast to early government positions: See page 67. On "transitionals", as one of its type as "esnaf", a small scale handicraft producer or merchant or "habitants at the shanty town mushroomed around the urban centre", skilled industrial worker, Erder analyzed that these strata of Turkish society did not aim for top "educational facilities", because of their lack of material and motivational resources, while trying to prevent their children from "blue-collar works", similar to concerns over status and prestige, see page 70-71. For the educational demand discussion of traditionals, moderns and transitionals, see OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 65-73. On Lerner see: OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 60.

³²⁸ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 61

group on acquiring mobility opportunities, strategizing on whether education could provide such opportunities for upward mobility against becoming the household's "domestic servants".³²⁹ Erder concluded his analysis by implicating that the traditionals' attitude towards education was changing and "shapeless", negotiated in the matrix of aforementioned conflicting values and practical aspirations for a better life.³³⁰ On "moderns" attitude towards possible career paths and educational preferences, Erder reported the "rising prestige of engineering" in contrast to early aspirations for government positions, followed by higher education facilities providing training in economics and business.³³¹ This group was the urbanized higher strata of the Turkish population. He discussed "the moderns'" attitude by presenting data on the parental social class background of university students at the faculty of political science, presenting almost 70 % of students coming from the "upper reaches of the Turkish social pyramid".³³² Erder attributed greater emphasis on "the transitionals", as this group would share the greater part of the demand for education in the process of modernization and urbanization. According to Erder, the main typology of this social group consisted of the first-generation urbanized skilled industrial labour force and/or small-scale handicraft producers, "esnaf", who have had the chance to participate in politics after 1950s multi-party elections, upholding traditional values in contrast to the country's ideological preferences on secular education.

Erder's report has suggested a number of practical solutions to Turkey's manpower problems and educational planning issues. These suggestions were for example improving the status of both teachers and scientists while expanding the higher education system, which is a solution to the industry's demand for qualified manpower. The MRP was an experimental project for educational planning and manpower forecasting techniques developed for Greece, Turkey, Portugal, Yugoslavia, Spain, and Italy. The earlier emphasis on *human factors* became a concern on *human capital* and education's role in economic growth known as a *residual factor*.

³²⁹ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 63. For the whole discussion on "traditionals" see 62-65.

³³⁰ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 65.

³³¹ OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 67-68.

³³² OECD, *Country Reports: The Mediterranean Regional Project – Turkey*, 69.

3.2.3. Dependency on Foreign Abroad: TUBITAK Reports on “Students Abroad”

As early as 1929, Turkey was implementing a programme for training scientists, engineers, and other technical personnel for government organizations via an act designed this year.³³³ Under this act, SPO development plans for 1963-1967 and 1968-1973 aimed to send 500 doctoral students abroad each year. The second five-year development plan noted that shortages in faculty members at higher education institutions constrained the expansion of higher education during this period.³³⁴ In fact, during the first development plan, the intended number of doctoral students of 3000 actualized as nearly 500 students.³³⁵ Despite the programme’s shortcomings, the Second five-year plan also intends to send 3000 doctoral students abroad to train future faculty members of Turkish Universities between 1968-1972.³³⁶

Arif Türkeli, from TUBITAK's Science Policy Unit, prepared a report analyzing the 1416 program's effectiveness, which is part of a broader evaluation of national research policy. Türkeli criticizes the SPO’s projection of sending 3000 students abroad, particularly questioning the accuracy and composition of the actual numbers in various disciplines. Despite attempts to obtain information from SPO officials on how these disciplines were selected, he received no results. Türkeli then developed a detailed method to assess the existing policy, focusing on priority areas and identifying shortages in scientific and technical manpower. His analysis reveals significant projected shortages in specific fields, including 44.6% for architecture and construction engineering, 28.4% for mechanical engineering, and notable deficits in medicine and basic sciences. These projections, based on a fifteen-year outlook, highlight that the primary shortages are in engineering branches.³³⁷

Similarly, the programme for sending students abroad issued by SPO consists of 40 % of engineers, 20 % of basic scientists, 18,4 % of managers, 12 % of medical personnel, 5 % of social scientists, and 4,6 % for agriculture. While criticizing how SPO decided

³³³ “Ecnebi memleketlere gönderilecek talebe hakkında kanun” *Resmi Gazete*, 16th April, 1929

³³⁴ DPT, *İkinci Beş Yıllık Kalkınma Planı* 1967-1972, Ankara: TC. Başbakanlık, 1967, 161.

³³⁵ DPT, *İkinci Beş Yıllık Kalkınma Planı* 1967-1972, 166.

³³⁶ DPT, *İkinci Beş Yıllık Kalkınma Planı* 1967-1972, 170

³³⁷ Arif Türkeli, *Yüksek Seviyeli Bilim Adamı ve Teknisyen Yetiştirme Çabaları ve Bugünkü Politika*. Series II in a report on National Research Policy. TUBITAK BPU: Ankara, 1972.

these numbers, Türkeli also points out the problem of creating posts for these 3000 students at Turkish universities, as this requires the financial expansion of the higher education system by almost 50 % despite the investments not being realized as indicated in the plans.³³⁸

In 1973, an additional report by Şefik Uysal, a member of TUBITAK's Scientists Training Group (BAYG), conducted a study concerning the 1416 Act programme of students sent abroad, via the 1416 Act. The research focused on assessing the effectiveness of this law, which was deemed limited in scope by the BAYG group.³³⁹ The manpower issue was critical for economic development, primarily driven by investments in education. According to SPO's plan, the amount spent on education is 14 billion Turkish Liras³⁴⁰, emphasizing the necessity of effective employment planning. It was indicated that the manpower problem was important for two reasons: investment and workforce planning.³⁴¹

Since higher education institutions began offering graduate education much later, some academies in economic and commercial sciences that granted graduate degrees were considered significant sources of specialized manpower. The second source was students sent abroad. According to Uysal, despite providing graduate education for many years, university programs in Turkey often lack the breadth needed to meet the demand for specialized manpower across public and private sectors.³⁴²

Thus, it was revealed that university programmes were insufficient quantitatively to produce the specialized manpower required by public institutions and the private sector. This inadequacy is explicitly stated in the Third Five-Year Development Plan: "Higher education will be directed to train high-quality personnel required for economic, social, and cultural development in the long term".³⁴³ From 1963 to 1971, only 1,181 students were sent abroad for graduate education, distributed by field as follows: 20% in social sciences, 27% in management and administration, 17% in

³³⁸ Türkeli, *Yüksek Seviyeli Bilim Adamı ve Teknisyen Yetiştirme Çabaları ve Bugünkü Politika*, 1972

³³⁹ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, TÜBİTAK BAYG, 1973, iii.

³⁴⁰ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, TÜBİTAK BAYG, 1973, 2.

³⁴¹ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, TÜBİTAK BAYG, 1973, 2.

³⁴² Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*.

³⁴³ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, 4.

agriculture and veterinary sciences, 7% in health sciences, 12% in engineering, 10% in basic sciences, and 7% in other fields.³⁴⁴ The study also noted a lack of comprehensive data on these scholarships, with Türkeli's study being cited as one of the few reliable sources on the quantity of students sent abroad.³⁴⁵ As of April 12, 1971, this total was 8,336 students, with 2,338 pursuing doctoral degrees and 5,998 in pre-doctoral education.³⁴⁶

Considering the findings, Uysal made some specific recommendations that the programme established under the 1416 law should be thoroughly reviewed based on the collected data in his report, government agencies that were benefitting from the programme should prepare long-term planning for specialization and manpower needs to ensure the program's effectiveness. The Act should focus solely on doctoral and post-doctoral fields, given the importance of specialization. The implementation of the 1416 Act should be transparently communicated to ensure appropriate applicants could respond effectively and a centralized body should manage the scholarship examination process, taking holistic criteria into account.³⁴⁷

3.3. The Establishment of Ankara Science High School

The initiative for the establishment of a Science High School on the model of a similar American high school was suggested by Ford Foundation representative, Eugene Northrop to government officials in 1964.³⁴⁸ These officials including Kemal Kurdaş and Turhan Feyzioğlu, former METU rector, and then Ministry of National Education have found the idea intriguing as the Science High School was designed to be established within the METU campus. Under the Ford Foundation's sponsorship, some Ministry of Education officials visited the United States to draw up a programme for this initiation. In 1962, the Ministry of National Education established a commission to prepare a feasibility report, and based on their recommendations, construction of a school building for 300 boarding students began. It was planned that the 100 most successful students, selected through a nationwide exam, would be

³⁴⁴ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, 5.

³⁴⁵ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*.

³⁴⁶ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, 5.

³⁴⁷ Şefik Uysal, *Yurtdışında Yetişen İhtisas Gücü*, 16.

³⁴⁸ Ali Erken, *Amerika ve Modern Türkiye'nin Oluşumu*. Trans. Ebru Kılıç, Vakıfbank Kültür Yayınları, (2018) 126.

admitted to the school every year. Due to changes in ministers, there was a brief delay, but in 1962, the Republican People's Party and the Justice Party formed a new government, and the new Minister of National Education, Hilmi İncesulu, approved the establishment of the school.³⁴⁹

In 1963, the Ministry of National Education, the Ford Foundation, and ODTÜ signed an agreement for the development of science high schools. The curriculum development was made on the earlier movement in the United States, concerning the problem of scientific manpower first in the mid-1950s, as can be identified from NATO's involvement, and Sputnik's launch in 1957. For example, the physics curriculum was projected to be reformed on the *Physical Science Study Committee's* (PSSC) textbooks which were produced during the earlier science education reformation in the United States.³⁵⁰ During and after Ankara Science High School's establishment in 1964, TUBITAK's Scientists' Training Group's almost all projects were developed to reform science education in the country.

3.3.1. BAYG projects on the High School Education Reform

From 1964 to 1989, TUBITAK's Scientists Training Group (BAYG) focused extensively on the *Ankara Science High School project* and the broader goal of enhancing science education in Turkey. The Ankara Science High School served as a model for curriculum development, which was tested through various BAYG projects and subsequently implemented in other pilot high schools. The most funded TUBITAK projects by BAYG during this period include: BAYG E7 (1967-1968) BAYG E14 (1968-1971) BAYG E23 (1971-1976) BAYG E33 (1976-1980) In total, BAYG funded five long-term projects on Ankara Science High School, from 1964 to 1989 (see table 3.3). Among these, three projects were coordinated by the Ministry of National Education (MNE), which can be considered *government research*. Additionally, scientists from METU and Ankara University's Department of Educational Sciences developed 16 more projects covering various aspects of secondary education. These projects consisted of mechanisms for student selection, IQ testing, curriculum adjustments, and addressing the needs of highly intelligent students

³⁴⁹ Erken, *Amerika ve Modern Türkiye'nin Oluşumu*, 120-126.

³⁵⁰ Alperen Yalçınkaya, "Constructing a "Scientific Manpower Crisis": Science Education and the Ford Foundation in Cold War Turkey, *History of Education*, 4.

at Ankara Science High School, as well as mathematical and critical thinking assessments.³⁵¹

Table 3.3. BAYG Projects with MoNE

Project	Project Title	Accepted-Finished	Coordinator	Funding (TRY)	Funding USD
BAYG E-7	Research on the Implementation of Advanced Science Teaching Programs Developed by Science High Schools in Other Turkish High Schools	July 1967-August 1968	MNE	787,000.00	\$823,492.00*
BAYG E-14	Further development of the Curriculum	September 1968-March 1971	MNE	2,581,222.79	\$258,122.20
BAYG E-23	Experimentations on Mathematics Education and Further Development	July 1971-July 1976	MNE	3,000,000 TRY + 288,948.20 USD	\$2,893,000.00
BAYG E-33	Final Development	June 1976-July 1980	MNE	7,800,000	\$999,782.00

*Note: These numbers are adjusted to exchange rates in accordance with the Central Bank exchange values.

³⁵¹ BAYG E1, BAYG E4, BAYG E11, BAYG E26, BAYG E28, BAYG E52 are all individual projects by scientists from educational sciences departments of METU, Ankara University, and Hacettepe that developed achievement and evaluation tests of high school students' attainment in courses. These scientists were Süleyman Çetin Özoğlu from BAYG with three projects, as he was BAYG's chairman between 1966-1974, Hacettepe University Psychology professor, Hüsnü Arıcı with two projects, and Durmuş Ali Özçelik and Fethi Toker with one project in 1982, see TUBITAK, 25. *Yılda TÜBİTAK*, Ankara, (1989) 438-469.

As can be seen from Table 3.3, TUBITAK and MoNE cooperation mostly focused on improving science education by reforming the curriculum in secondary schools. Despite earlier reports prepared by SPO and TUBITAK's officials about the country's need for reformation in producing scientific and technical manpower, an academic logic focusing only on science education was prevalent during these years. Most of the government research prepared by TUBITAK's BAYG and funds were spent on science education, it is possible to suggest that a national education policy based on producing "the right kind of minds" was dominant in these years.

3.4. Preliminary Conclusion

In this chapter, I argued that the United States' perception of a threat to the expansion of Soviet higher education capacity has led to the creation of a further chapter in the formation of the transnational organizational field of science policy. As I showed, this perception, first led to the creation of NATO's Science Committee and guided the OEEC in collecting statistical data on qualified personnel in member countries. Following this, as part of the development of the research evaluation manual, the Frascati Manual, a forecasting and educational planning programme was developed among the OECD circles, specifically for developing countries such as Turkey, Greece, and Portugal, the *Mediterranean Regional Project*. This project was the further step towards incorporating data collection and forecasting scientific manpower production, first, in terms of educational planning, but also as part of the development of science policy schemes. During the implementation of the project, a number of visits by OECD experts have been made to Turkey, which culminated in the country report, prepared by Necat Erder, SPO's head of the Social Planning Department. As I argued in this chapter, Turkey was dependent on training its scientists, engineers, and technical manpower through a programme via sending students abroad. This programme was criticized by TUBITAK officials in the 1970s under SPO's directive for the evaluation of the 1416 Act. Despite these critiques, TUBITAK's BAYG and the MNE officials, following the establishment of Ankara Science High School, dedicated their resources to developing science education and curriculum reform. As I argued in the introduction, this reflects the prevalence of academic logic emanating from the idea of producing the "right kind of minds".

CHAPTER 4

THE INTERPLAY OF ACADEMIC AND POLICY LOGIC IN DEFINING SCIENCE POLICY OF TUBITAK (1963-1983)

4.1. Introduction

This chapter analyzes the inner politics of TUBITAK and the struggle over the means to define TUBITAK's position on science policy. TUBITAK's legislation embedded the two institutional logics, academic and policy logic, into the organizational form coexisting together until 1983, under the banners of a strong Secretariat and Science Committee. The regulation made by the Senate on TUBITAK's first draw bill on the first act defining TUBITAK's establishment rationale i.e. not only promoting and supporting but also "coordinating and making research" realized fragmentarily via the establishment of Marmara Scientific and Industrial Research Institute (MSIRI) which officially formed in 1972. Additional regulations such as the delegation of the secretary-general as one of the members of the Science Committee, its appointment via dual decree signed by the president and prime minister which was not present in the first draft bill sent to the Senate by the Assembly, enabled the position of secretary-general as a separate administrative role with certain powers, not subjugated under the Science Committee's vast powers. Following this, the establishment of MSIRI (today Marmara Research Centre-MRC) was accomplished largely by the first secretary-general, Mehmet Nimet Özdaş. Attached to the secretariat, the Science Policy Unit was formed, and it developed inventories of research expenditure and statistical data on research organizations and researchers, which was used as the basis of legitimacy for the establishment of MSIRI and applied research units. In addition to that, MSIRI's applied research units such as operational research, electronics, chemical engineering, nutrition, and food engineering research units developed their activities under the working programme prepared by Nimet Özdaş in line with the MSIRI's terms of

reference. A separate research institute for building research was already designed to be established way before the 1960s under the Ministry of Public Works³⁵², attached to TUBITAK in 1969. Although there is no detailed information about the activities of the Guided Vehicles Technology and Measurement Institute (Güdümlü Araçlar Teknoloji ve Ölçüm Merkezi)³⁵³ for defense research and development was also established in 1972. MSIRI's research units and Institutes made *contract research* mostly with State Economic Enterprises, as the absence of the industry's R&D activity "forced"³⁵⁴ the government to take up the issue. In addition to those government research projects, MSIRI's research units were constant applicants of the OECD's Technical Aid and NATO's research projects such as the Science for Stability Programme.³⁵⁵

The introduction and development of policy logic are accomplished through the routinization of project management via defining the principles of research contracts, conditions on the acceptance of research proposals including their prospective impact, and the limit on the length and conditions on the renewal of contracts were subtle activities of what the dialectical relationship between *practice work* and *boundary work*. Thus, the transformation of TUBITAK towards a policy logic in the 1980s occurred in parallel with fragmented research policies of applied research units and activities such as the collection of data on research indicators, standardization of TUBITAK's project management, and inner review reports prepared by Operational Research Unit and Science Policy Unit. Government research projects and routinization of TUBITAK's activity represent practice work during these years,

³⁵² Ergun Türkcan, *Dünyada ve Türkiyede Bilim Politikaları*, 599.

³⁵³ This research center became Ballistics Research Center in 1983, and Defense Research and Development Center in 1987.

³⁵⁴ "Forced" because Nimet Özdaş explains the reason to establish MSIRI because of the absence of industry's R&D activities. I will discuss the rationale and working programme of the MSIRI in the following section.

³⁵⁵ Science for Stability Programme was formed for the developing countries of NATO i.e. Turkey, Portugal and Greece in 1980s in line with NATO's focus on environmental issues developed in the late 1960s and 1970s, as well as developing country delegates' request to be involved more in NATO research spendings. Until that time, NATO Science programmes such as summer schools and courses were mostly populated by students from developed countries, as Krige points out. See: John Krige, "NATO and the Strengthening of Western Science in the Post-Sputnik Era", *Minerva* 38, (2000) 96-97. After the NATO's focus shifted on environmental issues, Turchetti discusses in detail the positions of Turkey, Italy, and Greece. See: Simone Turchetti, *Greening the Alliance: The Diplomacy of NATO's Science and Environmental Initiatives*, The University of Chicago Press, (2019) 139-144. Özdaş held important positions at NATO Science Committee beginning in 1964, including the Committee on the Challenges of Modern Societies, and as the chairman of Science Committee and scientific adviser to Secretary-General of NATO.

expanding the role of applied research although fragmentarily. The positioning of Science Committee members, i.e. academic logic on the other hand, voiced on certain occasions against external pressures and the delayed inner activities of producing a general government paper on science policy, as part of the *boundary work*. These qualitative differences are not visible at first hand, similar to the legislation process held at the Assembly and the Senate took different ways via *Ad Hoc* Committees. For example, the first president of the Science Committee, Cahit Arf's preference for a largely autonomous science policy organization during the legislation is indicated years later in Erdal İnönü's memoirs. İnönü recalls Arf's words: "In countries like ours, where there is not yet a scientific tradition, it is dangerous to give a central organization the authority to direct research through subsidies".³⁵⁶ On the other hand, Erdal İnönü, Bahattin Baysal, and Cengiz Uluçay, three professors met with Sami Küçük on the establishment of a science policy organization was interested primarily in promoting the spirit of research/science in the country.³⁵⁷ These ideas represent the main locus of academic logic which a research organization must emphasize.

In consideration of the academic logic, the members of the Science Committee voiced their objections openly on preserving TUBITAK's academic logic i.e. the autonomy of the Council and presumably the freedom to research, at occasions of external pressure from the government circles. In other cases, however, all of the former practitioners in their memoirs and anniversary speeches, only subtly remark on inner differences in science policy. For example, Ergun Türkcan recalls an incident in a footnote to his book, after the Science Policy Unit invited a famous policy expert Stevan Dedijer to Ankara for a speech in 1972, which Secretary-General of that time, Muharrem Miraboğlu gave a proper talk questioning Dedijer's talk on technological forecasting and Türkcan's initiative.³⁵⁸ The resistance of supporters to academic logic was mainly in the form of implicit objection and delaying the inner workings of TUBITAK. However, the general tone towards the government's intervention i.e. a kind of policy logic, into the university's activities can be summarized in SPO's first

³⁵⁶ Erdal İnönü. "Cahit Arf'tan Anılar" in *Bilim ve Teknik, Special supplement in the memory of Cahit Arf to the issue 363*, (1998), 19. A special supplement to this issue was prepared for Cahit Arf's memory after his death in December 1997, including writings of Erdal İnönü, Halim Doğrusöz, Nimet Özdaş, Refet Erim, Tosun Terzioğlu, and his friends. A similar quote of Arf's words is recalled in Erdal İnönü's memoir. See: Erdal İnönü, *Anılar ve Düşünceler Cilt 3*, Doğan Kitap: 2001, 467

³⁵⁷ Erdal İnönü, *Anılar ve Düşünceler Cilt 3*, 2001

³⁵⁸ Ergun Türkcan, *Dünyada ve Türkiye'de Bilim Politikaları*, 532

chairman, Atilla Karaosmanoğlu's experience with Istanbul University professors. On the occasion of TUBITAK's 35th year and 75th Anniversary of the Republic of Turkey, Karaosmanoğlu recalls his inquiry on the possibility of expanding graduate studies with the professors to meet the five-year development plan objectives, and their answer of "mind your business, the university would plan its graduate programmes in its terms".³⁵⁹ Another incident that shows a strong academic logic that leans on mostly basic positive sciences, Karaosmanoğlu recalls the incident took place during the colloquium on the programming of building research in 1966, which was developed in the line of Turkish report of the OECD's Pilot Teams Project, Cahit Arf, Erdal İnönü, and Mustafa İnan called Karaosmanoğlu "you do not sound like a social scientist" which Karaosmanoğlu first thought as a reprimand, years later learned from TUBITAK's president between 1992-1997, Tosun Terzioğlu, that their intentions might be the opposite hinting "mind your own business".³⁶⁰ The same story might be relevant to the establishment of a similar research council in social sciences which was never accomplished, probably on the model of France's Economic and Social Council³⁶¹ about the prominence of basic positive sciences amongst the scientific community in Turkey during those years.

In this chapter, I discuss how MSIRI was established as a distinct research institute in the organization of TUBITAK with historical details on how Nimet Özdaş was appointed as the sole authority on the institute, how MSIRI adopted a contract-research-centered organization. MSIRI's unique position was related to Nimet Özdaş's concerted efforts on the grounds of, for example, his undertaking of various MSIRI-related issues "in the name of the Science Committee". Following this Nimet Özdaş introduced seemingly small yet innovative ways to enhance MSIRI's practice work such as project evaluation schemes which would be adopted as routinized activity in TUBITAK and the MSIRI. Özdaş also developed the institute around a project-based organizational form, as research units undertook large government projects for State

³⁵⁹ TÜBİTAK, *Cumhuriyetimizin 75. Yılında Anılarla TÜBİTAK*. TÜBİTAK, (1998), 24.

³⁶⁰ TÜBİTAK, *Cumhuriyetimizin 75. Yılında Anılarla TÜBİTAK*, 26. In this speech Karaosmanoğlu states Terzioğlu as "a friend from TUBITAK", in his memoirs he gives Terzioğlu's name. See Atilla Karaosmanoğlu, *İzmir Karşıyaka'dan Dünyaya*. Türkiye İş Bankası Yayınları, (2005), 187. Karaosmanoğlu was invited this anniversary because of his role in the establishment of Science Policy Unit at TUBITAK during his military service when Nimet Özdaş invited him in 1965. His work was rather short as he went to work at OECD's Directorate for Scientific Affairs in the same year.

³⁶¹ Vedat Milor, *A Comparative Study of Planning and Economic Development in Turkey and France: Bringing the State Back In*, PhD Dissertation, University of California, Berkeley, (1989), 156.

Enterprises in the form of contract research dedicated to technology development. The workings of the Operational Research Unit and Science Policy Unit produced inner reviews advocating for a formulated science policy around a policy logic developed for economic growth, instead of freedom to research. In addition to these inner critiques, a series of other government agencies produced reports about the problems of science policy, designating TUBITAK, for example, under the Ministry of Industry and Technology, which was reorganized in 1971. Thus, this chapter consists of three main sections: in the first section, I discuss the establishment of the MSIRI and research units with details on their research projects as part of the practice work. In the second section, I provide information about the external government reports and inner critiques of the Science Policy Unit and Operational Research Unit. In the final section, I show the initial transformation of TUBITAK as the executive organ of the Supreme Council of Science and Technology (SCST) and its implications for the policy logic. Discussing these sections, I show the instances of academic logic in the form of implicit and/or explicit ways, for example, in anniversary speeches or the memoirs of former TUBITAK officials. After the initiation of SCST in 1983, the following period until 1990 represented an unstable time, as the TUBITAK legislation went through several regulations. The two conflicting logics were quite explicit in the private exchange of ideas, professors on the one hand and the Ministry of State on the other. The settlement of the problems in 1990 was accomplished with Kemal Gürüz's appointment to the presidency of TUBITAK, who addressed the importance of legitimacy in assuring the consent of the scientists.³⁶²

4.2. The Establishment of Marmara Scientific and Industrial Research Institute

MSIRI's history is entangled with Nimet Özdaş's trajectory in building close relationships with international organizations such as NATO and OECD, his introduction of mechanisms for project management, and the organization of MSIRI around project-centered research schemes, which paved the way for Özdaş's career as a science administrator. Considering the early developments of the relationship between governments and science systems as discussed in the second chapter, these science administrators played the role of institutional entrepreneurs introducing and developing policy logic in various transnational organizations. The definition of an

³⁶² Kemal Gürüz, *Aklımdan Başka Silahım Yok ki: Hatırladıklarım, Düşündüklerim ve Değerlendirmelerim*. Kakitap, (2015), 138-139.

institutional entrepreneur as of achieving the proposed changes in the institutional logic, Nimet Özdaş can be considered one of the most important carriers of policy logic in TUBITAK's history and Turkish science policy.

Nimet Özdaş was a professor in the faculty of mechanical engineering at Istanbul Technical University (ITU) when Cahit Arf first communicated with him for the position of secretary-general at TUBITAK in 1964.³⁶³ He graduated from ITU Mechanical Engineering in 1955, had his PhD from Imperial College of London³⁶⁴, and was a visiting researcher at Case-Western Reserve University³⁶⁵ and Massachusetts Institute of Technology in the late 1950s, he also established the chair of Automated Control at ITU. When Cahit Arf visited him in 1964 for the position, he was working for Turkish Automotive Industries and was also the founding manager of ITU's Electronic Calculating Centre.³⁶⁶ Özdaş's close affinity with industry, his profession as an engineer, and his role at TUBITAK in addition to his experience at the American universities must be influential in his later career, such as his delegation to NATO's Science Committee beginning in 1965³⁶⁷, his initiatives when a project developed for NATO's Committee on the Challenges of Modern Society about air pollution in Ankara³⁶⁸, as well as his ascension to the chairmanship of NATO Science Committee and scientific adviser to NATO Secretary in 1973 to 1979, and his return to the country as the Ministry of State responsible for TUBITAK and Turkish Atomic Energy Agency after the coup in 12th September 1980.

Özdaş was the first secretary-general of TUBITAK, but his work at the secretariat was a part-time duty as his main post was the professorship at ITU. He worked as the secretary-general between 1964 and 1966. Following this year, he was appointed to the Engineering Research Group at TUBITAK in 1967 and later became a Science Committee member in 1968. Even though his work was short period, he was the

³⁶³ Mehmet Nimet Özdaş, *TÜBİTAK'ın İlk Yılları: Bir Enstitünün Doğuşu*, (1998), 2

³⁶⁴ Alexander King, the director of OECD's DAS was also graduated from this university. Although not known in detail, a close affinity must be established between King and Özdaş, as he indicates in his memoir. See: Mehmet Nimet Özdaş, *TÜBİTAK'ın İlk Yılları*, 17.

³⁶⁵ Case-Western Reserve was hosting prominent names of operational research at the time including Russell Ackoff. Halim Doğrusöz also completed his PhD under Glen D. Camp at Case-Western Reserve, as discussed in the second chapter.

³⁶⁶ Özdaş, *TÜBİTAK'ın İlk Yılları*, 2.

³⁶⁷ Özdaş, *TÜBİTAK'ın İlk Yılları*, 25.

³⁶⁸ Özdaş, *TÜBİTAK'ın İlk Yılları*, 66-71. He was also appointed as the chair of NATO's Committee on the Challenges of Modern Society in 1973. See: Özdaş, *TÜBİTAK'ın İlk Yılları*, 79, and his appointment as the chair of NATO Science Committee, 108-111.

initiator of the establishment of a Science Policy Unit attached to the secretariat in 1964. As he recalled his first Science Committee meeting in 1964, Özdaş intervened in eight long-term research projects confirmed by Cahit Arf, proposed by the members of the Agriculture and Forestry Research Group for 30 years, including eight Jeeps for each project.³⁶⁹ Similar to American and European project evaluation schemes as Özdaş indicated, a project application form was prepared right after this incident titled “Guidelines for Evaluating and Tracking Research Projects” which bound the confirmation of research projects to certain criteria by TUBITAK.³⁷⁰ While pointing out he did not have such quarrels with the Science Committee or its chairman during his work, Özdaş explained the reason why his successor secretary-generals’ duty was almost always short-period as these names could not work in harmony with the Science Committee during those years.³⁷¹ After Özdaş, TUBITAK had four secretary-generals in four years until Muharrem Miraboğlu’s appointment in 1970, as none of them even completed one year.³⁷²

The origins of the idea for the establishment of an industrial research institute are rather unknown, but there must be a consensus on establishing such an institute amongst the government circles in addition to a Building Research Institute which was already wished to be established.³⁷³ As early as 1964, the United Nations Industrial Development Organisation (UNIDO) prepared seminars on industrial research and development institutes in developing countries.³⁷⁴ In the same manner, Özdaş recalled his wishes not to be too late for the establishment of MSIRI. A survey of R&D activity by sectors and statistical data on researchers was collected in 1965 by the Science Policy Unit. A founding ad hoc committee also formed by the Science Committee appointed to work on the establishment of the Institute in the same year consisting of Özdaş, Halim Doğrusöz, and Refet Erim. According to the survey, there were 3700 researchers at universities and other research organizations in 1965. Most of the

³⁶⁹ Özdaş, *TÜBİTAK’ın İlk Yılları*, 7.

³⁷⁰ Özdaş, *TÜBİTAK’ın İlk Yılları*, 8.

³⁷¹ Özdaş, *TÜBİTAK’ın İlk Yılları*, 8.

³⁷² Özdaş, *TÜBİTAK’ın İlk Yılları*, Appendix 2, 114. These names were Mustafa Uluöz, the initiator of Nutrition and Food Engineering Research Unit in 1966, Mecit Çağatay served as substitute in 1967, Halim Doğrusöz in 1968, Kazım Ergin in 1969.

³⁷³ TÜBİTAK. *Danışma Kurulu Toplantısı*, (29 March 1965), 20-21.

³⁷⁴ UNIDO. *Manual on the Management of Industrial Research Institutes in Developing Countries*, United Nations, (1966), iii. While the manual was published in 1966, the seminar took place in Beirut, 1964.

research expenditure, 247 Million Turkish Liras in total, was spent by the government on education routinized testing and small-scale research projects, while only 4 Million Turkish Liras were allocated to R&D by the industry.³⁷⁵ Research expenditure was aimed to be %1-2 of GDP during these years by various transnational organizations, while Turkey's share of research in GDP was only %0.37 at the time.³⁷⁶

These survey results were employed in a report prepared for the establishment of MSIRI and presented to the Science Committee by Özdaş to secure the legitimacy of establishing such an Institute. The issue was the absence of the industry's role in R&D and the government's needs in certain areas relating to five-year development plans in certain sectors. There were also other reasons such as the expectation of joining the European Economic Community, predecessor of the European Union in those years, thus industrial production must meet certain standards to be competitive. The report was translated into English by the International Relations Unit of TUBITAK in 1966.³⁷⁷ This translation was employed for applications to foreign aid from UNIDO, NATO, and OECD's Technical Aid schemes. A research unit for operational research, materials research, applied mathematics, and electronics research were the first initiations of the MSIRI. Özdaş also addressed TUBITAK's wishes to establish an institute at various international organizations, while experts from these organizations evaluated the construction of the campus and the equipment of designated research units. For example, Özdaş, Hikmet Binark, and Mustafa İnan visited France, the Netherlands, and Norway to inspect industrial research institutes in these countries i.e. French Centre National de la Recherche Scientifique (CNRS), the Netherlands's TNO, and Norway's Council for Scientific and Industrial Research Council (NTNF).³⁷⁸ Probably on the experience of CNRS forming research units at correspondent universities funded by the Centre itself, Özdaş proposed a memorandum to the Science Committee³⁷⁹ to establish proposed research units at different universities such as Applied Mathematics and Materials Research at ITU (1968), and Electronics at METU

³⁷⁵ Özdaş, *TÜBİTAK'ın İlk Yılları*, 36-37.

³⁷⁶ Özdaş, *TÜBİTAK'ın İlk Yılları*, 37.

³⁷⁷ TUBITAK. *Report on the Research Institute*. Ankara, TUBITAK, 1966[1973].

³⁷⁸ Özdaş, *TÜBİTAK'ın İlk Yılları*, 48-49. For the visit to Norway, Özdaş mentioned his meeting with Mr. Major. This must be Robert Major, who prepared the report on scientific manpower problem for the Committee of Three, which started the initiative to establish NATO's Science Committee.

³⁷⁹ He indicates the archival code of the document, GNS 66/18, however I do not have access to Science Committee documents.

(1969), and later Nutrition and Food Engineering (1971) at Ege University before the construction of Gebze Campus for the Institute.³⁸⁰ Operational Research Unit was already formed by Halim Doğrusöz in 1965 at METU.

The story of MSIRI's Gebze Campus and the construction committee's work was also discussed by Özdaş in detail. After his appointment to TUBITAK's Science Committee in 1968, Özdaş was the person who founded the estate in Gebze for the construction of MSIRI's campus. The confiscation of the area in Gebze took several visits paid by Özdaş and his committee to politicians and ministers. In 1969, he was appointed as the founding director responsible for the construction and development of research units of the MSIRI with full authorization by the Science Committee.³⁸¹ This must be one of the main reasons why MSIRI was established as a distinct research institute from the Science Committee's general affairs. The working programme centered on contract research, the organizational form around project-based development, a specific salary structure, and the guidelines for the classification of research developed at MSIRI were all related to Özdaş's early initiations during the process of the establishment of the Institute. Similar to his early intervention on the "project application form", he defined types of research at the Institute would be categorized as follows:

Contract Research: These projects consist of research developed for the industry or other organizations in the form of R&D and/or development research in which the project applicant organization must fully or partially meet the costs of research,

Internal Projects at the Institute: These projects are developed to improve the competency of the Institute, prepare infrastructure for large-scale, and directed research, and the development of new techniques and methods.

National and Directed Research: These projects are large-scale research projects developed for the advancement of science and technology with an interdisciplinary character that requires consistently larger funds.

Services and Other Studies: These activities include the industry's routine standard testing mechanical experiments, and chemical analysis for

³⁸⁰ Özdaş, *TÜBİTAK'ın İlk Yılları*, 49.

³⁸¹ Özdaş, *Tübitak'ın İlk Yılları*, 60.

product improvement, which can enhance cooperation with industry and may provide further opportunities.

Educational Activities: These activities include project-based employment of scientific and technical personnel assisting the personnel's scientific career.³⁸²

The founding principles of MSIRI also include an understanding of a matrix organization, consisting of research units in which every research personnel are responsible to his unit's head, while this research was administered through coordinators according to the types of research. The focus, as Özdaş indicated that the MSIRI's organization was arranged around project-based activity, especially contract research and large guided research projects.³⁸³ Project-based employment was also incorporated into the salary structures of the Institute, arranged also in relation to experience and education.

Nimet Özdaş's role as an institutional entrepreneur is related to his introduction of certain science policy mechanisms that were developed through experience in other countries and dispersed through international organizations for the allocation of sources into certain types of research. The secretariat's position with strong authoritative execution role elevated during the legislation of TUBITAK also contributed to Özdaş's distinguished role, when he proposed a project application form, MSIRI's principles on contract research, and project-based organization in contrast to the Science Committee's unstable relationship with other secretaries-general. Accordingly, the MSIRI was developed around contract research, although the role of industry was quite limited. Operational Research Unit, for example, undertook research for State Enterprises such as the optimization of electrical infrastructure for Directorate of Electric Power Survey and Administration and modernization of management of Sümerbank factories, Electronics Research Unit's cooperation with Post and Telegraph Administration (Posta ve Telgraf Teşkilatı – PTT) for the development of telecommunication technology, and Materials Research Unit's cooperation with State Enterprises of steel manufacturing. In addition to these

³⁸² Özdaş, *TÜBİTAK'ın İlk Yılları*, 99-100.

³⁸³ Özdaş, *TÜBİTAK'ın İlk Yılları*, 102. Özdaş presented the archival codes of the project management documents as well.

seemingly small-scale innovations in research management, Nimet Özdaş was also an ardent bearer of field effects that occurred through the transnational organizational field. As he worked for NATO and developed close relationships with OECD's corresponding agencies, he was able to secure certain foreign aid for the development of the MSIRI's research units. Materials Research Unit was established via UNIDO's contribution amounting to 1,18 million US Dollars.³⁸⁴ Nutrition and Food Engineering Research Unit, for example, developed a project on a cold chain for food transportation in the 1980s via NATO's Science for Stability Programme, amounting to approximately 1 million US dollars.³⁸⁵ The programme was developed during the chairmanship of Özdaş to NATO's Science Committee. Moreover, he was also transferring certain mechanisms such as foreign applied research organizations' activities for developing a specific research unit in host universities. While MSIRI's Gebze Campus was officially opened in 1972, a series of internal and external critiques of TUBITAK were published during these years. In against these external pressures, TUBITAK's Science Committee members positioned themselves, accordingly, preserving the Council's academic logic.

Table 4.1. *Some Research Projects by Building Research Institute*

Year	Project Title	Researcher	Institution	Funding	Key descriptions	Type of Research
1966	A Colloquium on Planning Construction Research (28-29 June 1965)	TUBITAK	TUBITAK	TUBITAK	A colloquium on building research based on the OECD Pilot Teams Project	Debates on Science Policy
1972	Criteria on selection of areas for Shanty Towns, and Prevention Sites. First Report	İrem Acaroğlu	TUBITAK – Building Research Institute (BRI)	TUBITAK	An urban planning decision-making project for shanty towns	Government Research
1975	Cost Determination of Building Parts via Computers	Şükür Genç	TUBITAK – BRI	TUBITAK	Computerization on surveys of buildings and cost-analysis	Government Research
1981	Process of Production of Higher Education Buildings	Ş. Yalçın Ersoy	TUBITAK – BRI	TUBITAK	On SPO's request about the improvements of the Academies of Architecture and Engineering in 1973.	Government Research, Contract Research

³⁸⁴ Özdaş, *TÜBİTAK'ın İlk Yılları*, 88.

³⁸⁵ Vural Yiğit, *Enstitü: Marmara Araştırma Enstitüsü'nün Kuruluş Öyküsü*, 299-306.

Table 4.1. Some Research Projects by Building Research Institute (Continued)

1988	Management of Collective Housing I: Project Planning and Designing Guide	İmre Orhon	TUBITAK, BRI, ITU, Department of Architecture, Housing Administration of Turkey (TOKI)	TUBITAK	A joint project on the management of government housing administration. Collaborators: ITU, Housing Administration (TOKI), TUBITAK-BRI	Government Research, Contract Research
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Note: Collaborated from aperta.ulakbim.gov.tr as other project tables 4.2. and 4.3. These are selected projects, not the full list, which is presented to show the prevalence of government research in MSIRI projects.

Table 4.2. Some Research Projects by Electronics Research Unit

Year	Project Title	Researcher(s)	Institution	Funding	Key Descriptions	Type of Research
1971	The State of The Electronic Industries in Turkey and the Problem of Assessing the Needs in Components	Toğan Zeren (Deputy Director of Electronics Unit)	TUBITAK-MSIRI, Electronics Research Unit	MSIRI	Survey on the Electronics Sector in Turkey, stating Post and Telegraph Agency's (PTT) R&D laboratories (PTT-ARLA)	Government Research, Surveys, Decision-making
1978	Communication with and via Satellites	M. Çelebiler, G. Stette	TUBITAK-MSIRI, Electronics Research Unit	MSIRI, NATO AGARD, Ministry of National Defense R&D (AR-GE)	A seminar on satellite technologies and communication systems sponsored by MSIRI, AGARD, and MoND AR-GE	Government research, Defense Research
1981	COST 201: Optimization and Planning of Telecommunication Systems, 1st Report	Çetin Evranuz, Çiğdem Mısırlı, Ali İhsan Dalgıç, Tarkan Menlioğlu	TUBITAK-MSIRI, Electronics and Operational Research Unit	MSIRI, European Cooperation in Science & Technology (COST), PTT	A joint project developed by the OR unit and Electronics Research Unit for PTT, sponsored by COST	Government Research, Interdisciplinary Research,

Table 4.3. Some Research Projects by Operational Research Unit

Year	Project Title	Researcher(s)	Institution	Funding	Key Description	Type of Research
1970	Logistics Optimization Project for Turkish Coal Enterprises: 1 st Intermediary Report	Bülent Bayraktar, Tamer Uykal, Çağlar Güven, Çetin Evranos, Sibel Maktav.	MSIRI-Operational Research Unit	MSIRI, Turkish Coal Enterprises	A project for optimization of logistics for Turkish Coal Enterprises	Government Research, Contract Research
1972	Survey for the Selection of Areas for Rural Health Services: A Case Study for Etimesgut	Operational Research Unit	MSIRI-Operational Research Unit	MSIRI-Operational Research	A case study for the optimization of health services in rural areas	Government Research
1973	Project on Turkish Electricity Administration Network Facilities Programming and Control Final Report: Implementation Plan on the Application of Projects and Management Information System Vol V	Halim Doğrusöz, Kutay Arman, Necdet Atabarut, Osman Coşkunoğlu, Çetin Evranos, Osman Oğuz, İzzet Şahin	MSIRI-Operational Research Unit	MSIRI – Turkish Electricity Administration (TEK)	A comprehensive survey result for the optimization and development of electrical infrastructure. Five Volumes in Total.	Government Research, Contract Research
1978	Research and Development Planning for Iron and Steel Integrated Plants	Muhittin Oral, Nükhet Yetiş, Rıza K. Uygur, Bilge Küneralp, Seyhun Altunbay, Arif Gündüzlü	MSIRI-Operational Research Unit	MSIRI, SPO	A document on “Technology Policy” for SPO’s, 4 th publication in the series, sponsored by SPO for the R&D activities in Steel Manufacturing State Enterprises	Government Research, Survey

4.3. Early Science Policy Papers, Internal and External Critiques

The retrospective critiques about the so-called failure of implementing a science policy in Turkey revolve around two ideas. The negligence of adopting a policy paper or the preparation of it, as part of TUBITAK’s establishment rationale “to coordinate” research efforts, and the problem of organization of the Council, i.e. fully autonomous

research organization without a supervisory body for making policy decisions, and the politicians' reluctance of implementing certain science policy papers. These critiques are followed by the industry's non-existent demand for R&D activities. However, as former practitioners recall there were some efforts to produce a policy paper apart from MSIRI's implicit unit-based research policy. These policy papers included a colloquium on planning building research initiatives in 1966 by TUBITAK with Atilla Karaosmanoğlu who resigned from SPO and started to work for the OECD at that time.³⁸⁶ The additional legislation on "coordinating" research was added by the Senate's Commissions, as can be recalled from the second chapter. However, Cahit Arf's position about the "dangers of directing research via a central organization", must be influential in the Science Committee's handling of the task of "coordinating" research. This must be also a shared idea amongst, at least to some extent, among the members of the Science Committee in the late 1960s. For example, SPO formed a *Special Commission on Research Activities and Policy* in 1966 which included several bureaucrats and professors from various government agencies including the Ministry of National Defense's R&D department (AR-GE), as well as Erdal İnönü from METU and TUBITAK in the sub-commission called, *Studies on the Models for Research Activities and Economic Development*, which Erdal İnönü did not even participate.³⁸⁷ Although there were other problems drawing such a commission as one of the members who was responsible for conducting survey research on economic and social sciences, similar to TUBITAK's Science Policy Unit's inventory studies, resigned right before the meeting of the commission, these instances represent the reluctance of some of the Science Committee members, notably Arf and İnönü, for implementing the task of "coordinating" research except funding study groups' projects.³⁸⁸ Moreover, the issue of drawing a general policy paper and the two conflicting logics are also present in Arf's rather rare speeches given at the Advisory Committee. At the end of the 12th meeting of the Advisory Committee in 1971, Cahit Arf briefly explained

³⁸⁶ OECD's Pilot Teams Project included a second volume on construction sector, as part of a science policy scheme for Turkey. SPO planners and probably other decision-makers in the government circles were aware of the building sector's prospective growth in the following years. Construction sector was also important for massive infrastructure investments such as Keban Dam. SPO planners were trying to diminish agriculture's role in the economic growth, when Nimet Özdaş proposed SPO, for example, MSIRI's plans for forming a Nutrition and Food Engineering Research Unit, he stated SPO's wishes about the Institute on not including a research unit on agriculture. See Özdaş, *TÜBİTAK'ın İlk Yılları*, 42. On SPO's plans for diminishing the role of agriculture, see Milor, 163.

³⁸⁷ DPT, *Araştırma Faaliyetleri Politikası Özel İhtisas Komisyonu Raporu*. DPT, (Ankara, 1966), 5.

³⁸⁸ DPT, *Araştırma Faaliyetleri Politikası Özel İhtisas Komisyonu Raporu*. 3.

why TUBİTAK did not manage to produce a science policy scheme indicating there were some concepts and science policy rather implicitly, while the priorities of this policy cannot be defined solely by TUBİTAK.³⁸⁹ These priorities must be defined through “economic and social planning organization,” pointing to SPO, in contrast to what TUBİTAK is not.³⁹⁰ Asking for these priority decisions from SPO, for the economic and social development of the country, Arf cynically pointed out that “a word called GRAF technique is spoken at the organization during these days” would point out such a programme for policy priorities in the coming years.³⁹¹ Cahit Arf’s word on the GRAF technique is actually what Nimet Özdaş employed during the construction of the MSİRİ’s Gebze Campus, called the Critical Path Method (CPM), which was part of project management methods during those years in line with the development of operational research and management studies. As a famous Turkish Mathematician and a basic positive scientist, Cahit Arf’s words represent the prominence of academic logic during these years, which assigns much more prestige to basic positive sciences in contrast to applied and social sciences. Although Arf pointed out his hopes of drawing a policy paper in the coming years at the same meeting, he resigned from TUBİTAK in the same year, 1971, “because he was dissatisfied with the Council”.³⁹² This year was also a series of internal reports prepared by the Science Policy Unit proliferated on the problem of scientific manpower³⁹³ as well as TUBİTAK’s research funding schemes. These reports were followed by external reports produced towards the end of 1970, and 1980 with Operational Research Unit’s review reports.

The discrepancies between *academic logic* and *policy logic* at TUBİTAK were implicit, as can be seen from the examples above. The translation and negotiation of science policy concepts derived from the organizational field as well as other management schemes intruded into the organization's step-by-step employment of

³⁸⁹ TUBİTAK, *Danışma Kurulu Onikinci Toplantısı*, 26 Nisan 1971, 89.

³⁹⁰ TUBİTAK, *Danışma Kurulu Onikinci Toplantısı*, 26 Nisan 1971, 89.

³⁹¹ TUBİTAK, *Danışma Kurulu Onikinci Toplantısı*, 26 Nisan 1971, 90-91. In this brief speech, Cahit Arf called TUBİTAK a tinsmithing organization (tenekeci), which he was using wittily to define engineers and/or applied scientists. He was calling social scientists as “wordsmith” (lafolog, lafbilimci)

³⁹² Özdaş, *TUBİTAK’ın İlk Yılları*, 97.

³⁹³ For the third five-year development plan, TUBİTAK was assigned to review graduate programmes, specifically 1416 act which designed to send students abroad for graduate levels. A comprehensive report was also prepared by Şefik Uysal, a member of Scientist Training Group (BAYG) in addition to Science Policy Unit’s 1971 reports. The problem of scientific manpower is discussed in the previous chapter.

these mechanisms through the Secretariat, Science Policy Unit, and Operational Research Unit. In addition to these, government research made by units located at the MSIRI was also influential in the utilization of science in economic growth supporting what policy logic expected from the beginning. Thus, this section first introduces earlier science policy papers and continues with describing the internal and external reports as part of the work that redefined the boundaries of academic logic i.e. promoting a research spirit in the country in contrast to the idea of research's utilization in economic development. The struggle over the means of defining science policy ended theoretically with the establishment of SCST, and the first policy paper prepared by Nimet Özdaş, called *Türk Bilim Politikası: 1983-2003*. This transformation made TUBITAK attached to a higher supervisory government organ as the decision-making body in contrast to the Science Committee's earlier position. Although the struggle ended with the establishment of SCST, the conflict between academic logic and policy logic continued for about ten more years until 1990, when Kemal Gürüz became the president of TUBITAK and managed to legitimate TUBITAK's position both in the eyes of the scientific community and government circles.

4.3.1. OECD's Pilot Teams Project

The Pilot Teams Project was organized by the OECD for developing countries to assist them in the formulation of a national science policy “primarily with a view to enhancing the contribution of scientific research to economic growth” in 1961.³⁹⁴ The Turkish Team was formed in 1963 after the participation of Greece and Italy in the project, followed by Spain and Yugoslavia. The Pilot Teams Project was the twin project of the Mediterranean Regional Project, which was also developed by the Directorate for Scientific Affairs.³⁹⁵ Turkish participation must have been right before the creation of TUBITAK in 1963. SPO sponsored this study and collected relevant data on sectors while determining case studies in agriculture, metallurgy, and construction.³⁹⁶ The final reports were submitted in 1967 for an evaluation conference

³⁹⁴ OECD. *Pilot Teams Project: Evaluation Conference*. OECD: 1968, 5. OECD's Committee for Scientific Research has taken the decision for pilot teams in 1962. See: OECD/SR(62)12. “Pilot Teams to Study the Needs for Scientific Research and Technology in relation to Economic Growth”. 7th May 1962.

³⁹⁵ OECD. *Pilot Teams Project: Evaluation Conference*. OECD: 1968, 6. Karaosmanoğlu also pointed out a twin project for educational planning in the 35th anniversary of TUBITAK. See: TÜBİTAK: *Anılarla TÜBİTAK*, 24.

³⁹⁶ OECD/SR(65)44. “Report of the Chairman of the Working Group to Review Pilot Teams' Activity”. 1965, 4.

that took place in the same year. The final report consisted of two volumes on the relationship of science, economic growth, and technology development. The discussions held at the Evaluation Conference, on the other hand, took place as an exchange of ideas in the line of the Pilot Teams Project representing TUBITAK as SPO's twin organization responsible for the formulation of national science policy.³⁹⁷ For example, the report presented at the Conference states:

- i) Science policy must be formulated in close relationship with economic and social planning in general. This is because the structural changes which the development plans aim at are partly a function of scientific and technical possibilities, while the objectives of science policy are to be determined in relation to social objectives in general.
- ii) Science policy must treat the science system in an integrated and internally consistent way.³⁹⁸

These excerpts show that SPO's objectives in promoting the "capital goods sector"³⁹⁹ as research must be directed towards technological fields while diminishing the role of the agricultural sector coincided with the role, they ascribe to TUBITAK, as one of the main factors in the struggle between academic logic and policy logic. The second point in the quote, on the other hand, pointed out the rationale of a science policy objectified in the concept of policy. Thus, SPO and the Turkish Team of the Pilot Project determined a role for implementing development plans via increasing the volume of investment in capital goods such as semi-processed materials, raw materials for manufacturing, and so on.⁴⁰⁰ Further the report, for example, proposed ideas such as two SPO officials' placement in TUBITAK's Science Committee while the chairman of the Science Committee would be a member of the High Planning

³⁹⁷ OECD, *Pilot Teams Project: Evaluation Conference*, 173. A flow chart was presented on this page showing SPO and TUBITAK, side by side, as the sole organizations of basic decision units "Decisions on research areas, and other basic decisions"

³⁹⁸ OECD, *Pilot Teams*, 174.

³⁹⁹ Milor, *A comparative Study of Planning and Economic Development in Turkey and France*, 233-234.

⁴⁰⁰ Capital goods are simply manufacturing materials that requires large infrastructural investment on modernization and development. In contrast, Milor discusses, for example, first planners' perspective on the necessity of an agricultural reform, while High Planning Council did not even discuss the issue. Milor explains his case via indicating the class relations of landholders with Democratic Party in against SPO's first planners wishes on expanding investment in capital goods. See: Milor, *A comparative Study of Planning and Economic Development in Turkey and France*, 162-163.

Council.⁴⁰¹ The report stated “In this way, the integration of policies at the national level should be ensured”, while the Science Committee “will require the power to co-opt senior administrators from the various Ministries responsible for the execution of research work at such time as this should be necessary”.⁴⁰² This must be the basic reason why the Senate legislated an additional task for TUBITAK adding “coordinating” research, as the former military of National Unity Committee were all involved in also SPO’s legislation.⁴⁰³ Former military officials and the Senate’s now natural members must think exactly of the flow chart presented in this evaluation conference as twin organizations i.e. SPO for development planning and TUBITAK for research planning. In addition to these, the report also stated that those functions can only be achieved with a “powerful Secretariat”, with the support of a strengthened “Science Policy Unit”.⁴⁰⁴ The report integrated earlier OECD/EPA suggestions on the management of an applied research organization i.e. coordination and planning of research activities across the government sector, allocation of resources in research according to proposed policy priorities⁴⁰⁵, as well as improvements in the salary structure of higher education sector and the expansion of the numbers of researchers.⁴⁰⁶ Although the presentation included statements such as “these procedures are [...] not intended to increase administrative control over the progress of research”⁴⁰⁷, none of these suggestions must be sound with “any good intentions” on TUBITAK’s Science Committee members, considering Arf’s position on centralization and Istanbul University professors’ reaction to SPO planners.

The actual reports submitted to OECD’s DAS in two volumes, included a general proposition on the formation of science policy, allocation of resources, and government agencies’ role in the implementation of this policy, while the second volume was a specific case study on the construction sector.⁴⁰⁸ The construction sector

⁴⁰¹ OECD, *Pilot Teams Project*, 175.

⁴⁰² OECD, *Pilot Teams Project*, 175.

⁴⁰³ For a discussion SPO’s legislation see: Vedat Milor, *A Comparative Study of Planning and Economic Development in Turkey and France*, University of California, PhD Dissertation, 1989, See also his paper: Vedat Milor, “The Genesis of Planning in Turkey” in *New Perspectives on Turkey 4*, (1990): 1-30.

⁴⁰⁴ OECD, *Pilot Teams Project*, 175.

⁴⁰⁵ OECD, *Pilot Teams Project*, 178-179.

⁴⁰⁶ OECD, *Pilot Teams Project*, 182.

⁴⁰⁷ OECD, *Pilot Teams Project*, 178.

⁴⁰⁸ OECD/DAS/SPR/67.8, “Scientific Research and Technology in Relation to the Economic Development of Turkey Volume I, February 1967”. OECD/DAS/SPR/67.8, “Scientific Research and

and building research were appropriated because of the massive economic growth that took place according to urbanization, large-scale infrastructure investments by the government, and as a way to leverage the rural population's employment in this sector. The propositions made by the conference report on two SPO officials' placement to TUBITAK's Science Committee and the Chairman's participation in the High Planning Council never turned out to be real. The other propositions on research allocation were partly conducted by the MSIRI, however, the overall reorganization of the higher education sector must not be accomplished as well as the other project developed via OECD, namely The Mediterranean Regional Project was not so influential.

4.3.2. The Colloquium on Planning Building Research in Turkey

The reports produced by OECD's Pilot Teams Project were influential in a Colloquium organized by TUBITAK in 1965. This Colloquium was related to planning building research in the country, following the same manner proposed by Pilot Teams Project's case study on the construction sector. The idea of establishing a Building Research Institute was already prevalent among government circles from the beginning of the 1960s.⁴⁰⁹ SPO's identification of the growth of the construction sector must be widely known among the bureaucracy as mentioned before. Accordingly, the keynote speaker of the Colloquium was Atilla Karaosmanoğlu, the head of the first planners of SPO, who was working for the OECD at the time. On the first day of the Colloquium, Karaosmanoğlu presented his proceeding to an audience consisting of TUBITAK representatives, senior government officials, and professors who were members of the research groups of TUBITAK. The whole discussion that took after Karaosmanoğlu's speech was a clear representation of the interplay between policy logic and academic logic, considering the questions raised after Karaosmanoğlu's proceeding and Karaosmanoğlu's responses. These questions showed that even amongst the engineers, the concept of the plan and the idea of planning scientific research was something inconvenient because of the quality of freedom inherent in the definition of scientific research.

Technology in Relation to the Economic Development of Turkey Volume II: The Construction Sector", February 1967. The report is more than 500 pages in total.

⁴⁰⁹ Türkcan, *Dünyada ve Türkiye'de Bilim*, 532.

Karaosmanoğlu's speech consisted of ideas such as the distribution of investment funds in the best feasible way in economic sectors.⁴¹⁰ Taking the issue of economic and social development at the centre, he explained the developments in Western countries and the USSR regarding the increasing research expenditure⁴¹¹ , he proceeded to explain why a national science policy was a requirement, even considering the absence of such a science policy:

Today, if scientific research is largely done with public funds or for short-term commercial profit, there is no such thing as freedom in the present situation of scientists. [...] The unpleasant aspect of the present situation is that the decisions determining the activity of the scientist are not seen systematically and therefore, there is no possibility to react against these decisions by scientists themselves.⁴¹²

He also promoted the idea of priority between certain research areas, considering the long-term economic and social development plans. For this, he suggested an inquiry determining the various levels of the research environment in a holistic approach to draw a general policy, while determining a “strategy” for sub-research areas.⁴¹³ These ideas were not welcomed, even by engineers such as Nejat Ölçen and Turhan Tüzemen, who pointed out that the plan would reduce scientific research into its criteria while discarding the very basis of scientific research i.e. curiosity and freedom to research.⁴¹⁴ The other objections were related to the problems of the less-developed situation of scientific tradition in basic sciences as if planning would disregard the importance of basic sciences which was deemed crucial for the development of technical sciences.⁴¹⁵ Before Karaosmanoğlu responded to these questions, only Halim Doğrusöz, the head of the Operational Research Unit indicated that the issue of planning “was a stochastic process, in that sense, a dynamic process to decide which requirements would be needed”, and added, “the ideal might be developing the planning as an ‘adaptive system’” to its environment, considering the economic and social conditions in the long-term.⁴¹⁶ Karaosmanoğlu responded to these concerns by

⁴¹⁰ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 28-29 Haziran 1965, TÜBİTAK, (1966), 8.

⁴¹¹ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 11

⁴¹² TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 12

⁴¹³ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 17.

⁴¹⁴ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 18-19.

⁴¹⁵ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 20

⁴¹⁶ TÜBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokyumu*, 20-21.

indicating that “these questions do not occur to me as objections, rather they are problems of refinement on the science planning itself”⁴¹⁷, while, for example, providing instances of Turkey’s possible needs for large-scale research, such as building an “accelerator” which requires planning of scientific manpower, resource allocation i.e. a set of priorities given certain research areas in the first place.⁴¹⁸ On the case of disregarding basic sciences and the elements of curiosity and freedom to research, Karaosmanoğlu advocated that, if a science planning would be drawn, then refinements in the plan would provide safety valves for considering these types of research as decision-makers would have all of the information about the scientific system they need.⁴¹⁹

Atila Karaosmanoğlu’s speech included a set of conceptual tools such as the need for inventory, a holistic approach, the educational planning of scientific manpower supply, and resource allocation i.e. a perspective that was developed in early conceptualizations of science policy in the late 1950s. On the other hand, scientists, even engineers have had the conviction of promoting basic sciences as the precursor of further developments in technical fields, representing the main point of view of academic logic during these times. Nimet Özdaş described this colloquium as the first step towards the formulation of science policy at TUBİTAK.⁴²⁰ Halim Doğrusöz’s stance, on the other hand, represents the subtle aspect of policy logic embedded in TUBİTAK via the Operational Research Unit in support of science planning. In any case, no matter how refined this policy logic inscribed into Karaosmanoğlu’s speech, it was not possible to legitimate these views in the eyes of professors in general, and Science Committee members considering those further steps that were foreseen in the Conference report of the Pilot Teams Project, such as the placement of two SPO officials at TUBİTAK’s Science Committee. Thus, these debates on science policy continued and resurfaced at the beginning of the 1970s in a series of reports prepared by the Science Policy Unit. This was also the time that several governments increased their pressure on TUBİTAK.

⁴¹⁷ TUBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokiyumu*, 24. In Turkish: “Ama, ben burada bilim planlamasına karşı diye formüle edilen düşüncelerin çoğunu, aslında, ‘Bilim Planlaması yapıldığı takdirde, hangi vasıflara sahip olmalıdır?’ şeklinde anlamaya temayül ediyorum.”

⁴¹⁸ TUBİTAK, *İnşaat Araştırmalarının Planlanması Kolokiyumu*, 24.

⁴¹⁹ TUBİTAK, *İnşaat Sektöründe Araştırmaların Programlanması Kolokiyumu*, 25.

⁴²⁰ Özdaş, *TUBİTAK’ın ilk Yılları*, 27-28.

4.3.3. Internal and External Reports

In 1971, the Science Policy Unit prepared reports on scientific manpower and R&D expenditure in Turkey in relation to economic growth numbers during the five-year development periods and R&D expenditure. The brief report, prepared by Arif Türkeli, concerning the resource allocation to R&D activities, represents the culmination of review mechanisms developed by the OECD through Frascati Manuals. Although the mechanisms such as statistical data collection on scientific manpower and resource allocation by sector on R&D were developed during the years of the First World War, it can be recalled that it was first suggested by NATO, about the concerns on scientific manpower to alert countries to take certain measures against the threat of Soviet Union. Science Policy Unit's report, thus, represents the transformation of the ground on the debate of science policy in Turkey. The report discussed the discrepancy between the economic growth numbers by GDP's %6.5 between 1964 to 1970, while R&D expenditure grew only at %4.1 and continued to decrease throughout the years. In addition to the budget allocation to large research organizations such as Mineral Research and Exploration Institute and Electric Power Survey and Development Administration, which mostly develop research in terms of standard services and experiments, the issue was more negative considering the actual research expenditure in the country.⁴²¹ The decrease in spending on R&D activities must draw attention to TUBITAK's activities without considering that the Council itself was dependent on resource allocation from the government. In the same manner, these issues were addressed in the 15th Advisory Committee meeting in 1972, citing the Science Policy Unit's report. For example, Erdal İnönü thought it was necessary to defend TUBITAK considering these pressing issues. He indicated that these numbers would not show that TUBITAK functioned ineffectively, rather it pointed out that a problem was out of the scope of the Council.⁴²² Erdal İnönü's response to this issue was derived from the values ascribed to the scientific community, which stated universities' main task is to create new knowledge via basic research, and the basic criteria on research developed at universities must be the general view of the scientific community defining the value of such research.⁴²³

⁴²¹ TÜBİTAK Bilim Politikası Ünitesi, *Milli Bilim Politikası Tayini İçin Ön Çalışma Raporları Seri: I – Milli Hedefler ve Araştırma Geliştirme Harcamaları*. TUBITAK, (1971), 11-12.

⁴²² TÜBİTAK. *Danışma Kurulu Onbeşinci Toplantısı*, 4.

⁴²³ TÜBİTAK, *Danışma Kurulu Onbeşinci Toplantısı*, 8-9.

In addition to the report prepared by Arif Türkeli, a separate document was circulated amongst the members of the Advisory Committee at this meeting, titled “Increasing research activities in the higher education sector”⁴²⁴ This report stands for the idea of “professionalization of research” i.e. expanding graduate level studies to meet the research requirements of government and industry sectors. The origins of university-industry relations can be traced back to early EPA studies on the question of applied research at universities. The professionalization process of research is argued by Ben-David, explaining the formalization of scientific research in relation to the rise of salaried structures followed by the increasing role of the industry and the rise of government funding.⁴²⁵ The developments in the United States concerning PhD-level graduates, assured the industry and private sectors about the capability of such researchers which created certain standards for the employment of researchers, while providing PhD holders a bargaining point, according to Ben-David.⁴²⁶ In the report prepared by the Science Policy Unit, this case was translated into Turkish context, suggesting a few points about a university reformation for improving the conditions of professionalization via university-industry-government cooperations. One of these suggestions, for example, was allocating government research projects to universities’ correspondent research units. As this might intervene with the educational activities of universities, the report suggested establishing research institutes at universities at graduate levels for dealing with research projects.⁴²⁷ The report included further suggestions for the government sector as well, but the main point discussed at the Advisory Committee by Erdal İnönü was related to the type of research, which the report differentiated “big science” in basic sciences were developed in advanced countries while Turkey cannot afford such large research projects.⁴²⁸

The review mechanism created by the Science Policy Unit may be influential in transforming the ground on the debate of research expenditure implementing a *practice work* altering the perspectives on science policy. However, the debate on the

⁴²⁴ TÜBİTAK, *Danışma Kurulu Onbeşinci Toplantısı Eki: Üniversite Sektöründe Araştırma Faaliyetlerini Arttırma Çareleri*, 1972.

⁴²⁵ Joseph Ben-David, “The Profession of Science and its Powers”, *Minerva* 10, No. 3, (1972): 362-383.

⁴²⁶ Ben-David, “The Profession of Science and Its Powers”, 372.

⁴²⁷ TÜBİTAK, *Danışma Kurulu Onbeşinci Toplantısı Eki: Üniversite Sektöründe Araştırma Faaliyetlerini Arttırma Çareleri*, 15.

⁴²⁸ TÜBİTAK, *Danışma Kurulu Onbeşinci Toplantısı Eki: Üniversite Sektöründe Araştırma Faaliyetlerini Arttırma Çareleri*, 4.

“professionalization of research” and the suggestions on reforming universities via expanding graduate levels to do government and contract research hit to certain understanding of academic logic, preserved by Erdal İnönü about the boundaries of scientific research and what universities mean, ascribing the evaluation criteria to scientific community. Moreover, these were the years that Advisory Committee Meetings increasingly became familiar with science policy concepts, as Türkcan indicates.⁴²⁹ In 1974, for example, Necmettin Erbakan, as the deputy prime minister of the coalition government paid several visits to Advisory Committee Meetings. Erdal İnönü recalled these years later in 2003, as the heated debates on the autonomy of TUBITAK again resurfaced during the AKP government’s intervention in TUBITAK, indicating that “Erbakan did try to change TUBITAK legislation, wanted to implement his own policies way before Özal⁴³⁰, but did not succeed because he encountered too much resistance.”⁴³¹

There were also other reports prepared by SPO’s Social Planning Department published in 1977, and TUBITAK’s Operational Research Unit’s review of the research funding programme in 1980. The first report was prepared by Ahmet Tuğaç designated TUBITAK’s position, for example, under a coordination committee or more truly an “Advisory Committee on Research Policy” consisting of scientists, TUBITAK officials, SPO, and Ministry of Industry and Technology.⁴³² This report advocated a more functional role for the Department of Science and Technology at the Ministry of Industry and Technology, for example, proposing the appointment of a “Research Director” at every government agency under the authority of the Department of Science and Technology.⁴³³ The suggestions remind the duo of British science policy organizations where the Department of Scientific and Industrial Research was the executive organ of science policy while the Advisory Council was making suggestions to the government via the Privy Council, as can be remembered from the second chapter. On the other hand, the Operational Research Unit’s review included the resource allocation and project numbers in each research group

⁴²⁹ Türkcan, *Dünyada ve Türkiye’de Bilim*, 612.

⁴³⁰ İnönü mentions here the 1987 legislations. I will discuss thoroughly in the next chapter.

⁴³¹ Milliyet, “İnönü: Bilime Müdahale Var”, 12th October 2003. Accessed by <https://www.milliyet.com.tr/siyaset/inonu-bilime-mudahale-var-5147874>

⁴³² DPT, *Milli Bilim Araştırma Politikası ve Örgütlenme Sorunları*. DPT Sosyal Planlama Dairesi, (1977), 46.

⁴³³ DPT, *Milli Bilim Araştırma Politikası ve Örgütlenme Sorunları*, 46.

established by TUBITAK. This report was prepared at the request of the Science Committee in 1976 and published in 1980. These increasing developments in questioning TUBITAK's organizational form led to the establishment of SCST in 1983. As the organizational form of TUBITAK goes hand in hand with the adopted research policy, to some extent via distinct bodies such as the MSIRI, Operational Research Unit, and Science Policy Unit, the outcome of the transformation was related to Nimet Özdaş's role in the new government as the State Minister and his policy paper called *Turkish Science Policy: 1983-2003*. The inner review mechanisms promoting a policy logic and the debates on a general policy paper guiding national science policy were finally accomplished through these developments. After 1983, the debates focused more explicitly on the question of the autonomy of science.

4.4. “Turkish Science Policy: 1983-2003” and the Rise of Policy Logic

The developments concerning subtle changes at first via the introduction of project management mechanisms, the establishment of MSIRI as an applied research organization, and then review mechanisms through the Science Policy Unit on the debates of a general policy paper have paved the way to the establishment of Supreme Council of Science and Technology (SCST – Bilim Teknoloji Yüksek Kurulu - BTYK). SCST is designed as a supervisory policy-making body to implement Turkish science policy. These transformations must be thought of with the 12th September 1980, Military Coup which resulted in radical changes for higher education and universities i.e. the establishment of the Council of Higher Education, market-oriented economic changes through *24th January 1980 Decisions* right before the coup, and the establishment of SCST for the scientific system of the country. SCST is established via a legislative decree by the government titled *77th Legislative Decree*. The first and second articles of the decree define the establishment rationale of SCST as follows:

Article I. To determine, guide, and coordinate research and development efforts in the field of science and technology in relation to economic and social development objectives and national defense, the Supreme Council of Science and Technology is established and attached to Prime Minister

Article II. Any government agency that makes research and development activities including universities is bound by this decree for coordination and guidance of these activities.⁴³⁴

The tasks of SCST are defined in the fourth article:

- a. To assist the government in the determination of long-term science and technology policies.
- b. To determine research and development targets in areas related to science and technology.
- c. To identify priority research and development areas and to prepare plans and programmes relatedly.
- d. To assign public research organizations in line with the plans and programmes in the field of research and development, to cooperate with the private sector when necessary, and to determine incentive and regulatory measures related to the private sector.
- e. To enact laws and regulations in the field of science and technology to activate and develop the science and technology system, to have drafts and legislation prepared.
- f. To determine the necessary measures for the training and effective utilization of research manpower and to ensure its implementation.
- g. To determine the principles and procedures necessary for private institutions to establish research and development centers, and to monitor, evaluate, and direct the activities.
- h. To determine in which areas and to what extent research and development investments should be made.
- i. To ensure coordination between sectors and institutions at the programming and execution stages.⁴³⁵

This legislation shows that the issue of “coordinating” research, starting from the early corrections made by the Senate in 1963, is now solved through a supervisory body, SCST. For coordination, the Council includes various government agencies,

⁴³⁴ “Karar Sayısı: KHK 77, Bilim ve Teknoloji Yüksek Kurulu Kurulmasına İlişkin Kanun Hükmünde Kararname”, *Resmî Gazete*, 4th October 1983.

⁴³⁵ Karar Sayısı: KHK 77, Bilim ve Teknoloji Yüksek Kurulu Kurulmasına İlişkin Kanun Hükmünde Kararname”, *Resmî Gazete* 4th October 1983.

ministries, private sector representatives, and the newly established Council of Higher Education's (CHE – Yüksek Öğretim Kurulu – YÖK) president which is defined by article three. In the same article, TUBITAK is designed to execute science and technology policy and report the implementation results to the Council. This transformation represents the outcome of the changes that took place between 1963 to 1983. TUBITAK was established as an organization embedding the two conflicting logics i.e. academic logic and policy logic through its separate organs. The Legislative Decree 77 makes TUBITAK an execution organ of science and technology policies of the country.

The document *Turkish Science Policy: 1983-2003* is the first policy paper that was appropriated by SCST in 1989 due to the unstable period that TUBITAK entered right after this transformation. However, in any case, this document prepared by Nimet Özdaş represents the policy logic's domination ending the Science Committee's sole decision-making role within the TUBITAK organization. In this sense, Nimet Özdaş states that the document is prepared in collaboration with "300 hundred experts and scientists" indicating its status and legitimacy, as the first policy paper in line with "international norms"⁴³⁶. These international norms are what OECD's Frascati Manuals' suggestions on the inventory of R&D capacity of the country, data on research expenditure by sectors, scientific manpower statistics, and long-term science and technology priorities. The document states objectives such as increasing the Gross Domestic Expenditures on Research and Development (GERD) by %1 in ten years and %2 at the end of 2003. It also aims to increase the researcher number exponentially in twenty years, and Turkey's place in the rankings on contributions to the world scientific literature.⁴³⁷ These objectives and the definitions of science policy concepts as well as research areas given priority are discussed in detail by Özdaş. It consists of five chapters, the first chapter defines science policy, a historical overview in the second chapter, the open systems approach deciding the priorities in the third, the status of scientific infrastructure in the fourth, and the long-term science policy plan in the fifth chapter.⁴³⁸

⁴³⁶ Devlet Bakanlığı, *Türk Bilim Politikası: 1983-2003*, (Ankara 1983). In the letter to Bülend Ulusu, prime minister of the time, attached to the first page of the document.

⁴³⁷ Devlet Bakanlığı. *Türk Bilim Politikası: 1983-2003*, III-IV.

⁴³⁸ Devlet Bakanlığı. *Türk Bilim Politikası: 1983-2003*, VIII.

Nimet Özdaş's preferences about the statistical objectives and *open systems approach* indicate a clear integration of science policy concepts developed in the late 1950s into the document. *Open Systems*, designing a system consisting of integral parts with a feedback mechanism from the external environment, itself is part of the developments of what operational research turned into throughout the years. Retrospectively, Nimet Özdaş recalls these developments as a “gap” between Europe and the United States in the 1950s concerning “management”.⁴³⁹ This gap was related to differences in productivity rates in those years when EPA applied operational research techniques coupled with human resources management to introduce these techniques to European firms as discussed in the second chapter. The idea of a system approach is now completed with the production of Turkey's first national science policy paper.

On the preparation of Turkish Science Policy: 1983-2003, when he is invited to coordinate the process, Özdaş recalls the interplay of policy logic and academic logic as “the first steps in 1966”, and “the incomplete work in 1971” should now be completed in 1981.⁴⁴⁰ Nimet Özdaş gives detailed information about the process of preparing the document. The first step was the establishment of a coordination committee at TUBITAK, as Özdaş recalls, consisting of mostly members from the MSIRI.⁴⁴¹ Inventory data are also collected in relation to Frascati Manuals.⁴⁴² In 1983, a joint conference with OECD and TUBITAK was organized at Hacettepe University with the participation of five OECD experts invited at the request of Özdaş.⁴⁴³ In the fifth chapter of Turkish Science Policy: 1983-2003, the document reviews each scientific discipline by pointing to growing research areas, thus, such as energy policies, environment, microelectronics and computer-based designing and manufacturing systems, nuclear sciences, sustainable energy, other technology-intensive sectors using the priority list provided by SPO by employing systems approach.⁴⁴⁴ According to these indicators, Özdaş proposes a list of scientific disciplines that consists of four levels of priority, with engineering areas such as

⁴³⁹ Nimet Özdaş, *Bilim ve Teknoloji Politikası ve Türkiye*, TÜBİTAK, (Ankara, 2000), 8

⁴⁴⁰ Özdaş, *Bilim ve Teknoloji Politikaları ve Türkiye*, 33

⁴⁴¹ Özdaş, *Bilim ve Teknoloji Politikaları ve Türkiye*, 33.

⁴⁴² Özdaş, *Bilim ve Teknoloji Politikaları ve Türkiye*, 35.

⁴⁴³ Özdaş, *Bilim ve Teknoloji Politikaları ve Türkiye*, 37-39.

⁴⁴⁴ Devlet Bakanlığı, *Türk Bilim Politikası: 1983-2003*, 172-203.

Mechanical Engineering at the top, and Anthropology, Logic, and Analysis at the end of the list.⁴⁴⁵ This follows with priority given research areas.

These developments closed the circle of policy logic at TUBITAK, while at first, Bahattin Baysal, a member of the first group communicated with Sami Küçük before the establishment of TUBITAK published an article at *Cumhuriyet*. This article summarized the provisions placed in the document in the first column that appeared on 9th June 1984, pointing, for example, to the second chapter written by Aydın Sayılı, Turkish science historian, and the third chapter by the “operational research unit”.⁴⁴⁶ In this first column, Baysal does not place any objection. However, in the second column published on 10th June 1984, Bahattin Baysal indicated that the fifth chapter of the document did not have any organic connection with the early chapters, as this last chapter did not criticize the early statistical indicators of the absence of scientific tradition in Turkey. In this article, Baysal returned to the criteria of the scientific community on assigning the value of any research activity by indicating the lack of Turkish publications in “professional journals”.⁴⁴⁷ For example, Bahattin Baysal criticized the priority list of scientific disciplines starting with Mechanical Engineering at the top, as “he was not surprised as the document is prepared by Mechanical Engineers”. He added that “according to the inventory study, it is obvious that research expenditure is spent by bureaucratic circles without ever reaching to publications”, while stating the difference between science and technology, “as technology can be bought, but without a proper scientific infrastructure, it cannot last”. Baysal’s article continued with an argument of “what is not science”, pointing, for example, “a laboratory analysis of rubbish factory products is not science”, finishing his article reverting to the old idea of promoting the research spirit in the country: “The main focus of Turkish Science Policy must be promoting an environment and supporting researchers and scientists who can make science.”⁴⁴⁸

⁴⁴⁵ Devlet Bakanlığı, *Türk Bilim Politikası: 1983-2003*, 172-203 and 205

⁴⁴⁶ Bahattin Baysal. “Türkiye’de Bilim Politikası: 10 bin kişiye 4 araştırmacı”, *Cumhuriyet*, 09th June 1984. Retrieved from Cumhuriyet Gazetesi Online Database.

⁴⁴⁷ Bahattin Baysal. “Türkiye’de Bilim Politikası: 10 bin kişiye 4 araştırmacı”, *Cumhuriyet*, 9th June 1984. Retrieved from Cumhuriyet Gazetesi Online Database.

⁴⁴⁸ Bahattin Baysal. “Türkiye’de Bilim Politikası: Türkiye’de Bilim Yapıldığından Söz Edilemez”. *Cumhuriyet Gazetesi*. 10th June 1984. Retrived from Cumhuriyet Gazetesi Online Database.

Bahattin Baysal's statement is the first instance of *boundary work* of the era after TUBITAK's transformation under SCST as an executive organ. These statements were followed by a series of private communications with the new State Ministry Tınaz Titiz of the elected government in 1983 and a series of professors that were working at TUBITAK at the time, including Kemal Kafalı, Mithat Özsan, and Metin Bara. These controversies reached their peak in 1987 when further legislation was proposed by the Özal Government concerning the executive role of TUBITAK. This shows that despite Özdaş short-period legitimacy on various professors, later interventions from the government must evoke stronger reactions from the professors, resisting on the premises of academic logic. As mentioned earlier, the settlement was achieved under Kemal Gürüz's presidency as he managed to get consent from both parties. However, the transformation of TUBITAK into a policy organization did not revert in the coming years.

4.5. Preliminary Conclusion

TUBITAK's transformation into a policy organization takes place on the early introduction of several mechanisms, such as project application forms, review mechanisms, and the employment of statistical data as part of *practice work*. These mechanisms represent the activities of correspondent bodies of the organization's influence at the inner struggle over the means of defining science policy. The secretariat, Operational Research Unit, and Science Policy Unit were influential in introducing such policy tools. In the following years after their introduction, these policy tools became a routinized activity at the organization, although not paid attention by the Science Committee Members until 1971 with the resignation of Cahit Arf, an ardent supporter of academic logic for the organization. Government pressure was becoming intense as TUBITAK did not fulfill the wishes of drawing a national science policy paper. This expectation was reinforced by the Science Policy Unit's reports, as well as external pressure from the SPO towards the end of the 1970s.

In the meanwhile, the MSIRI's separation from the Science Committee's influence via Nimet Özdaş's specific efforts must also be influential about the increasing need for a policy paper designing priority areas. The MSIRI's research units introduced the concept of contract research for government agencies and mostly in designated areas by SPO for developing a research-intensive sector, for example, in electronics. These

units accomplished large-scale government research on certain technological fields without any guidance from a science policy paper. However, the MSIRI's project-based organization, as well as foreign aid on certain research projects contributed to the idea of the utility of applied research, irrelevant to their impact in designated sectors. Although I do not have any information about defense research handled at the Guided Device Technology and Measurement Institute (GATÖM), defense research must also be influential in promoting contract research in joint projects of government agencies.⁴⁴⁹ These are also *practice works* that permeated the boundaries of academic logic which was quite strong via Science Committee members' conviction about basic positive sciences.

The trajectory of the field effect via operational research on project management and as a research evaluation method, the Frascati Manuals' influence on the objectives of a science policy, as well as earlier discussions on why a science policy or a science planning is a must, according to former SPO planners represent the long-term penetration of science policy concepts into the organizational form which has led to the establishment of a higher supervisory council. In the second chapter, the history of British science policy organizations stated a dual mechanism concerning the origins and organizational form of research organization. In Britain, there was an Advisory Council and an executive branch of research policy, DSIR. TUBITAK's final transformation in 1983 represents a long historical negotiation and translation of organizational forms and science policy concepts between the government and scientific community in Turkey i.e. the interplay of policy logic and the academic logic. In the next chapter, I discuss TUBITAK's transformation into a full policy organization in the 1990s via a president perceived as legitimate by both professors and government circles.

⁴⁴⁹ For example, Özdaş states ASELSAN as part of private sector who has R&D activities. See: Devlet Bakanlığı. *Türk Bilim Politikası: 1983-2003*, 39.

CHAPTER 5

THE TRIUMPH OF POLICY LOGIC AND THE INTRODUCTION OF MARKET LOGIC (1990-2010)

5.1. Introduction

In this chapter, I argue that TUBITAK's transformation into a policy-driven organization came full circle in 1990. This process began with the infamous *24th January Decisions* and the *September 12 Military Coup*, both of which led to a massive state reorganization. These changes introduced mechanisms to promote market liberalization while centralizing control over key government institutions such as the Council for Higher Education (CHE) and TUBITAK, which was restructured as the executive branch of the Supreme Council of Science and Technology (SCST). The transformation aimed to stimulate industrial and technological production across all levels of the business sector. To achieve this, the government introduced new incentive mechanisms to encourage export-focused economic activities.

During the period between 1980 and 2010, as I will show in this chapter, the final major controversy between *academic and policy logics* unfolded between the mid-1980s and 1989, centering on TUBITAK's transformation into a fully policy-oriented organization and its subordination to the SCST. This restructuring not only redefined TUBITAK's role but also introduced a market logic into its policymaking for R&D and technology production. As a result, TUBITAK began providing direct incentives to private-sector firms engaged in either technology production or the modernization of their manufacturing systems in line with technological advancements. At the same time, the SCST emerged as an incubation center for science and technology policy mechanisms, coordinating and proliferating new strategies for technological development.

This transformation also fully incorporated field effects emerging from the transnational organizational field, such as the introduction of national innovation systems and the Turkish Research Area (TARAL). In earlier periods, these transnational influences affected only certain executive bodies within TUBITAK—particularly its Secretariat—through practice work in the form of statistical review mechanisms, the project-based organization within the Marmara Scientific and Industrial Research Institute (MSIRI), and the introduction of contract research. Meanwhile, the Science Committee, the strongest advocate for academic logic, struggled to preserve the values of the scientific community. As I will discuss in this chapter, TUBITAK’s final transformation during this period represents the triumph of *policy logic*, as it integrated earlier practice work into its core function of coordinating the country’s science and technology policies.

Although as an interdepartmental council, the SCST has been preserved, and TUBITAK’s administrative autonomy was attached to the Prime Minister until 2016, at least to a lesser degree, that year marked a further shift when TUBITAK was attached to the Ministry of Industry and Technology, and the SCST was restructured as a distinct Presidential Policy Committee. Despite this organizational realignment, TUBITAK continues to incorporate the policy logic that began in the 1990s such as the Turkish Research Area (TARAL) and innovation policy as the central pillars of its functioning.

5.2. The Closing Chapter for the Academic Logic: Debate on “What Kind of TUBITAK?” between 1985-1989

The establishment of SCST ended TUBITAK’s administrative autonomy in 1983. The debate on the problems of science policy organization and the question of a general policy paper emanating from the internal and external environment of TUBITAK has also concluded with the publication of *Turkish Science Policy 1983-2003*.⁴⁵⁰ Until 1983, most of the innovative *practice work* had been introduced by Nimet Özdaş’s initiations, especially the MSIRI’s project-based organizational structure, leading to the Institute taking certain government research in the form of contracts. The most important aspect of this era was related to the *12th of September Military Coup*

⁴⁵⁰ Devlet Bakanlığı, *Türk Bilim Politikası 1983-2003*, (Ankara 1983).

enabling a broader transformation in the organizational structure of the state itself, and as a side effect in the TUBITAK. Considering the other transformations such as the establishment of the Council of Higher Education (CHE) after the coup, SCST's establishment shows a tendency in the state reorganization towards a more central position. However, civil governments wanted to introduce further changes to TUBITAK's organization, such as the replacement of the Science Committee with a Board of Directors while assigning the head of the Council as Secretary-General naming its position as the President of the Council. These developments invoked the last major debate between government officials and TUBITAK's Science Committee members in the mid-1980s to 1989. Despite the controversy, the Özal government introduced the designated changes through a Legislative Decree in 1987, replacing the Science Committee with a Board of Directors while appointing TUBITAK's role as a "service organization" to the public and government agencies.

In addition to the Military Coup's centralizing efforts in the state reorganization, the most prominent changes occurred in the restructuring of the Prime Minister's office which introduced certain financialization mechanisms following the January 24th Decisions as I discuss in the section on the introduction of *Market Logic*. The establishment of SCST and weakening of the TUBITAK's administrative autonomy was accomplished by a former TUBITAK Official, Nimet Özdaş, and later the newly elected Özal government and his state minister, Tınaz Titiz's initiations which evoked the last *boundary work* of the professors between 1985 to 1987. During these years, Tınaz Titiz insisted on transforming TUBITAK into a "service organization". Professors responded to these interventions by stating the unique position of TUBITAK, reminding that scientific organizations cannot be transformed into a fully "service organization" similar to other State Enterprises. The full correspondence between the Science Committee and the State Minister is not available in Sevtap Kadioğlu's dissertation. However, I argue that the policy logic has won the arguments by showing the legislative changes that took place in 1987. This controversy explains much of the TUBITAK's unstable period between 1983 and 1989 in addition to that SCST only achieved its first meeting in 1989. After this unstable period for TUBITAK, Kemal Gürüz, a "legitimate president" for both bureaucratic circles and TUBITAK officials accomplished the long transformation of TUBITAK into a policy-driven organization.

On 26th February 1985, Tınaz Titiz, Minister of State who was responsible for TUBITAK and the Turkish Atomic Energy Commission wrote to the then Chairman of the Science Committee about “improving the ways benefitting from TUBITAK’s services”.⁴⁵¹ This letter included some suggestions on making an advertisement for TUBITAK’s services to present “science is a way to improve life, something to benefit from with concrete projects for nutrition and housing services, solving stock problems and information flows for industry, government, and business sectors. Tınaz Titiz’s letter identified science as a problem-solver, there were statements like “even building a *gecekondu*⁴⁵² with science is much easier”. Although it is not present in the appendices in Kadioğlu’s study, this letter must also include the draft bill that introduced the replacement of the Science Committee with a Board of Directors. In response, Kemal Kafalı, Chairman of the Science Committee wrote a letter on 30th September 1986, with the title of “What Kind of TUBITAK?”, stating the unique characteristics of TUBITAK and science in general, reminding not to conflate solving industry and government’s daily problems with science. Kemal Kafalı’s letter consisted of earlier critiques about the preparation of a government paper, but also indicated the boundary between the bureaucrats’ and politicians’ wishes to transform it into a “service organization”. The context of the letter is not clear, however, Kafalı’s letter was a response to the designated draft bill introducing a Board of Directors. Instead, Kafalı suggested an executive board with preserved the status of the Science Committee while extending the number of memberships to the Science Committee and Advisory Committee. Other Science Committee members, such as Metin Bara also answered Tınaz Titiz’s recommendations on 17th July 1986. Bara’s letter stated the generalized version of linear progression from basic science to technology development, which belongs to the American context as early as the NSF’s foundation on Vannevar Bush’s initiatives. For example, Bara stated his objections to the defamed status of the Research Institute for Fundamental Sciences, probably in Tınaz Titiz’s letter⁴⁵³, which was formed in Gebze Campus based on the MSIRI’s research unit for

⁴⁵¹ Tınaz Titiz, “TÜBİTAK Hizmetlerinden Yararlanılması için Düşünceler Konulu Memorandum. 26.02.1985” in Sevtap Kadioğlu, *TÜBİTAK’ın Türk Bilim Hayatındaki Yeri*, Appendix 17.

⁴⁵² Slum or shanty house. I left the term as “*gecekondu*” because of its connotations belonging to the Turkish context.

⁴⁵³ Bara cites the exact page number which calls Research Institute for Fundamental Sciences as an institute “misfunctioning the MSIRI and lacking any substantial reason in its formation”, yet this document is not available in Kadioğlu’s dissertation appendices. See Metin Bara, Letter to Tınaz Titiz, 17.07.1986 in Kadioğlu, *TÜBİTAK’ın Türk Bilim Hayatındaki Yeri*, Appendix 19.

Applied Mathematics. Mithat Özsan, another Science Committee member also wrote a letter to Tınaz Titiz on 20th August 1986. Özsan's concerns remarked the possible "politicization" of the Council when the Science Committee's authority diminished and the autonomy of the Council was removed. Although Özsan supported the amendments for an executive board and the appointment of a president to the Council, he rejected the absence of the Science Committee in the draft bill.

Kadioğlu discusses the debates on the amendments made in 1987 and the professors and state minister Tınaz Titiz's correspondence while contextualizing the debate by citing newspaper and article columns written by former TUBITAK officials, such as Cahit Arf's words on claiming Turkey's technological backwardness cannot be blamed on TUBITAK, while in contrast Adnan Kahveci, another State Minister who was responsible for SPO and National Treasury, stating the draft bill would make the functioning more efficient and also would not politicize the Council.⁴⁵⁴ On 11th November 1987, a Legislative Decree amended the TUBITAK Act introducing the Board of Directors and Presidency for TUBITAK.⁴⁵⁵ These amendments not only replaced the Science Committee with a Board of Directors but also explicitly stated the task of TUBITAK acting in accordance with economic development plans. It assigned TUBITAK to execute the tasks assigned by the SCST while reporting to the Prime Minister and defined services with possible fees.

The 1987 Legislative Decree is not as detailed as the original 1963 Act. This also retrospectively explains the earlier amendments made by the Senate when delegating the Secretary-General's position at TUBITAK with its appointment by dual decree, while preserving the qualities of Science Committee members as they must be appointed amongst the renowned scientists and stating the origins of members of the Advisory Committee in its representative power. The 1987 Legislative Act only designs the appointment of a Board of Directors by a joint decree and their quality of experience in science and technology while at least three of them are renowned in mathematical, physical, and biological sciences. The most important aspect of the amendments made after 1987 is the emphasis on "competitiveness". All the

⁴⁵⁴ Kadioğlu, "TÜBİTAK'ın Türk Bilim Hayatındaki Yeri, 92-93, For a full discussion, see Kadioğlu, 80-103.

⁴⁵⁵ "Karar Sayısı: KHK/294" in *Resmî Gazete*, 11th November 1987.

legislations made after 1987 included at one point, a statement on “competitiveness”. It was in article 2, subclause “a” emphasizing TUBITAK’s task of funding research “in terms of competitiveness” in the 1987 Decree. In the 1993 Decree, it was stated in article 2, subclause “d”, “to increase the country’s competitiveness”.⁴⁵⁶ 2018 Presidential Decree emphasizes it similarly in the first article explaining the establishment rationale of the Council.⁴⁵⁷ Although I will discuss the introduction of Market Logic into TUBITAK in the following section, this explains the continuity in the designated role of TUBITAK, changing its focus to directly stimulating economic development instead as a side quest while promoting the research spirit in the country after the 1980s.

Considering the internal affairs of TUBITAK and the functioning of SCST after 1983, the legislative decree signed in 1987 did not achieve the task of stabilizing the Council until Kemal Gürüz’s appointment in 1990. Gürüz’s distinguished position amongst the bureaucratic circles and his adoption of wide-ranging policy reformation in TUBITAK has provided the basis of much of today’s national science and technology policy schemes. Kadioğlu does not discuss his exclusive role in redesigning the TUBITAK, however, indicated the 1993 Legislative Decree which reintroduced the Science Committee as incorporating the autonomy of the 1963 Act with the 1987 Legislative Act’s presidency. The 1993 Amendments were made during the coalition government of the Social Democracy Party of Erdal İnönü, the initiator of establishing TUBITAK with NUC member Sami Küçük. These amendments reintroduced the Science Committee with the presidency as Kadioğlu claims, however, it did not allocate the original 1963 Act in terms of scientific, administrative, and financial autonomy. The 1963 Legislative Decree only recognized the prominent role of university professors when governing a unique organization such as TUBITAK.

Table 5.1. *Transformation of TUBITAK Act in terms of Autonomy vs. Centrality*

Date of the Act/Decree/Directive	Legal Authority/Logic	Type of Autonomy/Dependence	Attached to the government body	Focus of Amendments
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⁴⁵⁶ “Karar sayısı: KHK/494” in *Resmî Gazete*, 9th September 1993.

⁴⁵⁷ “Bakanlıklara Bağlı, İlgili, İlişkili Kurum ve Kuruluşlar ile Diğer Kurum ve Kuruluşların Teşkilatı Hakkında Cumhurbaşkanlığı Kararnamesi, Kararname Sayısı: 4” 15th July 2018, 254-260 <https://www.mevzuat.gov.tr/mevzuatmetin/19.5.4.pdf> accessed on 17th September 2025.

Table 5.1. *Transformation of TUBITAK Act in terms of Autonomy vs. Centrality (Continued)*

1963 Act (Establishment Act)	Science Committee/Academic	Scientific, Financial, and Administrative Autonomy	Prime Minister	After the Senate's amendments, the Secretary- General's position is improved.
1987 Legislative Decree	President (former Secretary General) + Board of Directors/Policy	Financial Autonomy, attached to the Prime Minister	Prime Minister + SCST	SCST's establishment in 1983 already ended administrative autonomy. The act abolished the Science Committee, and Advisory Committee and introduced Presidency and Board of Directors.
1993 Legislative Decree	President + Science Committee/Policy + Academic Logic	Financial Autonomy, governed by a consensus of SCST.	Prime Minister + SCST	Introduced the Science Committee but also preserved the Presidency. Reversed version of the 1963 Act in terms of Secretariat vs Science Committee.
2005 Act	President + Science Committee/Policy Logic	Financial Autonomy, governed by a consensus of SCST	Prime Minister + SCST	Increased the number of Science Committee members and changed the Council's name from “technical” to “technological”.

Table 5.1. *Transformation of TUBITAK Act in terms of Autonomy vs. Centrality (Continued)*

2008 Act	President + Science Committee/Policy Logic	Financial Autonomy, governed by a consensus of SCST	Prime Minister + SCST	Authorized to change the inner workings of the Science Committee with directives.
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A chronological comparison between the *1963 Act* to the *2011 Directive* can be seen in Table 5.1. The table does not include the Legislative Decree which authorized to establishment of SCST in 1983. SCST's establishment theoretically ended the large privileges allocated to TUBITAK's Science Committee in 1963 i.e. scientific, administrative, and financial autonomy. After 1983, the question has become only the recognition of a Science Committee and/or fully executive policy-driven organization. Much of the debates that took place between 1984 to 1989 were related to turning TUBITAK into a "service organization", and later in 2003 when the AKP government delayed the appointment of Science Committee members, did not reflect a concern for academic autonomy. After 1983, these debates reflected whether in TUBITAK the recognition of a scientific authority would occur or not, and to an extent a controversy on ideological/political differences. Until the mid-2010s, it is possible to suggest that the Science Committee acted as an interface between the scientific community and bureaucratic circles. Moreover, considering the TUBITAK's actual functioning after 1990 as SCST's secretariat, there is a clear continuity in terms of incorporating field-effects i.e. science policy concepts such as national innovation system, review mechanisms, funding development R&D, technology production projects, and contract mechanism to this day. However, the question of autonomy has become controversial since 1983, it is also clear that TUBITAK did not function stably without recognizing the presence of an academic committee until 2011. As I discuss the period between 1990 to 2010, TUBITAK's subordination to the Ministry of Industry and Technology in 2011, did not raise any objections from the scientific community. This explains the policy logic's coming into full circle after the 2010s.

5.3. From Operational Research to National Innovation Systems: How Field Effects Come Full Circle

This section argues that field effects emanating from the transnational organizational field came into full circle in the 1990s at TUBITAK. Statistical review mechanisms and forecasting techniques have become routinized activity, and a holistic approach to science and technology systems through the concepts of the *national innovation system* and *Turkish Research Area* have been introduced and operationalized from 1997 to this day. These field effects can be traced by a historical analysis of SCST documents. In 1997, the concept of the *National Innovation System* was introduced and adopted at the Third SCST Meeting to prepare a strategy paper for the science and technology policy of the country.⁴⁵⁸ In addition to the elaboration of these concepts and mechanisms, these transformations should be thought of in parallel to TUBITAK's administrative adaptation to field effects on the one hand, and the introduction of market logic via financial mechanisms on the other. For the transnational elaboration of the concept of national innovation systems, I argue that there is a continuity between 1950s operational research and late-1980s national innovation systems in terms of their stochastic thinking and holistic approach, and management of national science policy systems. Although I present data from 1990-2010, the concepts of the innovation system and Turkish Research Area are still employed today guiding the country's formation of science and technology policy.

5.3.1. The Systems Approach: From Operational Research to National Innovation Systems

The earlier adaptation of operational research in the Turkish Military and later in TUBITAK has had its impact partially on the Council's internal affairs. The direct connection of the Military with Operational Research is however clear when Halim Doğrusöz's PhD supervisor Glen D. Camp's close connections with the Turkish General Staff's R&D Department. Although the Operational Research Unit at TUBITAK has employed its methods and techniques only to modernize State Enterprises, during the late 1970s it provided some internal reviews of TUBITAK's research policy. In addition to that, Nimet Özdaş's application of a systems approach

⁴⁵⁸ TÜBİTAK BTP 97/04, *Türkiye'nin Bilim ve Teknoloji Politikası*, "Decisions have been reached at the third SCST Meeting." accessed 23 January 2022, <https://tubitak.gov.tr/tr/kurumsal/politikalar/arsiv>. All SCST meeting documents are available in here.

to priority research areas in the text, *Turkish Science Policy: 1983-2003* can be considered as the clear continuation of operational research's importance about the changing cognitive frameworks towards national science policy. When critiquing Nimet Özdaş's paper, Bahattin Baysal claimed that the section on research priorities must be prepared by the Operational Research Unit. This argument is also convincing when considering that Nüket Yetiş, the president of TUBITAK between 2004-2011 was a researcher at the Operational Research Unit and produced a paper on "A Method for Selection of the Best R&D Project"⁴⁵⁹. There were also other SPO-sponsored OR studies in which Nüket Yetiş was part of the team exploring the models of "Technology Policy" published in 1978.⁴⁶⁰ The connection between SPO's sponsorship of these series is also important. The third volume *Technology Formation: An Examination of Industry*, and the fourth volume on Steel Industries stated that these studies were prepared "in memoriam of Ahmet Tuğaç, an SPO expert who laid the ground for these studies".⁴⁶¹ Ahmet Tuğaç was one of the SPO Experts who critiqued the organizational problems of Turkish science policy in his report published in 1977, which I discussed in the third chapter as a part of the *practice work* from the external environment of TUBITAK. The other important connection between the organizational field and the continuity of the field-effects was that this four-volume study was supported by the OECD Technical Co-operation Service specifically for technical visits made to England. The most prominent feature of operational research was its emphasis on the management of operations with a holistic approach, surveying enabling and constraining factors to make stochastic predictions about the operation. In this context, MSIRI'S OR Unit's study on technology formation recalled this approach in the introduction stating that "Science and Technology" should be thought of and examined as a sub-system of a country's 'socio-economic system'" and pointing to the difficulties of establishing relations between these sub-systems, a

⁴⁵⁹ Nüket Yetiş, *Ar-Ge Çalışmalarında En İyi Proje Seçimi için Bir Yöntem*. MBEAE Yöneylem Araştırma Ünitesi, (1978).

⁴⁶⁰ Only reached two volumes of this series on Technology Policy. See Muhittin Oral et al. *Teknoloji Oluşumu: Sanayide Bir İnceleme: Teknoloji Politikası Cilt 3*: MBEAE Yöneylem Araştırma Ünitesi. (1978). See also the fourth volume of this series: Muhittin Oral et al. *Demir Çelik Entegre Tesisleri için Araştırma+Geliştirme Planlaması: Teknoloji Politikası Cilt 4*. MBEAE Yöneylem Araştırma Ünitesi. (1978).

⁴⁶¹ Oral et al. *Teknoloji Oluşumu*. 1978, 3. Ahmet Tuğaç died in 1977, he donated a family property to TUBITAK to form a foundation on his father's name, TÜBİTAK-Hüsamettin Tuğaç Vakfı. For this information, see: TÜBİTAK, *Bülten*, Sayı 6, Ocak 2002, 4. Retrieved from https://tubitak.gov.tr/tubitak_content_files/ocak02.pdf on 24th December 2024.

“holistic approach” was necessary and beneficial for a model on technology production in the country.

Similar to what Nimet Özdaş had done in preparing the text, Turkish Science Policy:1983-2003, this tendency of a holistic approach represents the continuity of what operational research reflected in the late 1930s. As can be recalled, British Scientists and later NATO officials identified the operations varying from developing weapon systems to logistical planning and structuring of defense mechanisms to modernization of any business organization towards more “efficient” functioning. After WWII, operational research integrated into larger business management techniques and military planning in conceptualizing a systems approach. Benoit Godin identifies the elaboration of the concept, the *National Innovation System*, in the late 1980s among the OECD circles as part of the continuation of this *systems approach* that emerged from the United States, particularly by the RAND Corporation. Thus, I propose that the impact of NATO-AGARD and the establishment of the Turkish General Staff’s R&D Department have culminated first, in the review mechanisms and cognitive frameworks considering the management and modernization of organizations by the MSIRI’s OR unit. In 1983, Özdaş adopted these mechanisms and techniques in the preparation of the country’s first national science policy paper. A similar government paper was prepared for the Second SCST meeting in 1993. This paper called *Turkish Science Policy: 1993-2003* also emphasized the importance of understanding science and technology policies in terms of a systems approach. For example, *Turkish Science Policy: 1993-2003* identified that:

A quantitative evaluation of research and development (R&D) requires examining the inputs and outputs of a system when considering it with a systems approach. The input parameters are manpower, financial tools, infrastructure, and knowledge/information. The outputs are new products, systems, scientific publications, and patents. It is not possible to show the input-output relationship with simple equations, however when great efforts have been placed on inputs, the outputs would be progressively greater, but it is a well-known trend when the inputs are stable, the outputs decrease logarithmically.⁴⁶²

⁴⁶² “Türk Bilim ve Teknoloji Politikası: 1993-2003” accessed 23 January 2022, <https://tubitak.gov.tr/tr/kurumsal/politikalar/arsiv>. All SCST meeting documents are available in here. This document does not have any page number, nor an archive code.

In 1997, this concept became a pillar for establishing a *national innovation system*. The Third SCST meeting discussed at length the importance of technological innovation to increase the country's competitiveness in the international arena as the "sole strategic choice".⁴⁶³ In addition to these emphases, the High Planning Council itself adopted a key policy in 1995 called "Project for Breakthrough in Science and Technology". Although I will discuss in the next sections the administrative restructuring of TUBITAK and the introduction of *market logic*, a distinct department was established at TUBITAK called the Directorate for Technology Review and Examination (TİDEB) in 1995. This department is still responsible for much of the policy innovations and reviews of direct subsidies provided by TUBITAK for technology development in the industry. In connection to the organizational field and as a field effect, the concept of a national innovation system occurred from the OECD circles, specifically in the works of the inventor of the *Frascati Manuals*, Chris Freeman, and others such as Berg Ake Lundvall which encapsulates earlier conceptual innovations of operational research i.e. a holistic approach, pattern recognition, and probabilistic future projections. Benoit Godin relates the invention of the concepts to a systems approach in general, however as I discussed in the second chapter, it goes back to the invention of operational research as part of military administration.⁴⁶⁴ , the manual prepared for the indicators of National Innovation Systems, the Oslo Manual published in 1992 after one of the authors of the concept, became the Deputy Director of OECD's Directorate for Science, Technology and Industry (Successor to Directorate for Scientific Affairs).⁴⁶⁵ These field-effects were translated into Turkish context with the introduction of the National Innovation System in 1997 at the Third SCST meeting.

Turkey's desire to participate European research and development network was already employed in 1986, when Turkey became a foundational member of a research funding organization for advanced technology, EUREKA, in cooperation with the

⁴⁶³ TÜBİTAK BTP 97/04, *Türkiye'nin Bilim ve Teknoloji Politikası*, "Decisions have been reached at the third SCST Meeting." accessed 23 January 2022, <https://tubitak.gov.tr/tr/kurumsal/politikalar/arsiv>.

⁴⁶⁴ Military administration in Turkish is called "Sevk ve İdare". Much of the earlier public administration and business management organizations in Turkey employed/still employs these Turkish words. For example, TUBITAK Institute TÜSSİDE, Türkiye Sanayi Sevk ve İdare Enstitüsü which I think reflects much better about the military connotations of the words' origins.

⁴⁶⁵ Benoit Godin, "National Innovation System: The System Approach in Historical Perspective", in *Science, Technology and Human Values* 34, No.4, (2009), 479.

European Economic Cooperation. Nimet Özdaş wrote two articles for the journal, *İnsan ve Kainat* in the same year ITU was developing a project for advanced technologies in Turkey.⁴⁶⁶ In 1999, Turkey reached an agreement to open negotiations for full membership to the European Union (EU), the emphasis on innovation put by SCST coupled with another conceptual tool called “European Research Area”. The novelty of Turkey’s starting negotiations and the EU’s impact was this concept that SCST decided to define Turkey’s own Research Area called TARAL (Turkish Research Area). Similar to a national innovation system conceptualization, TARAL identifies the existing Turkish science and technology mechanisms, financial tools, and budget, and connects these different parts with an umbrella concept. These mechanisms are research parks for University-Industry Relations, technology development areas for subsidizing industry and tech firms, government R&D programmes, government subsidies, and parent organizations, as well as funding for academic/basic research. Besides TARAL being identified in terms of an EU’s field-effect, it is similar to the concept of a national innovation system in terms of categorizing research and funding schemes to review it. Although I will discuss in the section on Market Logic, the thirteenth SCST meeting held in 2006, shows what consists of TARAL, concerning the R&D budget and financial tools which are crucial to understanding the developments that took place after the 1980s. All these mechanisms reflect, for example, TUBITAK’s reorganization as a policy-driven council and its wider environment’s restructuring after 1980. The 13th SCST meeting’s document cites, for example, R&D funding organizations, TUBITAK, Prime Ministry’s Undersecretariat of Foreign Trade (DTM – Dış Ticaret Müsteşarlığı), EU Framework Programme (FP), SPO Technology Development Projects, University Scientific Research Projects (BAP), (TTGV), and Small and Medium-Sized Industry Development Organization (KOSGEB), with TUBITAK’s internally differentiated programmes. These R&D funding organizations constituting TARAL reflect both historical developments concerning the market liberalization of Turkey after 1980 and

⁴⁶⁶ For journal articles: Nimet Özdaş, “EUREKA ve ötesi”, *İnsan ve Kainat*, May 1986. 6-8 and Nimet Özdaş, “EUREKA ve Türkiye”, August 1986, 20-21. For the working paper on advanced technologies, see İstanbul Technical University Rectorate. *Türkiye İleri Teknoloji Teşvik Projesi Ön Raporu*. 1985. This report was prepared by Nimet Özdaş and the MSIRI’s Electronic Research Unit’s professor, Duran Leblebici in addition to Kemal Sarıoğlu, Nadir Yücel, Erdal Panayırıcı, Ahmet Kuzucu. In 1987, Özdaş published another article in *İnsan ve Kainat* indicating his objections to Tınaz Titiz’s critiques about TUBITAK’s lack of funding. This shows that even Özdaş himself did not really support the 1987 Legislation. For the article See: Nimet Özdaş, “Özdaş Cevap Veriyor”, *İnsan ve Kainat*, (September 1987), 8-10.

the coming into full circle of policy logic. To this table, it should also be added the Undersecretariat of Defense Industry (SSM).

5.4. State Reorganization after the 1980s and the Introduction of Market Logic

The literature on Turkey's economic transformation from a mixed economy, state protection, and import substitution regime to export-led trade liberalization policies i.e. the neoliberal turn, attributes the *24th of January 1980 decisions* and the 12th of September Military Coup a prominent role.⁴⁶⁷ The doctrine of this market liberalization or neoliberalism indicates the downsizing of the role of the state in various sectors. In contrast, in this section, I argue that the expansion of the Prime Minister's Office due to the market liberalization programme and specifically the idea of export-led economic growth was the major reason for TUBITAK's reorganization. These processes culminated in 1990, under Kemal Gürüz, which transformed TUBITAK into a fully policy-driven organization.

The *Coup D'etat* and the *24th of January decisions* enabled a massive transformation introducing several centralization efforts in the state organization. In against the arguments on downsizing the state organization due to the privatization of state enterprises and withdrawal from social policy sectors, it is evident that after the 1980s, the organizational structure of the Prime Minister's Office was expanded with financial mechanisms to enable market liberalization policies. This centralization may be considered in the same manner as expanding the government's control in higher education via the Council for Higher Education (CHE) in 1981, and the SCST's establishment in 1983 about science and technology policies.

In this section, I argue that TUBITAK's transformation into a policy-driven organization and the introduction of market logic reflects the general tendency in its environment i.e. the state reorganization towards market liberalization. Although market logic may connote the pressures of business and industry sectors' demand on the government's financial tools on R&D expenditure in the first instance, here I only draw attention to the bureaucratic transformation with little examples voicing the

⁴⁶⁷ Gülten Kazgan, *Tanzimat'tan 21. Yüzyıla Türkiye Ekonomisi*, İstanbul Bilgi Üniversitesi Yayınları, 2006, and Korkut Boratav, *Türkiye İktisat Tarihi (1908-2015)*, İmge Yayınevi, 2023[1988].

business and industry sector itself such as the 1994 TUSIAD Report. In addition to these developments, it should also be considered that TUBITAK was originally established under the patronage of the Prime Minister. While the government's attitude toward the Council varied due to their preferences about the bureaucracy⁴⁶⁸, this also explains why TUBITAK's reorganization was related to the Prime Minister's Office reorganization beginning in the 1980s.

5.4.1. The Expansion of the Prime Ministry's Financial and Administrative Mechanisms

In 1980, a series of new mechanisms concerning the economic policy i.e. incentives, import/export rules, and foreign investments were attached to the Prime Minister's Office following the *24th of January decisions*. Some of these mechanisms were already functioning but scattered among the other ministries. These new agencies were the Directorate of Foreign Capital, Directorate of Incentives and Implementation, and mechanisms to protect Turkish currency attached to a new coordination agency under the Prime Minister's undersecretary. This coordination agency, the Money-Credit and Coordination Council has been made responsible for deciding import-export regimes, and customs quotas, and guiding the policy for foreign investments. Senior government officials such as SPO, Ministry of Finance, Ministry of Industry and Technology, and undersecretaries from other ministries, and on the occasions of deciding quotas, the chambers of trade and industry are included in this higher coordination agency. This new policy-making mechanisms and coordination agency was attached to the Prime Ministry for "rationalizing the services, coordinating and implementing policy decisions more rapidly".⁴⁶⁹

The importance of this expansion was not only related to market liberalization but also to the concentration of political power under the Prime Minister's Office. Much of the

⁴⁶⁸ At one point in 1991, TUBITAK's research institute, the MSIRI (or Marmara Research Center after 1991) was planned to be closed and attached to the Gebze High Technology Institute which was in the establishment process. During his government with Social Democratic Populist Party of Erdal İnönü, Süleyman Demirel prevented its close. See former MAM president's words, Ömer Kaymakçalan, "TÜBİTAK Marmara Araştırma Merkezi (MAM) Teknopark ve Teknoloji Geliştirme Merkezi", in *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Cezmi Güner Omay (ed), Ankara: Bilimsel ve Teknik Araştırma Vakfı, (2017), 69.

⁴⁶⁹ "Kuruluşların Bağlı Oldukları Bakanlıkların Değiştirilmesi ile İlgili İşlem" in Resmi Gazete, 25th January 1980. Including the decisions to attach these new financial mechanisms to Prime Minister, policy papers for incentives and exports, exchange regime, and the establishment of *Subsidies and Price Stabilization Fund* can be found in this issue of Official Gazette.

inventions concerning the funding, expansion of government incentives, and later privatization of state enterprises were governed by a series of new funds when Özal was elected and became Prime Minister in the 1983 civil elections. The first series of funds was formed under a new administration for *Public Housing and Government Shareholding* (Toplu Konut ve Kamu Ortaklığı İdaresi – TOKİ). This new administration and funds were established due to the newly legislated acts about public housing, and “the act to promote savings and the acceleration of public investments” in 1984.⁴⁷⁰ According to these acts, the administration’s budget was financed with these new funds, which were introducing shareholding options for State Enterprises and State facilities, public housing projects, and initiating large public investments.⁴⁷¹ According to the founding bureaucrat of this administration appointed by Özal, these new funds were called Public Housing Funds, Privatization Funds, Government Shareholding Funds, and later Development and Subsidies Funds.⁴⁷² In addition to the resources from shareholding and leasing state facilities, these funds were collecting revenues from gas consumption, beverage production taxes, and other sources.⁴⁷³ Privatization funds were collected by selling non-finished public investments and ending the shareholding of the government in the private sector.⁴⁷⁴

Prime Ministry’s expansion was not only limited to the establishment of these administrations and funds. A key agency and fund for the defense industry was also created in 1985. *Defense Industry Development and Subsidies Administration* (SSM) was established under the act no. 3238.⁴⁷⁵ This act introduced the establishment of the Defense Industry High Coordination Council, Executive Committee, and Defense Industry Development Fund.⁴⁷⁶ The High Coordination Council included the Chief Commander of General Staff, the State Minister responsible for economic affairs, the

⁴⁷⁰ TBMM Zabıt Ceridesi. “Tasarrufların Teşviki ve Kamu Yatırımlarının Hızlandırılması Hakkında Kanun”. 8.3.1984. and TBMM Zabıt Ceridesi, “Toplu Konut Kanunu”, 17.3.1984.

⁴⁷¹ See the Acts, on the previous footnote.

⁴⁷² Vahit Erdem. *Hatıralarla Devlette 45 Yıl*. Boğaziçi Yayınları, (2021), 157-158

⁴⁷³ Erdem, *Hatıralarla Devlette 45 Yıl*, (160).

⁴⁷⁴ Erdem, *Hatıralarla Devlette 45 Yıl*, (173).

⁴⁷⁵ “Savunma Sanayii Geliştirme ve Destekleme İdaresi Başkanlığının Kurulması ve 11 Temmuz 1939 Tarih ve 3670 Sayılı Milli Piyango Teşkiline Dair Kanunun iki Maddesi ile 25 Ekim 1984 Tarih ve 3065 Sayılı Katma Değer Vergisi Kanununun Bir Maddesinde Değişiklik Yapılması Hakkında Kanun” Resmi Gazete, 13 November 1985.

⁴⁷⁶ “Savunma Sanayii Geliştirme ve Destekleme İdaresi Başkanlığının Kurulması ve 11 Temmuz 1939 Tarih ve 3670 Sayılı Milli Piyango Teşkiline Dair Kanunun iki Maddesi ile 25 Ekim 1984 Tarih ve 3065 Sayılı Katma Değer Vergisi Kanununun Bir Maddesinde Değişiklik Yapılması Hakkında Kanun” Resmi Gazete, 13 November 1985.

Minister of National Defense, Commanders of other forces, and with Prime Minister's undersecretaries under the chairmanship of the Prime Minister himself/herself. According to the founding bureaucrat of this Administration, the high council did not hold any meetings while the executive branch held regular meetings discussing defense spending, R&D developments, and arms sales.

Similar to other funds, resources of this administration were defined as part of the tax revenues of gas consumption, part of the revenues from alcoholic beverages and tobacco products, a part of lottery and betting and gambling revenues, %2,5 of income and corporate taxes, resources from paid military service, and transfers from foundations which were established for supporting Turkish Armed Forces. In the same manner as other funds and administrations, the Defense Industry Development Administration was made exempt from auditing by the Exchequer and Audit Department (SAYIŞTAY) and the Public Procurement Act. As the Act forming the Defense Industry Administration projected to include public and private cooperation and national and foreign investment collaborations, for example, in the form of forming a corporation and shareholding with some foreign defense company, the Administration has become an issue whether it contradicts of constitutional articles foreseeing the development and manufacturing of defense technologies a national issue. Although the Supreme Constitutional Court ruled out that there was no conflict with the constitution in 1986⁴⁷⁷, this shows the general coalition about forming funds, opening defense industry developments to foreign investment at least to a degree to those who were willing to subsidy defense industry separately.

The extension of the Prime Ministry's authority was also reinforced by the establishment of an Undersecretariat of Treasury and Foreign Trade in 1983 by the legislative decree no. 188. This new undersecretary brought together a number of duties that were previously under the responsibility of the Ministry of Finance and Ministry of Trade, such as foreign economic affairs, international economic cooperation, public finance, import/export, and credit and currency exchange issues. The undersecretariat's duties were related to almost every policy decision about the economic issues of the country.

⁴⁷⁷ "Yargı Bölümü: Anayasa Mahkemesi Kararları", *Resmî Gazete*, (21 November 1987), 3.

Under the Prime Ministry's authority, several other funds were also established during this period. In the following years after the mid-1980s, these funds were diversified, for example, Public Housing and Government Shareholding Funds were separated in 1994.⁴⁷⁸ Similarly, Treasury and Foreign Trade Undersecretariats were separated in 1994. The executive branches and the funds themselves are key players in the decision-making on subsidies, including R&D expenditure on defense research i.e. TUBITAK's role. These government agencies have used their authority such as defining the rate of their tax revenues of gas consumption income, corporate tax, and alcoholic beverages and tobacco products to increase the volume of these funds.

5.4.2. Development of Small and Medium Scale Industry and Technology

Development Foundation of Turkey

The impetus of market liberalization has influenced two other developments in addition to the expansion of the Prime Ministry's economic departments, and the formation of funds within the Office in relation to TUBITAK's organizational transformation. These developments are the establishment of an administration for stimulating small-scale industry, and later the establishment of a non-governmental foundation for financing technology development. In this section, I argue that TUBITAK's decision to allocate direct resources to technology development firms is related to the overall efforts to support small and medium-sized industries in Turkey which began in the 1970s. This development effort was extended after 1980, as the country's economic policies turned towards export-led market liberalization. Further development occurred after the 1990s. In addition to TUBITAK's direct subsidies to technology-developing firms, a non-governmental organization, the Technology Development Foundation of Turkey was established in 1991. In considering these developments, I argue that a market logic is introduced into TUBITAK's organizational structure in the same manner as the government's restructuration towards market liberalization. In this section, I discuss these developments in a historical context.

A number of World Bank credits are allocated to Turkey to invest in infrastructure developments, reformation of financial and economic mechanisms, and industry and technology development projects between the 1980s and 1990s. In relation to

⁴⁷⁸ O. Ertuğrul Önen, *Bir Bürokratin Gözünden*, Türk Dış Ticaret Vakfı Yayınları, (2018), 345. Önen was the first undersecretary for Foreign Trade after 1994.

TUBITAK's transformation, there are two important World Bank Credit Agreements made with the government concerning TUBITAK's changing role. Before the World Bank Credit Agreement, the government initiated a project in cooperation with the United Nations Industrial Development Organization (UNIDO) in 1980.⁴⁷⁹ This agreement consisted of the modernization of an earlier pilot project, a regional industrial development organization established at Gaziantep in 1970. During this pilot project, an administrative body called the Center for Development of Small-Scale Industries (KÜSGEM) was established. The World Bank Credit Agreement was made in 1986 aimed to modernize the overall services to small and medium-sized enterprises which amounts to 100 million US Dollars.⁴⁸⁰ This credit agreement was made upon the premises as follows:

- (i) to assist in the development of labor-intensive small and medium-scale industries (SMIs) and export-oriented industries through the extension of credit to finance their investment needs; (ii) to further develop the institutional capacity of financial intermediaries, and (iii) to establish a framework within which technical and management advisory services will be provided to SMIs on a nationwide basis.⁴⁸¹

A UNIDO evaluation report from 1986, gives context about what happened between 1970 and 1986, especially after the 1980's agreement. According to this report, a further regional development center and the administrative body for developing small-scale industries was established in Ankara (Middle East Industry and Trade Center – OSTİM) in 1974.⁴⁸² While the pilot project located in Gaziantep has “mixed” efficiency, Ankara Center was quite good in terms of UNIDO evaluation criteria. As this report indicates, TUBITAK's information center TURDOK (Türkiye Bilimsel ve Teknik Dökümantasyon Merkezi – Turkish Scientific and Technical Documentation Centre) has provided information services to Ankara regional development center.⁴⁸³ However, while the Ankara regional center was successful according to the UNIDO experts, the status of the project and the administrative body depended on international

⁴⁷⁹ “Milletlerarası Andlaşma, Karar No. 8/1655”, *Resmi Gazete*, 30 Aralık 1980, 1-29.

⁴⁸⁰ “Milletlerarası Andlaşma, Karar Sayısı, 8/1655”, *Resmi Gazete*, 30 Aralık 1980

⁴⁸¹ “Milletlerarası Andlaşma, Karar Sayısı 86/10541, 6 April 1986, 27.

⁴⁸² UNIDO DP/ID/SER.C/7. *Extension Services for Small Industry – DP/TUR/80/010 Turkey*. 30 May 1986, 1.

⁴⁸³ UNIDO DP/ID/SER.C/7. *Extension Services for Small Industry*, 26.

agreements, and lacking a stable legal status would prevent its further evolution.⁴⁸⁴ As a consequence of this report and the World Bank Credit Agreement, a permanent legal structure for the organization of supporting the development of small and medium-scale industries was established in 1990 (Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı – KOSGEB) attached to the Ministry of Industry and Trade.⁴⁸⁵

In 1991, a separate World Bank Credit Agreement was made for the “technology development project”.⁴⁸⁶ This agreement envisaged the credit’s use in the following areas:

(a) develop the MSTQ (Measurement, Standards, Testing, Quality) system to international standards; (b) *stimulate private investments in industrial technology development*; (c) promote the growth of the *venture capital industry*; and (d) strengthen the capacity of TUBITAK to undertake new initiatives in science and technology.⁴⁸⁷

The agreement went on detailing the implementation of the project and the requirements of the credit’s usage. Accordingly, what MSQT system was related to the modernization of the Turkish Standards Institute and TUBITAK’s National Metrology Institute to meet the industry’s needs for standardization and quality assurance. In addition to that, it also provisioned the establishment of a national accreditation agency to enforce and spread the standardized processes. Stimulating “private investments in industrial technology development”, necessitated the establishment of a non-government foundation to use the credits for funding technology development projects via providing seed capital and initiating *venture capital* corporations to support technology start-ups. To do this, it was also necessary to introduce legal frameworks for the development of a venture capital sector. The latter objective of the credit’s usage was related to the modernization of TUBITAK-MAM. The agreement also exclusively stated that one of the prerequisites of the

⁴⁸⁴ UNIDO DP/ID/SER.C/7. *Extension Services for Small Industry*, 32.

⁴⁸⁵ “Milletlerarası Andlaşma: Karar Sayısı 86/10541, 6 April 1987.

⁴⁸⁶ “Milletlerarası Andlaşma: Karar Sayısı 91/1939”, *Resmi Gazete*, 4 July 1991.

⁴⁸⁷ “Milletlerarası Andlaşma, Karar Sayısı 91/1939”, *Resmi Gazete*, 4 Temmuz 1991, 29. Italics are mine.

project was to “ensure the appointment of a suitably qualified person to the position of Secretary General of the Foundation, and the start of functioning of such Secretary General's Office, not later than October 31, 1991”.⁴⁸⁸ On these premises, TTGV was established in 1991. It became a key agency in the *Turkish Research Area*, funding technology development firms, and initiating venture capital funds for the development of seed capital for start-ups.

These developments show a certain tendency in the state reorganization towards centralization that took place after the 1980's *24th January Decisions* and *12th September Military Coup*. The whole apparatus of the Prime Ministry is expanded towards implementing market liberalization policies through certain economic decision-making agencies. These agencies have found specific funds to finance their operations through percentages from tax, new ventures, and privatization. This has led to an increase Prime Ministry's authority in both implementing economic decisions as well as its bargaining power concentrating key government agencies and financial tools that direct economic policy and defense industry policies. In addition to that, a series of World Bank Credit Agreements have led to the establishment of certain mechanisms for industrial and technological development. For example, a further World Bank Agreement was made in 1999.⁴⁸⁹ This agreement was about an “industrial technology development project” which amounted to a total of 155 million US Dollars. In a similar vein to the 1991 agreement, this time World Bank credits are allocated to MAM, Turkish Patent Institute, TUBITAK's Metrology Institute, and TTGV. The overall objective of the credit and the project was implementing further developments in the patent and quality system, integration of the country into the European Union tariff system, and technology development projects. TTGV's role is ascribed as: “(a) technology upgrading and modification activities; (b) technology service centers; (c) technopark initiatives; and (d) venture capital funds.”⁴⁹⁰ Although I do not have evidence suggesting TTGV's direct role in the establishment of technoparks, right after this agreement was made in 1999, a series of technology development areas and technoparks were established at METU in 2000, MAM campus in 2001, at ITU in 2003.

⁴⁸⁸ “Milletlerarası Andlaşma, Karar Sayısı 91/1939”, 24.

⁴⁸⁹ “Milletlerarası Andlaşmalar Karar Sayısı: 99/1330”, Resmi Gazete, 1 October 1999.

⁴⁹⁰ “Milletlerarası Andlaşma, Karar Sayısı 91/1939”, 121.

In considering these developments, between 1980 and 2000, the economic turn towards export-led market liberalization culminated in the establishment of Organized Industry Areas and Technology Development Areas, and for university-industry relations, technoparks are attached to these areas. This is accomplished by the expansion of the Prime Ministry's Office through economic decision-making agencies, especially by the Undersecretary for Foreign Trade (Dış Ticaret Müsteşarlığı – DTM, formerly Undersecretary of Treasury and Foreign Trade). Funding projects have become the main mechanism during this period. As an example of the magnitude of one of these funds, Ali Ercan, then Undersecretary of Defense Industry formed at Prime Minister's Office indicates that the funds for Defense Industry amounted to 1 Billion US dollars in 2001.⁴⁹¹ In relation, at the second SCST meeting, the government paper Turkish Science Policy: 1993-2003, indicated its desire to expand subsidies which started in 1991 with TTGV.⁴⁹² As I argued earlier, these transformations took place right after 1990 when Kemal Gürüz became the president. Much of his initiations during his presidency between 1990-1992 have not changed to this day except, for example, the elaboration of the “national innovation system” and Turkish Research Area. Other than that, Kemal Gürüz has impacted the organizational structure deeply. In the next section, I discuss the main protagonists of this transformation.

5.5. Main Protagonists of TUBITAK Transformation in the 1990s

In the opening section of this chapter, I discussed the last debate about the interplay of academic logic and policy logic between TUBITAK's Science Committee Professors and State Minister, Tınaz Titiz. I suggested that this period ended in 1989, which also practically concluded the academic logic i.e. TUBITAK's organizational structure around the values of the Turkish scientific community. The documents show these debates took place between 1985 to 1987 when the legislation was made to transform TUBITAK's governance model by the Özal Government. As I discussed in the previous chapter about Bahattin Baysal's critiques about the establishment of SCST and Turkish Science Policy: 1983-2003, it is safe to assume that these debates continued in other mediums, as Kadioğlu shows in her dissertation. This unstable

⁴⁹¹ TÜBİTAK – MAM, Panel II “Türkiye'nin 2003-2023 Teknoloji Öngörü, Bilim ve Stratejik Plan Çalışmaları”, in *TÜBİTAK-MAM “Kritek 2001” Kritik Teknolojiler Sempozyumu*, TÜBİTAK Marmara Araştırma Merkezi: Gebze, 2002, 153.

⁴⁹² TÜBİTAK, *Türk Bilim Politikası 1993-2003*, Second SCST Meeting, 16.

period ended when Kemal Gürüz became the president of TUBITAK in 1990. In this section, I argue that Kemal Gürüz was the “legitimate” option for the TUBITAK presidency among the bureaucratic circles in those years.

About his appointment, Kemal Gürüz gives a context about TUBITAK’s situation in the late 1980s. According to him, TUBITAK positions were filled with incompetent people only because of their “religious views” during his predecessor period between 1988-1990, Mehmet Ergin, the first president appointed after 1987 Legislation.⁴⁹³ He addresses several newspaper headlines about the “religious people” who filled TUBITAK positions. In our personnel interview, Celal Şengör also points out the same situation, “people from Welfare Party”, associated with Islamist politics.⁴⁹⁴ Although this might be true, TUBITAK’s main problem was not related to this issue at that time, as I’ve discussed in the opening section. The debates were related to what kind of TUBITAK there should be i.e. a “service organization” or “a comprehensive council that emphasizes scientific values”.

Before his appointment to the TUBITAK presidency, Kemal Gürüz has developed close relations with certain key persons in the bureaucratic circles, especially with İhsan Doğramacı, the first president of the Council of Higher Education (YÖK) after the 1980 military coup. Doğramacı was known as “Hoca” among these circles and was quite influential in higher education policies as well as his initiative Bilkent University’s establishment in 1984. In addition to his familiarity with “Hoca”, Gürüz also has a close relationship with Özal and his “princes” such as Adnan Kahveci, Minister of State who was responsible for the Treasury in the 1987 Özal government. In the section on the “entrepreneurial university model” in his memoir, Gürüz speaks about his connection to Adnan Kahveci, and Kahveci’s advisors including Namık Kemal Pak, who would be the vice president to Gürüz and president of TUBITAK between 1999 to 2003.⁴⁹⁵ In considering his views on higher education, Gürüz indicates Doğramacı thought that the two people who think in the same way about universities with “Hoca” were Adnan Kahveci and Kemal Gürüz.⁴⁹⁶ Thus, after a long

⁴⁹³ Kemal Gürüz, *Aklımdan Başka Silahım Yok ki: Hatırladıklarım, Düşündüklerim ve Değerlendirmelerim*. Ka Kitap, (2015), 136.

⁴⁹⁴ Celal Şengör, *personal communication*, 20th February 2022.

⁴⁹⁵ Kemal Gürüz, *Aklımdan Başka Silahım Yok Ki*, 128.

⁴⁹⁶ Gürüz, *Aklımdan Başka Silahım Yok Ki*, 129.

unstable period and the outbreak of “religious people filled TUBITAK positions” towards the end of the 1980s, Kemal Gürüz appointed to TUBITAK presidency on 5th November 1990 on Doğramacı’s reference to Turgut Özal.⁴⁹⁷ After his appointment, Gürüz has made several new appointments to TUBITAK Institutes and the executive board. To do this, he has made contacts with ITU professors, such as Celal Şengör, Erdoğan Şuhubi, Gülsüm Sağlamer, and Cengiz Dökmeci.⁴⁹⁸ He also appointed Aykut Göker and Sahir Çörtoğlu as advisors to TUBITAK.⁴⁹⁹

After Gürüz formed his team, they had a meeting on TUBITAK’s functions which Gürüz summarizes in his memoir. These were identifying the elements of the national R&D system, in which TUBITAK institutes are responsible for producing “precompetitive technologies”, while the private sector is interested in “proprietary” technologies, primarily products and services for profit. In addition to that, Gürüz indicates the changes in the understanding of “linear progression” i.e. from basic research to development to technology towards a more complex set of relations.⁵⁰⁰ Thus, governing this complex web of relations, Gürüz and his team introduced the concept of a national innovation system. Accordingly, measurement of this system became an important part of TUBITAK’s duties in following the Frascati Manuals. Thus, Gürüz’s broader transformation in the TUBITAK organization has still its impact on the country’s science and technology policies concerning the emphasis on national innovation systems and stimulating the private sector for technology production.

Gürüz’s role was not limited to transforming TUBITAK’s organizational structure in those years. As the World Bank Credit Agreement identified TUBITAK and TTGV as

⁴⁹⁷ Gürüz, *Aklımdan Başka Silahım Yok Ki*, 136.

⁴⁹⁸ Gürüz, *Aklımdan Başka Silahım Yok Ki*, 139-140. Celal Şengör, *personal communication*, 20th February 2022.

⁴⁹⁹ Gürüz, *Aklımdan Başka Silahım Yok Ki*, 144. Aykut Göker was one of the most productive former TUBITAK officials who wrote a good amount of paper on Turkish Science and Technology policy. In those years, he was responsible for Directorate for Science and Technology Policies at TUBITAK. Some of his writings can be found on <https://www.inovasyon.org/>

⁵⁰⁰ Gürüz speaks about new perspectives in science and technology policies. In recent years, the long-accepted version of scientific and technological progress based on the National Science Foundation and American science policy about the linear progress is changed into identifying the complex relationship circular relationship between basic and applied research, from technology to basic research etc. These changes are conceptualized as either Double Helix, Triple Helix, or Quadruple Helix, representing the system in the latter as university, industry, governments, and society.

responsible national organizations about the requirements of the agreement, Gürüz's first duty appointed by the Minister of State, Mehmet Yazıcı, was related to this WB agreement. Dealing with the requisites of the agreement, Gürüz contacted World Bank representative Jeremy Oppenheim in 1991.⁵⁰¹ As Gürüz discusses the role of TTGV on the credit requisites, the main job was introducing *venture capital* mechanisms stimulating technology development in the country. In relation to this, TTGV was established in May 1991. The founding chairman of the foundation was Fikret Yücel, another important figure who initiated the cooperation of the Post Office and Telegraph Services Administration (PTT) with MAM in the early 1970s. Yücel was the founder of PTT laboratories on electronics and communication technology in 1965, called *PTT-ARLA*. He was also influential in establishing State Enterprises in communication sectors.

Concerning the emphasis, I've made in the previous section on the position of secretary-general in the World Bank Agreement, the first secretary-general of TTGV became Kemal Gürüz himself, in his words "without having paid".⁵⁰² In considering the role of TTGV in introducing *venture capital* mechanisms in the country, Kemal Gürüz's initiatives in TUBITAK were quite influential during these years. To put it in other words, not only Gürüz has transformed TUBITAK into a policy-driven organization but also paved the way for its next presidents, such as Namık Kemal Pak.

Another important initiative of Gürüz, maybe the most important one, was the production of a report on science and technology policies and the higher education system in Turkey for TUSIAD (Turkish Industry and Business Association) in 1994. The report called "Higher Education and Science and Technology Policies in Turkey" was prepared by Kemal Gürüz, the coordinator of the report, Erdoğan Şuhubi, Celal Şengör, Kazım Türker, and Ersin Yurtsever. This TUSIAD report was mostly related to the governance of higher education in Turkey. Setting the scene with concepts like "knowledge society" and "post-industrial society", the report identifies higher education systems and science and technology policies in this "new context". According to the report, the most important "input" of this new system is knowledge and competent human capital:

⁵⁰¹ Gürüz, *Aklımdan Başka Silahım Yok Ki*, 148.

⁵⁰² Gürüz, *Aklımdan Başka Silahım Yok Ki*, 149.

[...]in summary, knowledge and knowledgeable people have become the most important inputs of economies. Today, technology is not only machines and equipment but also emanates from a set of methods and organization models of knowledge which transforms inputs to products and services.⁵⁰³

On this premise, the report criticizes a number of points about science and technology policies in Turkey. It outlines, for example, “although a lot of documents are produced on science policy, there was never a policy is determined and applied in Turkey”.⁵⁰⁴ Then proceeds to describe the status of science policy indicators with a statistical review, government R&D agencies i.e. TUBITAK-MAM and KOSGEB, and the private sector’s situation regarding R&D investments. After describing the aspects of both higher education and science and technology policies in Turkey, the report suggests a number of policy decisions to be taken in the following years. For example, the authors suggest establishing a Ministry for Science and Technology for coordination of actual R&D and allocation of resources, an administrative body for Technology Development, and the separation of MAM from TUBITAK to maintain its services in areas such as electronics, advanced material research and production systems, for what Gürüz earlier called as “precompetitive technologies”, which turning MAM into a hub for the development of pre-market technological products.

In this report, Kemal Gürüz and his teams’ main concern was establishing an executive system connected to a ministry. TUBITAK’s Institutes were assigned the role of technology production in pre-market areas, while TUBITAK’s role is assigned to deal with university research projects. The report’s pro-market language was also prominent. For example, it suggested government should not directly enter into manufacturing but should play a role in stimulation. The ministry to be established should be limited in terms of organization to prevent heavy bureaucratic procedures. The issue of the shared budget concerning the TUBITAK Institute should be diminished, and these institutes must find financial sources through “contract research”.⁵⁰⁵

⁵⁰³ TÜSİAD, *Türkiye’de ve Dünyada Yükseköğretim Bilim ve Teknoloji Raporu*, TÜSİAD, (1994), 34.

⁵⁰⁴ TÜSİAD, *Türkiye’de ve Dünyada Yükseköğretim Bilim ve Teknoloji Raporu*, (1994), 217.

⁵⁰⁵ TÜSİAD, *Türkiye’de ve Dünyada Yükseköğretim Bilim ve Teknoloji Raporu*, 267-274.

When this report was written in 1994, Kemal Gürüz was a member of the Council of Higher Education. In 1995, he was appointed as the president of the Council. As can be seen, addressing industrialists and businessmen his critiques of higher education and science and technology policies, Kemal Gürüz was not only a “legitimate” option among the bureaucratic circles, but also an important figure for the business circles as well. On the other hand, it is obvious that what began in the 1980s after *24th January Decisions* about the expansion of economic governance, specifically in the Prime Minister’s Office i.e. the concentration of political power in economic decision-making have provided its fruits in the 1990s, through the elaboration of economic decision-making, and in the case of science and technology policies, through the elaboration of policy-making mechanisms. For TUBITAK’s organizational structure, the report’s suggestion to establish a Ministry for Science and Technology was accomplished in 2011. TUBITAK’s attachment to this ministry was achieved in 2018, as discussed before.

In relation, TUBITAK has undergone several transformations specifically starting from the 1990s. These transformations reflect what previous sections discuss i.e. the introduction of direct government subsidies, separation of academic and technology development projects, and appropriation of TUBITAK’s R&D bodies to this new situation. In the next section, I discuss this transformation to describe how TUBITAK’s policy-making mechanisms are elaborated throughout these years.

5.6. Organizational Transformation in TUBITAK after the 1990s

In this section, I argue that TUBITAK’s organizational transformation after the 1990s reflects what I discuss in the previous sections: the domination of policy logic and the introduction of market logic. This transformation also points out the predominance of the Marmara Scientific and Industrial Research Institute, the MSIRI now known as MAM’s evolution in terms of R&D areas of what TUBITAK directly involves. As I will show, MAM’s Institutes have evolved according to their previous structure, such as the Electronics Research Unit has become first, Ankara Electronics Research Institute in 1984, secondly became Information Technologies and Electronics Research Institute in 1995, and then turned into Space Technologies Research Institute in 2006. In this case, early developments concerning the establishment of PTT-ARLA laboratories have impacted the Electronics Research Unit’s expansion towards the

information sector i.e. mobile technologies, internet, and network operationalization. Similarly, TUBITAK's executive bodies are transformed towards becoming specialized in distributing research and technology development funds. For example, as I have shown earlier, right after 1990, during Kemal Gürüz's presidency, a Directorate for Science and Technology Policy was established in 1991. This also follows the previous Science Policy Unit of the Secretariat. As I argue in this section, these transformations show two related developments concerning TUBITAK's organizational structure. Executive bodies are expanded towards specialization in research funding schemes in accordance with the field-effects. Research Institutions' evolution shows the predominance of earlier government support for information infrastructure and defense research, and the objective of export-led marketization has had direct effects on TUBITAK's organizational structure.

5.6.1. Research Institutes

The origin of TUBITAK's research institutes goes back to the establishment of the MSIRI. The MSIRI was established in 1972. As I argued in the previous chapter, the MSIRI's establishment was related to Nimet Özdaş's distinct initiatives. The organizational structure of the Institute was planned according to "contract research". These contracts were mostly made with State Enterprises throughout the period between 1972 to 1980s. The MSIRI became the Marmara Research Center in 1991. This was related to the separation of its various research unit's transformation into research institutes in time. For example, two research institutes are established from the Electronics Research Unit. The first one was the Ankara Electronics Research Institute which was established in cooperation with METU in 1985. The other is the National Electronics Research and Cryptology Institute which was established in 1994. As the Electronics Research Unit was developing information technology for PTT-ARLA in its early years, it was also developing certain military technology for the Turkish army in those times. According to Omay, the first significant contract of the Research Unit was the Turkish Armed Forces' request to develop a crypto device in 1975.⁵⁰⁶ On the other hand, a joint project with ITU's laboratory on semiconductors

⁵⁰⁶ Güner Omay, *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017), 27

and microelectronics led to the development of crypto chips in the 1980s.⁵⁰⁷ In the following years, the Turkish Armed Forces' request to form a centre for Cryptology Design and Testing Centre was crucial for the transformation of the unit into an Institute in 1994. In 1997, as Omay indicates the revenues of the Institute exceeded the MAM's revenues, and the Cryptology Institute became a separate Research Institute in 1998.⁵⁰⁸ In the following years, this research institute became a research center itself in 2010 when MAM's Informatics Institute and Cryptology Institute merged under the name Informatics and Information Security Advanced Technologies Research Center (BİLGEM).

TUBİTAK's Guided Devices Technology and Testing Research Institute was established as a separate R&D body in 1972 for the technological requirements of the Turkish Armed Forces. In 1983, this research institute was named as Ballistics Research Institute, and in 1988, it became the Defense Industry Development Institute (SAGE). Although former practitioners do not speak openly about the projects, a brief testimony of Gökmen Mahmutyazıcıoğlu shows the trajectory of SAGE. According to Gökmen Mahmutyazıcıoğlu, a former coordinator at SAGE, the institute was mostly reflecting characteristics of a university until the 1990s.⁵⁰⁹ This was changed after SAGE had a fund from the Undersecretary of Defense Industry in 1991, about developing a "multiple launch rocket system" right after the Turkish Armed Forces bought an advanced system from the United States.⁵¹⁰ In the following years, these projects culminated in SAGE's development of guided missile technologies. In 2001, two projects on cluster bombs and precision-guided munitions were allocated to SAGE, which resulted in 2006.⁵¹¹ As I mentioned earlier, in 2001 Undersecretary for the Defense Industry's funds reached 1 billion US Dollars. As Mahmutyazıcıoğlu points out the earlier characteristics of the Institute, the establishment of the Undersecretary was crucial for the development of SAGE after the 1990s.

⁵⁰⁷ Omay, *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017), 29.

⁵⁰⁸ Omay, *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017), 30.

⁵⁰⁹ Gökmen Yazıcıoğlu, "Savunma Sanayi Araştırma Geliştirme Enstitüsü (SAGE), in *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017), 90.

⁵¹⁰ Mahmutyazıcıoğlu, "Savunma Sanayi Araştırma Geliştirme Enstitüsü (SAGE)", 89.

⁵¹¹ Mahmutyazıcıoğlu, "Savunma Sanayi Araştırma Geliştirme Enstitüsü (SAGE)", 96.

The former MSIRI has become a joint research center hosting several Institutes in 1991. The decision to transform the Institute into a Research Center might be related to what Omay says about the Cryptology Institute. However, as I have mentioned earlier, several World Bank Credit was allocated in 1991 to the modernization of the Institute. These credits, as I have mentioned earlier, were related to the establishment of a calibration and quality assurance system for industry i.e. TUBITAK's Metrology Institute, which was established in 1986, and the financialization and expansion of technoparks and regional industrial areas. TTGV was made responsible for the financialization of technoparks in those years. KOSGEB was responsible for the development of regional industrial areas, and TUBITAK-MAM initiated the establishment of one of the first technoparks in Turkey beginning in 1998. Former president of MAM, Ömer Kaymakçalan gives context about the technoparks' development in the United States, and the first steps taken in Turkey in 1989 under the Minister of State, Tınaz Titiz.⁵¹² The initial actions began in 1992 for MAM's Technopark. In the same year, a Center for Technology Development was established and initiated a NATO Science for Stability project's outcome to turn a biotechnology company. In the following years, alongside the establishment of technopark at Gebze Organized Industry Area, financialization of the technopark was implemented. A grant amounting approximately to 450 thousand US dollars was donated by Kadir Has for the incubation center. In 1999, a further World Bank credit was allocated to MAM for the establishment of technopark, and after one year, TUBITAK MAM's technopark was officially established in 2000.

In addition to these developments, the MSIRI's other former research unit, the applied mathematics research unit was transformed into a Research Institute for Fundamental Sciences in 1981. Although operated under MAM after its initial establishment in 1981, as can be recalled, the Institute has been an issue between the professors and the Minister of State in those years. After surviving these debates, the Institute was attached to the TUBITAK president in 1996 and later incorporated under TUBITAK's

⁵¹² Ömer Kaymakçalan, "TÜBİTAK Marmara Araştırma Merkezi (MAM) TEKNOPARK ve Teknoloji Geliştirme Merkezi", in *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017), 69.

newly established Informatics and Information Security Advanced Technologies Research Center in 2011.⁵¹³

The trajectory of research institutes of TUBITAK shows that the government's stake in defense research and the impetus of the export-led market liberalization process which began after the 1980s and intensified in the 1990s have had direct effects on the diversification of these research institutes. On the other hand, the evolution of the earlier MSIRI's research units to institutes, and then research centers, shows a path dependence on the research areas these Institutes have their expertise. In the same manner, TUBITAK's executive bodies are also expanding towards coordinating and supervising these developments, especially after it is decided to provide direct government subsidies to technology firms.

5.6.2. Executive Bodies

One of the major differentiations of the 1990s was related to TUBITAK's transformation towards providing direct subsidies for technology development projects and modernization of industries in 1995. This decision was reached at the third SCST meeting when the policy paper *Turkish Science Policy: 1993-2003* was accepted, as I have mentioned earlier. This decision was related to government subsidies for industries under the KOSGEB administration. In 1995, the Money-Credit and Coordination Council appointed TUBITAK to subsidy firms, and at the Fourth SCST meeting held in the same year, have decided to establish a coordination body within the TUBITAK organization called Directorate for Technology Review and Examination in 1995.⁵¹⁴ This new coordination body was responsible for spending R&D subsidies, EUREKA projects, tax postponing, and programme for University-Industry Cooperation Center (Üniversite Sanayi İşbirliği Merkezleri – USİMP) which was initiated in 1997 and later become what is known today as Technology Transfer Offices.⁵¹⁵ The spending of subsidies was coordinated with TİDEB on the one hand, and Undersecretary for Foreign Trade (DTM) at that time. As former deputy-president of TİDEB, the establishment of this directorate was also related to the introduction of

⁵¹³ "Tarihçe," TEMEL BİLİMLER ARAŞTIRMA ENSTİTÜSÜ, accessed October 23, 2025, <https://tbae.tubitak.gov.tr/tr/kurumsal/tarihce>.

⁵¹⁴ Müfit Akyos, "Teknoloji İzleme ve Değerlendirme Başkanlığı (TİDEB)", in *TÜBİTAK'ın 1990'lı Yıllarda Türk Bilim ve Teknolojisine Öncülük Ettiği Alanlar*, Bilimsel ve Teknik Araştırma Vakfı, (2017)

⁵¹⁵ Müfit Akyos, "Teknoloji İzleme ve Değerlendirme Başkanlığı (TİDEB)", 2017.

the concept, of “national innovation systems” in Turkey after 1993. TIDEB was renamed to Directorate for Technology, Innovation Review and Examination in 2005, after a further decision was reached about subsidies, making responsible DTM for 25% of subsidies, and TUBITAK for 75% of them in 2005. In 2010, TIDEB, now known as TEYDEB was made fully responsible for the usage of subsidies. In addition to subsidies, TEYDEB is also responsible for the former MSIRI research units’ R&D projects.⁵¹⁶

TUBITAK’s former research groups which were formed right after its establishment in 1963, such as the basic research study unit, engineering study unit, and others are supported by a similar coordination body called the Directorate for Supporting Research (ARDEB) is also established in 2006.⁵¹⁷ As the annual report for 2010 shows, ARDEB is responsible for both academic research projects similar to earlier research study units as well as R&D projects from government agencies. In relation, the trajectory of the Scientists Training Group has been to become the Directorate for Supporting Scientists in recent years.⁵¹⁸

5.7. Preliminary Conclusion

In this chapter, I argued that the last boundary work of the professors and the State Minister took place between 1985 to 1987. As I have shown this last controversy between the professors and the Minister of State has culminated into the 1987 Legislation that abolished TUBITAK’s Science Committee and replaced it with a Board of Directors. Although later Science Committee returned with the 1993 Act, this did not change the status of the presidency, thus preserving the new status quo regarding the policy direction of the council in the TUBITAK’s organizational structure.

In addition to that, I have argued that the policy logic started with the introduction of operational research has culminated in the “National Innovation System”, which was appointed as the main direction of the Council, right after 1990. Alongside the acceptance of preparing policy documents in the direction of forming a national

⁵¹⁶ TUBİTAK. 2010 *Faaliyet Raporu*, TUBİTAK, 2010. 28. Accessed on https://tubitak.gov.tr/sites/default/files/2023-09/FR2010_BK_1.pdf

⁵¹⁷ "13006 Sayılı Mevzuat," Mevzuat Bilgi Sistemi, accessed 23th October, 2025, <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=13006&MevzuatTur=7&MevzuatTertip=5>.

⁵¹⁸ TUBİTAK, 2010 *Faaliyet Raporu*, TUBİTAK, (2010), 224.

innovation system, a set of new organizational bodies such as the Directorate for Technology Review is introduced into the TUBITAK structure

As I have argued these transformations took place right after the country's economic direction towards market liberalization via exports, the organizational transformation was closely related to the concentration in the Prime Ministry via new economic decision-making bodies and the formation of funds in a number of areas. Two of the new funds were important in transforming TUBITAK. The first one related to export-led liberalization, the Undersecretary of Foreign Trade, and the other important fund was related to the formation of the Undersecretary of Defense Industry. TUBITAK's R&D Institutes expanded towards these two areas, primarily towards defense research. These developments introduced the market logic into TUBITAK's organizational structure.

During this period, one key organizational actor was important. Kemal Gürüz, as the "legitimate option" among the bureaucratic circles, especially in the Prime Ministry via his connection to İhsan Doğramacı, was influential in all of these transformations. After his appointment in 1990, I argued that TUBITAK's direction has not changed. Accordingly, the introduction of market logic, and the policy logic's coming into full circle have transformed the organization towards private sector's R&D investments surpassing government expenditure as Recep Tayyip Erdoğan told at the 21st meeting of SCST: "Private sector R&D expenditure have surpassed Government expenditure in 2010."⁵¹⁹

⁵¹⁹ "Başbakan Sayın Recep Tayyip Erdoğan'ın Bilim ve Teknoloji Yüksek Kurulu'nun 21. Toplantısı Açılış Konuşması". 22nd June 2010, 3.

CHAPTER 6

CONCLUSION

6.1. Summary of the Findings: Revisiting the Research Questions and Main Arguments

In this study, I have explored the relationship between scientists and governments, considering the invention of a new policy field, science policy conceptualizing science and state as social institutions. Instead of a common approach to knowledge production which is mainly employed by science and technology studies and sociology of science literature, I argue that considering science and governments as social institutions, I provide answers to the following questions:

Why a specific kind of new government agency that oversees spending on science, and coordinating the research efforts occurred in the first place?

Which type of interests have led the governments to set up science policy organizations?

How does the negotiation between scientists and governments, and the market take place?

Under what conditions this government agency and its organization have changed and why?

What this change might show about the trajectory of a national science policy, its organization, and its environment, considering the overlapping and conflicting areas of interest?

To explain why government agencies in formulating national science policies, I employed the concept of *institutional environment*. In the theoretical framework, I describe this concept as a separate yet related historical event, before the institutionalization of science policy in a transnational organizational field. In relation,

I described the organizational field as a recognized institutional area. In the second chapter, I have explored the answers to the first question of this dissertation. As I have argued in this chapter, firstly, Britain's perception of German "superiority" in science and dependence on the British economy and military, specifically in chemical industries led to the creation of a dual mechanism in Britain in 1916. These organizations were an executive agency, the Department of Scientific and Industrial Research, and the corresponding government agency Advisory Council for Scientific Policy.

In describing the institutional environment, I have posited three ideal-typical concepts, *regulative, normative, and cultural-cognitive institutional frameworks*. Accordingly, I emphasized the cultural-cognitive framework, more specifically, the changes in cognitive frameworks about governments' changing attitudes towards scientific systems. As one of the most crucial parts of the changes in the institutional environment that has led to the creation and dispersion of science policy mechanisms, I have argued that the invention of operational research and its coupling with probabilistic thinking on the one hand, and its application to management of operations have led to the dispersion of operational research methods to military organizations. These changes occurred during the WWII conditions and were primarily supported by British scientists, as I have argued in the second chapter. The government's stake in military modernization and defense research has merged under the operational research's institutionalization. The dispersion of operational research was accomplished by the transnational military organization, NATO, after WWII. As I have argued, the Turkish Military Staff was influenced during the mid-1950s and established the first R&D department at the General staff, an executive body, AR-GE, and a research council in 1960, İlmi Danışma ve Araştırma Kurulu (ILAR) an advisory body.

While the military was influential in the dispersion of operational research methods through national military bodies, the OEEC/OECD was influential in appropriating these mechanisms developed during WWII into Europe's productivity issues and business management problems. I argued that these two developments were crucial in the institutional environment for the institutionalization of a transnational organizational field via NATO and the OEEC/OECD towards the end of the 1950s.

These developments represented the formation of a policy logic i.e. the idea of managing operations/organizations, rationalizing them through probabilistic thinking i.e. the elaboration of forecasting techniques.

In the third part of this chapter, I take the case of TUBITAK's establishment legislation, as the first step in the negotiation of government officials and professors in Turkey. I have argued that while the professors emphasized the autonomy of the research council, stimulating a research spirit in the country through a strong Science Committee as the sole decision-making of TUBITAK, the former military officials as members of the Senate of the Republic reinforced a policy logic via a strong Secretariat. In the following chapters, as I have shown the main struggle between policy logic and academic logic took place between the secretary-general of TUBITAK and the professors of the Science Committee.

In the second chapter, I have discussed a further change in the institutional environment on the numbers of scientific manpower. The main historical event was related to the United States' perception of a threat to the Soviet expansion of the higher education system in the mid-1950s. As Americans made this a Western pact problem through NATO circles, first a Science Committee in addition to existing military research bodies of NATO was established, namely the NATO's Science Committee in 1958. This perception of the scientific manpower problem has also led the OEEC to undertake surveys on member countries' capacity to produce scientific manpower. Through OEEC circles, this problem is later transformed into a policy issue, as part of the educational planning, and forecasting sectoral expansion in labour markets, which would absorb the output of qualified personnel in the correspondent country. As I have argued, TUBITAK's involvement in the formation of the Scientists Training Group and its close cooperation with the Ministry of National Education about the establishment of Ankara Science High School, these policy initiatives are translated in consideration of a prevalence of an academic logic. Despite earlier attempts of SPO planners, who were eager to employ educational planning methods derived from the transnational organizational field and implement an overall expansion of the educational system in Turkey, TUBITAK and the MoNE cooperated in developing Ankara Science High School and science education in Turkey at the secondary school level. I have argued that this was related to Turkish modernization's emphasis on

producing “the right kind of minds”. As I have discussed in this chapter, the establishment of Science High School, despite the origins of the idea coming from a foreign philanthropy organization, shows the prevalence of academic logic between the period 1963 and 1989. The scientific manpower problem’s translation into an Elite Science High School shows that Turkish bureaucrats and professors shared the same ideals about reproducing a limited yet talented number of scientists on the model of Ankara Science High School.

In the third chapter, I take the case of inner power struggles at TUBITAK, a detailed analysis of the activities of the Secretariat on the one hand, representing the policy logic as practice work, and Science Committee Members on the other, as boundary work, preserving the academic logic. As can be seen in this chapter, while the secretary-general introduced certain *practice work* i.e. review mechanisms, principles about project management, and more specifically, a Research Institute that would specialize in government research, the Science Committee delayed certain tasks such as the formation of a national science policy or prevented external interventions from the government as in the case after the 1970s with statements on the academic values i.e. autonomy and freedom to research. As I have argued in this chapter, when the former Secretary-General became the Minister of State after the 12th of September Military Coup, he accomplished to undertake TUBITAK’s administrative autonomy through the establishment of a higher governmental agency, the Supreme Council of Science and Technology (SCST) in 1983, and the government policy paper, *Turkish Science Policy: 1983-2003*. On the other hand, as I have shown, one of the former professors who was himself a policy entrepreneur of the establishment of TUBITAK, had published columns in a newspaper stating that TUBITAK’s role is not taking more applied research but to promote research spirit in the country.

In the fourth chapter, I have argued that TUBITAK has become a fully policy-driven organization after 1990. I argued that TUBITAK’s transformation was related to the expansion of the Prime Ministry through economic decision-making bodies and funds after the country’s neoliberal turn in 1980 towards export-led market liberalization. In addition to that I have argued that the conceptual framework of science policy has also come into full circle in these years, from *operational research*, in other words, the idea of managing operations/organizations efficiently and probabilistic thinking,

culminated into an overall *systems approach* via the concept of *national innovation system*. In relation, I have argued that following the theoretical argument that TUBITAK is situated in a wider environment, its transformation shows that a general trend in state reorganization after 1980, towards appropriating market stimulation via new financial tools which TUBITAK's organizational structure responded, for example, forming a separate body supervising funds for technology firms after 1990.

As the main debate about TUBITAK's organizational structure and its policy framework was related to the controversy between academic and policy expectations, organizational actors were quite influential in shaping TUBITAK's orientation. I have argued that this controversy continued until the end of the 1980s, even after SCST's establishment in 1983 which theoretically ended TUBITAK's scientific autonomy. At a critical moment, another key organizational actor has become influential in transforming TUBITAK to its "appointed" role i.e. a policy-driven organizational structure. This key organizational actor was Kemal Gürüz, appointed as the TUBITAK's second president after 1987 legislation, which introduced the presidency and a board of directors as the main decision-making organ of the Council. To show Gürüz's role, I have analyzed his connections to influential figures among the bureaucratic circles, and his initiatives at TUBITAK right after his appointment. I have argued that Gürüz was not only a "legitimate option" among the bureaucratic circles for the TUBITAK presidency, but also, he was also influential in business circles as he extended his role, by writing a report to the most important business association of Turkey, attempted to shape science and higher education policies of the country.

The story of the organizational transformation of TUBITAK shows three important points concerning organizational studies and institutional approach on the one hand, and Turkey's political history of bureaucratic organizations on the other: (1) An institutional approach helps identify controversies among different societal conventions, for example, by conceptualizing science and governments as separate entities. Although a number of examples in this study show that these social entities have become interrelated, not necessarily isolated in their respective areas specifically when governments cooperate with scientists under "crisis periods"; conflicting views tend to be resilient until the occurrence of a specific context and organizational actors, as carriers of organizational transformation, which points out a sociological approach

is crucial to understand how *institutionalization* and *de-institutionalization* processes occur. (2) Bureaucratic organizations are connected to national and international contexts, preserving internal tensions that are products of a historically shaped cultural-cognitive framework and reflect material conditions of specific historical periods. This proposition challenges the idea of direct diffusion of innovations emerging from a specific organizational field, but also the organizational field's strong standardizing effects in policymaking across national contexts. (3) A historical approach is necessary to understand how organizations transform, referring to that specific historical context, key organizational actors, and material conditions as TUBITAK's organizational expansion has only been accomplished in the context of a wider state reorganization that took place after 1990.

These propositions add further questions about the political history of state organizations in Turkey, their transformation, and relationality to historical contexts. In the next sections, I will discuss what this study contributes about bureaucratic organizations in Turkey in addition to theoretical innovations of the dissertation.

6.2. The Importance of Institutional and Organizational Analysis in Turkish Context

Sociological studies of organizations and institutions in Turkey are limited and remain descriptive, instead of dealing with the complex web of relations, national and international influences, entangled political and ideological controversies, and a turbulent economic structure, which undergoes an economic and political crisis every 10-15 years. In contrast to existing literature, I think the basis of policymaking in Turkey resides in the inner workings of bureaucratic organizations, legislation practices, and external class coalitions about deciding what should be done about a specific area i.e. science policy, education, redistribution policies (e.g. tax and welfare regimes). A critical and in-depth study of bureaucratic organizations might contribute greatly to the debates on policies, that are crucial for everyday materialization of citizenship rights. These types of studies might also open up the position-takings across the bureaucratic field, social class coalitions, and the nature of policymaking in Turkey, which most of the time remains enigmatic to the general audience.

Former policymakers, bureaucrats, and military officials do not voice their views explicitly about these organizations in Turkey. The legislation process of TUBITAK's establishment act is one of the examples of this ambiguity. The two most important policy entrepreneurs in the history of TUBITAK, Erdal İnönü, and Sami Küçük, do not express the key controversies I analyzed in this study between the professors and bureaucrats, during the negotiation of what kind of a research council TUBITAK would be at the time. In their memoirs, Küçük and İnönü trivialize the details such as the question of establishing an Academy of Sciences or a Research Council. Nor there is any substantial information in the literature and former policymakers' accounts about TUBITAK's military twin organization, the ILAR and R&D Department of the Ministry of National Defense, and the organizational actors involved in their establishment. As can be recalled from the second chapter, some of the members of TUBITAK's Science Committee such as Ratip Berker, and later, Halim Doğrusöz, were also members of the Science Committee of ILAR. Even Cahit Arf, an ardent defendant of the academic logic in TUBITAK, is known for his participation in the activities of the Turkish General Staff's R&D Department.⁵²⁰ Moreover, as can be recalled from the continuity between NATO's influence on the Turkish General Staff's establishment of an R&D Department, NATO experts' seminars on operational research, and later Halim Doğrusöz's PhD under the supervision of a NATO consultant in operational research, and later his initiative of establishing an Operational Research Unit at METU, is not openly discussed neither by policymakers nor social scientists, which I think shows a clear continuation of the military's stake in science policy organizations.

Mostly, these former policymakers provide a "completed history" in their memoirs and autobiographies, speeches given on special occasions, rather than a history consisting of certain power struggles over the means of authority, definitions, and policy frameworks. At other times, they only hint implicitly at their conflicting positions. The problem with this complexity and policymakers' vague expressions of controversies are not only related to these persons' reluctance to explicitly debate these inner conflicts. One of the major reasons might be related to that policymakers do not think that these controversies are relevant to the changes in the trajectory of

⁵²⁰ Halim Doğrusöz, "Cahit Arf'le Anılar" in *Bilim ve Teknik*, (February no. 363), journal supplement, 1998: 10.

policymaking, as these actors are embedded in a bureaucratic field, and familiar enough with the inner workings of this field, which they might perceive as “second nature”. However, I argue that one of the most important outcomes of this study is to suggest that the very basis of politics and policymaking are these power struggles that directly affect the course of organizational structures. As I argue in this dissertation, these implicit conflicts reflect the nature of policymaking and politics in Turkey as part of wider social conventions in the form of consensus and struggle on authority subject to negotiation between partaking actors in specific historical periods rather than merely a technocratic issue. As these controversies are hidden between the lines and vague expressions, the contribution of this study is the findings about the struggle on definitions, classifications, drafting of a legislation text, and in small references to the past about the conflicting positions, and more openly in general critiques about the “failure and absence of a certain policy” in Turkey.

Finally, a further contribution is related to representing TUBITAK’s transformation into a policy-driven organization as part of a wider state reorganization in Turkey after the 1980s. Thinking about organizations relationally, situated in both national and transnational organizational fields, this finding can illuminate the course of change regarding the formation of political authority and power concentration in Turkey. In contrast to existing beliefs about the “separation” between states and markets, and the downsizing of the state in certain areas after the neoliberal turn, as I argued in the last chapter, the TUBITAK case and the Turkish state’s reorganization after 1980 show otherwise. This finding indicates that while states downsized in certain areas related to public policymaking in areas such as education, health, and other welfare sectors, it concentrated power to enhance economic liberalization and military areas, at least in terms of organizational capacity. The expansion of two important areas is valid for the Turkish case: the establishment of a military industry administration in 1985, and a series of government agencies in economic decisions and public funds dedicated to privatization. Although a further study might explore the impact of these agencies and to what extent these government agencies are influential, a clear organizational expansion of political power around these areas is relevant for the Turkish state’s reorganization after the 1980s.

6.3. Theoretical Innovations: A Multiple-Level Approach to Institutional and Organizational Analysis

The complexity of the *institutional environment* in which TUBITAK came into being necessitated an eclectic framework to capture different levels of analysis. As is obvious from this study, science policy, its conceptual frameworks and organizational structures are products of a deeply historical unfolding of the negotiation between scientists and governments. It is also apparent that both national and transnational fields are influential in their development, as can be tracked in the second chapter. The emergence and elaboration of the government's stake in science correspond to the utilization of research, firstly in weapon development, technology production, and management of military operations between the two Great Wars, and secondly, find its way into the task of stimulating economic growth. Thus, the intensification of interaction between science and governments is related to these two important areas, national defense and economic growth. While these are the main reasons that governments find their stake in science, the complexity of the issue stems from historically relevant particularities concerning the scientific traditions of specific countries if we compare, for example, basic research with the United States, and applied research with Britain. I conceptualized these differences as institutional logics at multiple levels. At one level, these logics refer to national contexts and scientific traditions while at the same time related to policymaking traditions in certain countries. At the international level, it is related to the rise of the Cold War international order and science policy's becoming of policy schemes through transnational organizations. Thus, the analysis should consider the flow of these innovations in policymaking i.e., science policy, emanating from transnational organizations to national contexts, which requires an explanation of how this change in policymaking is interpreted and translated under certain conditions referring to those national contexts.

Relatedly, I build a specific theoretical space to capture and explain this complex story of the emergence of science policy, changes in the cultural-cognitive framework, and organizational forms. In the first chapter, *Figure 1.1.* refers to this theoretical space, and *Table 1.1.* explains the properties of concepts that are employed in that space. Accordingly, I employ the concept of institutional framework to capture how science policy mechanisms emerged and what kind of historical events shaped the transformation of understandings of science and policy i.e. *institutional environment*.

While there are many different scientific traditions and histories of how governments interacted with science systems in certain countries, I chose the British case, because of its unique context which gave rise to the formation of the first examples of science policy organizations, and more importantly, British case was the origin of the organizational form, “research council”. The dual organizational mechanism; an interface organization between governments and scientists in the form of an Advisory Council, and an executive body for the application of science policy frameworks for industry, agriculture, and medicine can be first observed in the British case. The DSIR and the Advisory Council for Scientific Policy were established in 1916 during WWI in Britain to overcome the dependency on German “superiority” in science. As can be recalled, these two organizations served as the model for American and Canadian National Research Councils, and elsewhere, mostly in Britain’s colonies and commonwealth countries, as executive applied research organizations. A simple examination of UNESCO’s 1953 survey on national research organizations can show the impact of British science policy organizations in different countries. Moreover, the establishment of the National Research Council in the United States has led to the establishment of an International Research Council as a rival to the International Research Institute, which German scientific tradition dominated at the time. This was the first phase of the emergence of science policy frameworks in the *institutional environment*, concerning the increased interaction between science and governments.

The second phase was also related to the British context and, at least to some extent its continuation in the circles of the OEEC/OECD’s undertaking of science policy. An affinity of British scientists towards the utilization of science in industry, military, and social sectors has resurfaced during WWII. This time a unique difference, the invention of operational research was important. As I argued in the second chapter, although there was not any novel difference in its content other than applying scientific methods to military and economic issues, the invention of operational research was important because of its properties of thinking about an organization or an operation in terms of a holistic approach and probabilistic thinking. The spread of operational research among the military factions of the United Kingdom and the United States has greatly influenced the formation of government stakes in research to efficiently organize massive weapon systems, inventories, logistics, and more importantly decision-making processes. The trajectory of operational research went on the

elaboration of systems approach through transnational military organization, NATO, and the spread of business management education via OEEC/OECD. This period showed the emergence of “science administrators” as well, who would be influential in spreading science policy concepts in transnational organizations. As I argued in the second chapter, these changes in the institutional environment became a background for further elaboration of science policy frameworks. To put it simply, this background consists of a need to enhance defense research in new disciplines such as aeronautics and efficient organization of military inventories, modernization of weapons, and operations. Moreover, it simply conveyed the idea of rationalizing business management i.e. stimulating economic growth. In addition to that, review mechanisms, and statistical data collection in the development of research evaluation systems (recalling the probabilistic thinking and the rise of forecasting techniques) have reinforced their way to becoming a standardized characteristic of a science policy framework, while also constituting the formation of an *organizational field* in recognizing a valid institutional area i.e. science policy. As I shown in the second chapter, the military and economic decision-making officials in Turkey thought that this new framework must be the basis of TUBITAK’s formation. While it interferes with the existing academic values of the Turkish scientific community.

The historical transformation of the organizational structure of TUBITAK rests on the interplay of these two different conflicting *institutional logics*. On the one hand, there were government factions that desired to turn TUBITAK into an active policy organization, and there were professors, mostly originating in the basic positive sciences wished to preserve the academic values of a university in TUBITAK’s functioning. While I define this controversy as two institutional logics i.e. academic and policy logic in the discussion of TUBITAK’s organizational evolution, I also employed certain concepts to show the dynamic process of this power struggle. In relation, *practice work* is related to the introduction of standardizing effects of the organizational field consisting of statistical data collection to evaluate both the system and its impact. During the transfer of these mechanisms, I identified certain organizational actors as *institutional entrepreneurs*, who altered the existing social conventions on science, institutionalized norms, ideas, and practices. *Boundary work* refers to attempts to preserve these existing institutionalized conventions, for example,

in the form of “value statements” defending against the perceived interventions of the *status quo*.

6.4. The Complexity/Entanglement of National and International Contexts

The innovative part of the theoretical framework I employed in this study made available to think TUBITAK case in relation to national and international contexts, through existing bureaucratic and organizational fields, while capturing the complexity of inner power struggles conceptualizing controversies around certain *institutional logics*. As I have situated TUBITAK into an organizational field, the theoretical framework has helped to understand why TUBITAK has changed and the debate on academic values has ceased right after the 1990s. The trajectory of TUBITAK’s legislation and its organizational structure responds to a broader transformation of the state’s reorganization towards a centralized character and new economic order. In contrast to the widely accepted idea about the role of the state in not regulating the markets in neoliberal times, I argue that TUBITAK’s organizational expansion responds to another further expansion of the state’s economic decision-making bodies and financial tools, concentrated in the Prime Minister’s Office, right after the famous 24th of January Decisions about the export-led market liberalization, and 12th September Military coup in 1980. Considering TUBITAK’s transformation into a fully policy-driven organization in 1990, these two important milestones, referring to the country’s turn towards a centralized state organization, and two the expansion of economic-decision making and financial tools to achieve market liberalization were the main reasons that TUBITAK’s final transformation into a policy organization took place in these years. In line with what I hinted at earlier about class coalitions, this conclusion opens up further questions about the nature of policymaking and the bureaucratic field in Turkey: How should we explain the Turkish State’s centralization after the 1980 Military Coup in various policy areas? To what extent does this reflect the economic transformation of the country from a planned economy to a more liberal market formation? How should we conceptualize the Turkish state’s capacity in drawing policies in various areas or should we call it a “capacity” or wider coalitions among social classes? What does it mean that TUBITAK’s organizational expansion responded to a further expansion of state decision-making bodies and centralization in contrast to the existing belief about the downsizing of the government in neoliberal times? Although there are a number of

further limitations of this study, these questions are the most important ones I draw for further studies on bureaucratic space and the nature of political power in Turkey.

The trajectory of the organizational transformation of TUBITAK shows crucial differences in historical periods, which are influential in shaping the national and international context of politics and policymaking. Right after the 27th May Coup in 1960, Turkey entered a planned economy era. State Planning Organization was designed to plan and shape economic and social policy frameworks through five-year development plans. Although the Turkish economy has witnessed earlier attempts at planning economic and industrial policy in the early Republic era, SPO and the High Planning Council reflect a further change in the economic policies of the country. The main strategy of SPO was developing industry sectors i.e., capital-good sectors in the country. Recalling SPO's designated plan for TUBITAK and science policy in the country, specially identified subsidizing the construction sector, and at other times, SPO's prevention of the development of agricultural research at the TUBITAK's MSIRI, the idea was subsidizing industrial sectors which its outputs may resolve the country's structural problems, periodical currency crisis, high inflation, and overall economic crisis. Although a further study might be more illuminating, between 1963 and 1980s, and even later, the majority of the MSIRI's research projects consisted of government research for State Enterprises and designated technology areas such as the electronics and communications sector. These economic objectives are thought to have been successfully implemented under an import substitution regime during this period until 1980. One of the most prolific writers on Turkey's science policy, Ergun Türkcan, identifies one of the reasons for "the failure of science policy in Turkey" as industrialists' reluctance to "learn" to deepen their sectors towards technology production during this period.⁵²¹ Two important studies on SPO and import substitution regime provide further explanations about the failure of planning experiments in the country. Vedat Milor compares the case of Turkish planning experience with France and suggests that the "weakened" position of the working class, pressuring the adoption of SPO's five-year plans in terms of wider social acquisitions against class fractions intervention to development plans was the reason

⁵²¹ Ergun Türkcan, *Dünyada ve Türkiye'de Bilim, Teknoloji ve Politika*, 2009.

for SPO's planning experience in the country.⁵²² Henry Barkey explains the reasons for the import substitution regime's exhaustion in a country like Turkey as the "lack of state autonomy" in implementing economic policies.⁵²³ Barkey goes on to explain the emergence of a bureaucratic-authoritarian political order after 1980 to solve the problems of the import substitution regime of the previous era, enhancing "state autonomy".

Considering this literature on the SPO and import substitution regime, both studies provide additional material to Turkey's elaboration of science policy and the organizational transformation of TUBITAK after the 1990s. After the 24th January 1980 Decisions and military coup in the same year, I argued that the state's reorganization towards an export-led economic liberalization affected TUBITAK's organizational structure and implementation of science policy in the country. The argument about the "lack" of state autonomy might be one of the reasons for the concentration of power in the Prime Minister's Office after 1980, as I argued in the last chapter. Moreover, the distinguished features of both military coups add further points about the nature of political orders during and after these periods. The 1960 Military Coup introduced reforms not only in economic policies but also in terms of wider citizenship rights through renovating the constitution. Recalling that TUBITAK's legislation is delayed because of Senate's long discussions about labour union acts, university autonomy, and TUBITAK's formation around an *academic logic* shows this distinct characteristic of the 1963-1980 period. Vedat Milor also explains that an "etatist-patrimonial tradition" among the military bureaucrats, was influential in the course of SPO and the High Planning Council's formation to develop policies solving the unemployment problems and social justice issues after 1960.⁵²⁴

The international context might add further points on the course of policy development in Turkey. Right after WWII, the Cold War period represents Turkey's further participation in the Western Pact precisely through NATO's role in erecting an American hegemony in member countries. For example, the spread of science policy

⁵²² Vedat Milor, *A Comparative Study of Planning and Economic Development in Turkey and France: Bringing the State Back In*, University of California Berkeley, PhD Dissertation, 1989.

⁵²³ Henry J. Barkey, *The State and the Industrialization Crisis in Turkey*, Westview Press, 1990.

⁵²⁴ Milor, *A Comparative Study of Planning and Economic Development in Turkey and France: Bringing the State Back In*, 159.

concepts become more meaningful in relation to a wider context, which American foreign policy of stabilizing Europe against Soviet influence. As I argued in the second chapter, EPA and OECD's studies were related to constructing political stability in Western Europe. A further influence was related to the spread of business management education as scholars discussed in the literature on EPA and the OECD. On the other hand, the 1970s economic crisis changed the course of the welfare regimes of European countries. The 1980 Military Coup and market liberalization efforts of Turkey should be thought of in this context as well. Thus, in addition to what I pointed out in the previous section on the relatively lacking situation of literature on bureaucratic organizations in Turkey, further studies should take into account these national and international entanglements of politics and policymaking. For example, a study on Turkish state formation might show whether there was a lack of political mobility of the "working class" in the period from 1963 to the 1980s. I think this argument needs further evidence. Moreover, a Bourdieusian study of the bureaucratic field in Turkey might also explain whether it was the case of a "lack of state autonomy" that led to a bureaucratic-authoritarian state reorganization after the 1980s or not, when we think of wider class coalitions of turning country to export-led economic liberalization, similar to Milor's analysis of SPO's import-substitution regime. These types of studies might illuminate the course of science policy and the eventual adaptation of the country to international policy schemes emanating from the organizational field, as I argued in the last chapter as coming to full circle.

6.5. Limitations of the Research

In the previous sections, I discussed the advantages and disadvantages of an institutional and organizational approach to the TUBITAK case. I argued that a multilevel approach might be useful to capture policy frameworks of national and international contexts, historical events that took place in the institutional environment, and how one specific area is institutionalized as an organizational field, as well as its interpretation at the level of organization. In the second section, I point out further limitations of the study about expanding a study on policymaking in terms of social class coalitions. Although quite difficult to decipher class coalitions, one of the major limitations of this study might be related to the position I argued in the previous section.

A further limitation is related to the archival material of this study. Although I collected a good number of official documents from the OECD archives, TUBITAK officials' memoirs, anniversary publications, and the Advisory Committee minutes, this study does not include, for example, official holdings of Science Committee minutes because of my application to archives is lost at TUBITAK's bureaucracy. Moreover, it can be observed that a number of other transnational organizations were also influential in spreading science policy frameworks at the time. One of them is the Central Treaty Organization (CENTO), which was created between the United Kingdom, Iraq, Iran, Pakistan, and Turkey at that time. In addition to that I did not go into detail about the role of UNESCO, which Kadioğlu discusses its influence at both national and international level about TUBITAK's establishment.

Accordingly, I tracked a particular history of the organizational form of the "research council" that emerged in Britain's efforts to overcome dependency on German Science during WWI. Several different organizations, scientific communities, and other developments were influential in shaping the elaboration of science policy on the international scene. To overcome this problem, I specifically called the organizational field institutionalized at the OECD circles as a transnational field, instead of an international field. Although this organizational field is quite influential in standardizing the policy frameworks today, it is well known that certain countries developed their frameworks, for example, the Soviet Union, introduced industrial policy leverages in negotiation with the Soviet Academy of Sciences at the time.⁵²⁵

Although I cannot reach TUBITAK's official archive, this dissertation includes a thorough analysis of a very rich archival material.⁵²⁶ I think, the overall discussion of international and national context of science policy, how it is dispersed through NATO and EPA circles, and how it is institutionalized by the OECD's standardizing effects provides a clear framework for further studies. In following the previous arguments on the limitations of organizational studies on bureaucracy and the political economy of class coalitions, I hope new studies will further illuminate the nature of politics and policymaking in Turkey to open the debate of the arguments of this study as well.

⁵²⁵ Robert A. Lewis, "Government and the Technological Sciences in the Soviet Union: The Rise of the Academy of Sciences." *Minerva* 15, no. 2 (1977): 174–99.

⁵²⁶ See Appendix B and C for a list of archive documents, memoirs, and official publications.

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APPENDICES

A. APPROVAL OF THE METU HUMAN SUBJECTS ETHICS COMMITTEE

UYGULAMALI ETİK ARASTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER



ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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04 AĞUSTOS 2022

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Barış MÜCEN

Danışmanlığınızı yürüttüğünüz Zeynel Hakan AŞER'in "Türkiye Bilimsel ve Teknolojik Araştırma Kurumu Organizasyonel Tarihi" başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay 0448-ODTÜİAEK-2022 protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Mine MISIRLISOY
Başkan

Doç. Dr. İ. Semih AKÇOMAK
Üye

Dr. Öğretim Üyesi Müge GÜNDÜZ
Üye

Dr. Öğretim Üyesi Şerife SEVİNÇ
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Üye

Dr. Öğretim Üyesi Süreyya ÖZCAN KABASAKAL
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B. CURRICULUM VITAE

Graduated from Marmara University, Department of Sociology in 2014, have his master's degree in Sociology from Istanbul Şehir University, Graduate School of Humanities and Social Sciences with a thesis on “Cultural Capital Accumulation Among High-School Students: Cases of Gaziosmanpaşa and Ataköy” in 2017. Started his doctoral studies in 2017 at Middle East Technical University, Graduate School of Social Sciences in Sociology. In 2016, started to work as a research assistant at Ondokuz Mayıs University, Department of Sociology. Published articles about his previous study on cultural capital and sociology of education and translated some studies for journals.

C. TURKISH SUMMARY / TÜRKÇE ÖZET

Bu çalışma Türkiye’de bilim politikalarının tarihsel seyri ve ilgili politika kuruluşu, Türkiye Bilimsel ve Teknik Araştırma Kurumu’nun örgütsel dönüşümünü ele almaktadır. Tez temel olarak tarihsel bir çalışma olduğu için Türkiye’nin bilim politikasının seyri ve TÜBİTAK’ın örgütsel dönüşümü için 1963’ten 2010’a kadar bir zaman periyodu belirlenmiştir. Bu periyot içinde Türkiye’deki temel bilim politikası örgütü 1963’te kurulan TÜBİTAK ve 1983’te kurulan Bilim ve Teknoloji Yüksek Kuruludur (BTYK). Türkiye’nin 2016’dan itibaren cumhurbaşkanlığı rejimine geçişiyle beraber ülkenin bilim politikası, BTYK yerine Cumhurbaşkanlığı teşkilatında kurulan bir üst kurul ile belirlenmeye devam etmektedir. Tezde 2010 sonrası döneme dair belirli veriler bulunmakla beraber, 2016 sonrası dönüşüm ele alınmamaktadır. Bununla birlikte tezin temel argümanı, TÜBİTAK’ın kurulduğu yıl olarak 1963 itibariyle Türkiye’nin bilim politikasını çoğunlukla Türkiye bilimsel topluluğunun değerleri, bilim cemaatinin beklentileri çerçevesinde “üniversite” ve “profesörlerin” çizdiği akademik bir kurumsal mantık belirlediğini iddia ediyorum. 1983’ten itibaren ise bu akademik kurumsal mantığın yerini, yani bilimsel otonomi, araştırma fikrinin yaygınlaştırılması ideali gibi bilimsel değerlere atfedilen politika yöneliminin, “bilim politikası” merkezli, ekonomik kalkınma, ulusal güvenlik öncelikleri ve sanayinin geliştirilmesi çerçevesinde değiştiğini öne sürüyorum. 1983’te başlayan bu değişimin, başbakanlık örgütünün ihracata dayalı ekonomik büyüme çerçevesinde dönüşmesi ve genişlemesiyle TÜBİTAK’ın da 1990 itibariyle bu örgütsel çerçeve içinde dönüşümünü tamamladığını iddia ediyorum.

TÜBİTAK’ın örgütsel dönüşümünü ve Türkiye’de bilim politikalarının seyrini, yalnızca teknokratik ve ekonomik dönüşüm çerçevesinde anlamlandırmak yerine, tarihsel ve sosyolojik olarak açıklamak üzere kurumsalcı bir teorik çerçeve öneriyorum. Tezin teorik çerçevesinin ilk ayağını, W. Richard Scott’ın “kurumsal çevre” (institutional environment) kavramını, bilim politikasının henüz kurumsallaşmadan önceki tarihsel dönüşümünü açıklamak üzere kültürel-bilişsel, normatif ve düzenleyici çerçevelerin ortaya çıktığı dönemi açıklamak için

kullanıyorum. Bu dönemin ana ayırıcı özelliği Birinci Dünya Savaşı sırasında ortaya çıkan ve sürekli olarak artan bir biçimde devletlerle bilim sistemleri arasındaki müzakerenin kendisini oluşturmaktadır. Sosyolojik çalışmalar içinde büyük bir yer kaplayan, bilgi üretim mekanizmalarının sosyal inşası gibi konularla ilgilenen Bilim ve Teknoloji Çalışmaları (STS) gibi yaklaşımlara karşın bu çalışmada bu iki tarafı, bilim sistemleri ve hükümet/devletleri iki ayrı sosyal kurumlar olarak kavramsallaştırmaktayım.

İkinci aşamada bilim politikası çerçevesi, örgütsel formu ve mekanizmalarının ortaya çıktığı ve uluslararası bir çerçeveye kavuştuğu tarihsel momenti, Paul J. DiMaggio ve Walter W. Powell'ın örgütsel alan olarak kavramsallaştırdığı; bir alanın kurumsallaşması ile beraber bu örgütsel alan çerçevesinde farklı bağlamlarda benzer örgütlerin ortaya çıkışını açıklamaya yarayan kavram setini teorik çerçeveye dahil ediyorum. 1980'lerin başında, sosyolojik kurumsalcılık içinde kendine yer edinen yeni kurumsalcılığın (new institutionalism) temel tezi, birbirine benzeyen bürokratik (veya başka hallerde özel kuruluşların birbirine benzemesi) örgütlerin çoğalmasını; literatürde daha önce çalışıldığı gibi bu tür örgütlerin ekonomik faydası, kolaylaştırıcı işlevsel yönleri veya daha geniş olarak rasyonalitesi değil, bu rasyonaliteye duyulan inancın kendisinin olduğunu iddia etmektedir. Bu temel tez çerçevesinde, dünyada bambaşka bağlamlarda dahi olsa bürokratik veya değil belirli türden örgütlerin birbirine benzediği (isomorphism tezi) tezini ileri sürmekte, bu tezin ana omurgasını da belirli bir alanda kurumsallaşan örgütsel alanın (organizational field) oluşturduğunu iddia etmektedirler. Yeni kurumsalcıların bu temel tezi ve kavramsal seti, bu çalışma çerçevesinde de kullanılmakla beraber, ulusal bağlamların kendine has tarihsel dinamiklerini, alan etkilerini yorumlayıcı/dönüştürücü, ulusal bağlamlara “çeviren” (translation) ek bir kavramsal setin de önemli olduğunu düşünerek, bu çalışmada yeni ek teorik mekanizmalar ve kavramlar getirdim.

Çalışmada bu teorik çerçevenin üçüncü ayağı olarak; ulusal bağlamların, uluslararası ve yerel örgütsel aktörlerin etkisini ve herhangi bir örgüt çerçevesinde bu farklı aktörlerin ve kurumsal mantıkların mücadelesini yakalamak üzere Friedland ve Alford'un 1990'lar başında ortaya attığı, Patricia H. Thornton, William Ocasio ve Michael Lounsbury'nin geliştirdiği “kurumsal mantık” (institutional logics)” yaklaşımını benimsedim. Bu yaklaşım çerçevesinde, kurumsal mantık çerçevesi,

1980’lerin başında yeni kurumsalcıların öne sürdüğü gibi herhangi bir örgütsel alanda birbirine benzeyen bürokratik örgütlerin yalnızca difüzyon gibi mekanizmalarla ortaya çıkmadığını, bu türden yeni örgütsel formların, mekanizmaların ve düzenleyici, normatif ve kültürel-bilişsel çerçevelerin ulusal bağlamlarda yeniden yorumlandığını, ulusal tarihsel bağlam çerçevesinde şekillenmiş başka kurumsal mantıklarla karşılaştığını öne sürmektedir. Örgüt içinde ise bu kurumsal mantıklar, örgütsel alandan türeyen alan etkilerini taşıyan ve bunlara direnen aktörlerin bu kurumsal mantıkları yorumladığı/dönüştürdüğü/çevirdiği mücadeleler çerçevesinde örgütün yöneliminin dönüştüğünü iddia etmekteyim. Bu mücadelenin mekanizmalarını; örgütsel alandan türeyen etkileri organizasyonun içine taşıyan kurumsal ve örgütsel aktörler (institutional ve organizational actor) ve onların “pratik müdahaleleri” (practice work) ve yerleşik kurumsal mantıklar çerçevesinde kendi norm, değer ve pratiklerini oluşturan bu çerçeveyi korumak isteyen aktörlerin “sınır çalışmaları” (boundary work) oluşturmaktadır. Bu anlamda bu çalışma, çoklu seviyelerde çalışan bir teorik çerçeve çizmektedir. Birinci seviyede, kurumsal çevre adını verdiğim, “bilim politikası”nın henüz kurumsallaşmadığı bir dönemde ortaya çıkan örgütsel formlar, mekanizmalar ve kavramsal setleri tarihsel olarak açıklamaktayım. İkinci seviyede, bu birbiriyle bağlantılı veya bağlantısız şekilde ortaya çıkan tarihsel dönüşümü, bir örgütsel alan çerçevesinde kurumsallaştıran dönüşümü ele almaktayım. Üçüncü aşamada, “kurumsal mantıklar” adını verdiğim, hem ulusaşırı örgütsel alandan ulusal bağlamlara taşınan belli bir politika mantığını, hem de ulusal bağlama özgü olarak ortaya çıkmış akademik mantıkla karşılaşması, aktörlerin yorumları ve mücadeleleri çerçevesinde açıklamaktayım.

Teorik çerçevenin temsili olarak Şekil 1.1’de (Figure 1.1.) bir kavramsal alan kuruyordum. Bu alanda kurumsal çevre, şeklen sınırlı bir şekilde çerçevelendirilmiş olsa da aslında sosyal kurumlar olarak bilim ve devletler arasında gerçekleşen, henüz bilim politikasının kurumsallaşmadığı tarihsel dönemde, birbiriyle alakalı fakat teleolojik bir ilişki içinde olmayan, yalnızca geriye dönerek kurulabilecek ilişkilerden müteşekkil tarihsel olayları ele almaktadır. Örgütsel alan ise bilim politikasının, ulusaşırı örgütler tarafından (NATO ve OEEC/OECD başta olmak üzere) çeşitli araştırma projelerine ayrılan ekonomik kaynağın etkisini değerlendirmek üzere kurulmuş gözden geçirme mekanizmaları, istatistiki veri toplama yöntemleri ve araştırma türlerini kategorize eden rehber niteliğindeki çalışmalar vasıtasıyla

kurumsallaştığını ifade etmektedir. Bu mekanizmalar ve kurumsallaşma süreci tarihsel olarak anlaşılabilmesi için hem kurumsal çevre içinde ortaya çıkan düzenleyici, normatif ve kültürel-bilişsel değişimler ve bunların tezahürü olarak örgütsel alan içinde ortaya çıkan “kurumsal mantık”, bununla beraber bu örgütsel alan içinde kurulmuş ulusal örgütlerin kendisini çevreleyen “yerel” kurumsal mantıklar birarada gösterilmiştir. Şekil 1.1’de gösterdiğim gibi örgütsel alandan türeyen alan etkisinin yeniden yorumlanması tek yönlü olarak bu yerel organizasyonlara taşınmaktadır. Bunun karşısında sınır çekme ve pratikleri dönüştürme ikiliği çift taraflı olarak gösterilmiştir. Bu sınır ve pratikler mekanizmasının çift taraflı olması örgütsel alan ve organizasyon arasındaki dinamik süreci temsil etmektedir. Bu dinamik süreç ise ancak tarihsel olarak, yerel organizasyonlarda pozisyon almış örgütsel aktörlerin pratikleri, konuşmaları, genel olarak örgütsel değişime etkileri ölçüsünde anlam kazanmaktadır. Sınır ve pratikler arasında bu anlamda diyalektik bir ilişki vardır. Çeşitli örgütsel aktörler, yerele özgü koşullar çerçevesinde türeyen kurumsal mantık çerçevesini korumak üzere sınır çekme işlevleri gösterirken, örgütün yönünü başka bir yöne çevirmek isteyen aktörler o tarih itibarıyla inovatif sayılabilecek yeni pratiklerin yerleşmesi için aktif olarak çalışmışlardır.

Bu teorik çerçeve kapsamında, tezin ikinci bölümünde ampirik veriyi üç ana kısımda tartışmaktayım. İkinci bölümün ilk kısmında, bilim politikası organizasyonları ve bilim politikası çerçevesinin ortaya çıkışını, daha doğrusu “araştırma konseyi” örgütsel formunun ortaya çıktığı özel bir tarihsel vakayı ele almaktayım. Bu özel vakanın ayırıcı özelliği, daha sonrasında ulusaşırı organizasyonlar vasıtasıyla da yayılmasının öngörüldüğü bilim politikası mekanizmalarıyla doğrudan ilişkili olmasıdır. Bu özel tarihsel durum, ilk olarak Birinci Dünya Savaşı sırasında İngiltere’de ortaya çıkan bilim politikası örgütleri, ikili mekanizması, Bilimsel ve Endüstriyel Araştırma Dairesi (DSIR) ve Bilim Politikası Danışma Kurulu’nun (Advisory Council for Scientific Policy) 1916’da kurulmuş olmasıdır. Birinci Dünya Savaşı sırasında, o dönem için İngiliz bilim çevreleri ve yüksek bürokratları arasında kabul edilen Alman bilimine bağımlılık fikri, özelde de Kimya sektöründe Alman endüstrisine bağımlı olma meselesi bu türden bir ikili örgütsel formun ortaya çıkmasına sebep olmuştur. DSIR ve bilim politikası danışma kurulunun İngiltere’de ortaya çıkmasının hemen ardından, benzer örgütler, hatta bu ikili mekanizmanın kendisi başka ülkelerde de ortaya çıkmıştır. Bu örneklerden en önemlisi olan Amerika

Birleşik Devletleri'nde aynı yıl içinde, 1916'da kurulan Ulusal Araştırma Konseyi, yine aynı yıl Kanada'da bir Ulusal Araştırma Konseyi Kurulması İngiliz örneğinin önemini ortaya koymaktadır. Bunlara ek olarak 1919'da daha ziyade Alman araştırma ekosistemine ait bir form olarak bilinen Uluslararası Araştırma Enstitüsü'ne rakip olarak kurulan Uluslararası Araştırma Konseyi, İngiltere'de ortaya çıkan ikili mekanizmanın, DSIR ve danışma kurulu örgütünün etkisini göstermektedir.

Birinci Dünya Savaşı sırasında ortaya çıkan bu örgütsel formun yanında, bu dönem İttifak ülkeleri arasında daha ziyade askeri teknoloji alanındaki bilimsel gelişmeleri daha yakından takip etmek amacıyla kurulan, araştırma enformasyon komitelerinin daha sonra araştırma sistemlerinin izlenmesi için oluşturulan araştırma değerlendirme kriterleri, araştırma tiplerinin kategorizasyonu, düzenli istatistiki veri toplama gibi mekanizmaların ortaya çıkışının öncülü olarak tartışmaktayım. Bu komiteler daha ziyade dış politika çerçevesinde ordu bünyesinde kurulmuş, bilim insanlarının da aktif olarak başka ülkelerdeki askeri teknoloji gelişimi takip etmesi için oluşturulmuştur. Bu daha sonrasında ulusaşırı örgütler vasıtasıyla ulusal araştırma sistemlerinin ortaya çıkışını incelemektedir.

İngiliz bilim çevresinde yaşanan gelişmelerin bir ikinci önemi ise İngiliz bilim çevrelerinin “uygulamalı araştırma” kapsamında bilimin askeri, ekonomik ve toplumsal faydasını önceleyen bir anlayışa sahip olmaları ile ilgilidir. Uygulamalı araştırmalara dair bu yatkınlık veya bilimin faydalarının başka alanlarda da kurulmasına dair istek, karşıt bir örnek olarak Alman bilim geleneğinin pür bilim idealine temel bir zıtlık oluşturmaktadır. Bu yatkınlık çerçevesinde, İngiliz bilim insanları Birinci Dünya Savaşı sırasındaki taleplerinin daha ötesinde İkinci Dünya Savaşı sırasında bir dizi yeni “manifesto”lar yazmışlardır. Bunlardan en önemlisi John Desmond Bernal'in Bilimin Toplumsal İşlevi (The Social Function of Science) isimli metnidir. Bu metin, İngiliz araştırma sistemine dair ilk sistematik verileri birarada sunan, bununla beraber Bernal'in komünist olması hasebiyle bilimin toplumsal faydalarını yalnızca kapitalist toplumlar için değil, sosyalist bir gelecekte de kullanmak gerektiğini savunması çerçevesinde ilk önemli bilim politikası metinlerindendir. Fakat bundan daha önemlisi, o dönem için İngiliz bilim çevrelerinin, devleti; bilimi toplumsal, ekonomik ve askeri alanlarda kullanmaya dair yaptığı çağrılar bağlamında bir metin olması sebebiyle önemlidir. Diğer ulusal örneklerle

karşın, İngiliz bilim çevrelerinin bilimin toplumsal faydalarına dair, İkinci Dünya Savaşı sırasında, Bernal'in 1939'da yayınlanan metninin hemen öncesinde yayınladıkları anonim bir metinde, bilimin pek çok alanda "kullanılabileceği" fikrini yaymaları İngiliz örneğini daha önemli kılmaktadır. Bu anonim metnin yayınlanmasının üstünden yıllar geçtikten sonrası, Science in War isimli bu metnin Solly Zuckerman ve John Desmond Bernal'le beraber bir dizi başka bilim insanı tarafından yazıldığını öğreniyoruz. Dahası, Zuckerman ve Bernal'in ve bir dizi başka İngiliz bilim insanının, İkinci Dünya Savaşı sırasında doğrudan İngiliz ordusu için bilimsel metodu kullanarak savaşın kazanılmasında katkı sunduklarını takip edebiliyoruz.

İngiliz bilim çevresinde yerleşik olan bu "uygulamalı araştırma" ya da bilimin toplumsal faydalarına dair yatkınlıkla beraber, İkinci Dünya Savaşı sırasında, aralarında Zuckerman ve Bernal gibi isimlerin de olduğu İngiliz bilim insanları, esasen bilimsel metodun ya da istatistiki veri toplama yöntemlerinin, askeri operasyonları nasıl daha verimli kılacağına dair geliştirdikleri yöneylem metotları (harekat araştırması) bu dönem için İngiltere'de ortaya çıkan bir diğer kültürel-bilişsel değişikliği temsil etmektedir. Bu yöntemleri geliştirmiş İngiliz bilim insanlarının, aralarında Zuckerman'ın da bulunduğu, fakat İngiltere özelinde ilk bilim idarecisi (science administrator) sayılabilecek Henry Tizard'ın da bulunduğu bir dizi bilim insanı daha sonrasında İkinci Dünya Savaşı esnasında yerleştikleri uluslararası ağlarda, bilim politikası çerçevelerinin yayılmasını sağlayacak isimler olmuşlardır. Henry Tizard'ın özel önemi, Amerika Birleşik Devletleri'nin savaş esnasında kurduğu bilim politikası ajansının başındaki Vannevar Bush ve James B. Conant ile gerçekleştirdikleri; radarın ilk prototiplerinin ABD ile paylaşıldığı Washington misyonunun başı olması ile ilgilidir. Bu uluslararası işbirliği, savaş sonrasında bu kez Avrupa'nın restorasyonu ve ABD ile Avrupa arasındaki prodüktivite verimliliği açıklığının kapanması çerçevesinde önemli olacaktır.

Uluslararası bilimsel işbirliğinin ilk ayağını temsil eden etkinlikler; ekonomik kalkınma, Avrupa'nın restorasyonu ve üretim verimliliğini artırma politikaları, dönemin Marshall yardımlarını denetleyen ulusaşırı kuruluşu OEEC ve Avrupa Prodüktivite Ajansı'nın (EPA) etkinlikleridir. Diğer ayağı ise askeri alanda 1950'lerin başından itibaren NATO çerçevesinde gelişen 1958 sonrasında ise sivil alanda NATO Bilim Komitesi çerçevesinde gelişen işbirlikleridir. EPA'nın önemi, OEEC'nin

1960'ta bu kez OECD olarak yeniden örgütlenmesi ve bilim politikası direktörlüğünün, Henry Tizard'ın "çırağı" olarak kabul edilen Alexander King tarafından yürütülmesiyle ilgilidir. Alexander King, bilim politikası çerçevelerinin uluslararası bağlamda genişlemesini sağlayan en önemli aktörlerden birisidir. 1950'lerin ortasından itibaren ilk olarak EPA'nın direktörlerinden biri olarak, 1960 sonrası 1970'e kadar OECD'nin Bilimsel İlişkiler Direktörlüğü'nün (DAS) başı olarak bu dönemin başat aktörlerinden biri olduğunu takip edebiliyoruz.

Bu anlamda, İngiltere özel örneği, bu bağlamda ortaya çıkan örgütsel form ya da ikili mekanizma "araştırma konseyi" ve bir üst "danışma kurulu", 1960'lara kadar EPA tarafından özel olarak "uygulamalı araştırma" çerçevesinde bilim politikasının ekonomik kalkınmaya katkısı için üye ülkelere tavsiye edilmiştir. Bu dönem için tezin ikinci bölümünde EPA'nın düzenlediği "uygulamalı araştırma" konferans serileri, bilim politikasının temel hatları olan üniversite-endüstri ilişkileri, bilimsel ya da kalifiye insangücü meselesi, ekonomik kalkınma için sanayinin uygulamalı araştırmaya yönelik katkılarının stimüle edilmesi gibi bugün dahi geçerli ana hatların bu dönem çizildiğini görebiliyoruz. Diğer taraftan bilim politikası çerçevelerinin ulusal bağlamlara dağıtılmasının bir diğer sebebi ise uluslararası bağlamda yaşanan değişikliklerdir.

1950'lerin ortasından itibaren ABD'nin Sovyetlerin yükseköğretimde yaşadığı genişlemeyi, Sovyet üniversitele sisteminin bilim insanı ve mühendis sayılarında yıllık olarak ABD'yi geçmesi ve Avrupa yükseköğretim sistemlerini katlaması, ABD açısından bir bilimsel insangücü "krizini" temsil etmektedir. Bu "probleme" ek olarak Sovyetlerin 1957'de uzaya ilk Sputnik'i göndermesi hem ABD için hem de NATO vasıtasıyla Batı Paktı ülkeleri için bir tehdit algısı oluşturmıştır. Bu dönemde de üçüncü bölümde tartıştığım gibi, bilimsel insangücü problemi, OEEC ve OECD gibi diğer uluslararası örgütlerce üye ülkelerin bu alanda düzenli istatistiki veri toplamasına ve daha sonrasında araştırma sistemlerini değerlendirmek üzere Frascati Kılavuzu gibi bilim politikası verilerini standardize eden, diğer anlamıyla kurumsallaştıran bir karaktere bürünmesinin öncüllerini oluşturmaktadır.

Tezin ikinci bölümünün ikinci ve üçüncü kısımlarında bu gelişmelerin Türkiye'deki karşılıklarını tartışmaktayım. NATO'daki askeri bilimsel işbirliklerinin ilk etkisi,

1954’da Türkiye’de Genelkurmay çerçevesinde bir Araştırma Geliştirme Departmanının kurulması ile sonuçlanmıştır. İlk askeri bilim politikası örgütü olarak TÜBİTAK’ın kurulması öncesi, askeri bürokrasinin zihinsel dünyasında yer etmesi açısından bu Araştırma Geliştirme Departmanı’nın, 1959 itibariyle bir de askeri danışma kurulu olarak, İlmi İstişare ve Araştırma (İLAR) kurulunun kurulması önemli bir tarihsel moment olarak tartışılmıştır. Çok kısıtlı da olsa arşiv dökümanları, önce Genelkurmay bünyesinde daha sonra Milli Savunma Bakanlığı bünyesinde çalışan AR-GE departmanının, Türk ordusunun bilim politikasına dair beklentilerini şekillendirdiğini iddia etmekteyim. 1960’ların başı itibariyle sivil bir “Araştırma Konseyi”nin kurulmasının öngörülmesi bu çerçevede anlamlı olmaktadır. Nitekim, İkinci Bölüm’ün üçüncü kısmında TÜBİTAK’ın kuruluş yasasının içerdiği akademik ve politika mantıklarını temsil eden farklılıkları tartışmaktayım. Buna göre, TÜBİTAK öncelikle Millet Meclisi’nde yasalaştığı gibi yalnızca ülkede “araştırma ruhunu” geliştirmek üzere kurulmuş bir örgütken, 1960 Darbesi Milli Birlik Komitesi üyelerinin tabii üye olduğu Senato’da yaşadığı değişiklik, yani araştırma ruhunu geliştirmeye ek olarak araştırmayı “koordine” etme görevi, TÜBİTAK’ın kurulduğu yılından itibaren ikili bir kurumsal mantığı içerdiğini göstermektedir. Bu düzenlemeye ek olarak, Senato’nun, Millet Meclisi’nde yasalaştığı biçimde güçlü bir Bilim Komitesi’ne bir tür “frenleyici” organ olarak TÜBİTAK Genel Sekreterlik makamını güçlendirdiğini takip edebiliyoruz. Bu önemli iki pozisyon aslında 1963-1983 yılları arasında TÜBİTAK’ın ikili bir yapıya sahip olmasına, yine de bilimsel, idari ve finansal olarak özerk bir biçimde kurulmuş olan ana karar mekanizması Bilim Komitesi sebebiyle daha ziyade bir akademik kurumsal mantığın hakim olduğu bir bilim politikası örgütü olmuştur. Fakat nihai olarak 1983’te TÜBİTAK’ın daha üst bir kurula, BTYK’ya bağlanması kurumun ilk genel sekreteri, uygulamalı devlet araştırması yapmak üzere kurulmuş Marmara Bilimsel ve Endüstriyel Araştırma Enstitüsü’nün ilk Müdürü, Mehmet Nimet Özdaş tarafından gerçekleştirildiğini takip edebiliyoruz.

Bu bulgular çerçevesinde tezin sonraki bölümleri bu ikiliği tartışmakta ve 1980’lerin sonu ve 1990’ların başı itibariyle TÜBİTAK’ın tam anlamıyla bir bilim politikası örgütüne dönüştüğünü açıklamaktadır. Tezin Üçüncü Bölümü’nde 1960’lardan 1980’e kadar, üniversite özerkliği, bilimsel araştırma özgürlüğü gibi bilimsel cemaate gönderen değerlerin ne kadar başat olduğunu Ankara Fen Lisesi’nin kurulması ve

TÜBİTAK Bilim Adamı Yetiştirme Grubu'nun ülkede lise düzeyinde bir bilim (fen) eğitimi reformu gerçekleştirmesinden takip edebilmekteyiz. Bu bölümde önce bilimsel insangücü probleminin ortaya çıkışı ve politika çerçevelerine tahvil edilmesi sürecini tartışmaktayım. Daha sonrasında ise Türkiye'ye özgü insangücü problemlerinin, (özel olarak kentleşmenin hızına ayak uyduramayan sayılarda öğretmen eksikliği, endüstrinin mühendis talebi vb.), Devlet Planlama Teşkilatı Sosyal Planlama Dairesi başkanlığının ulusaşırı düzlemde gerçekleşen eğitim politikası çerçevesini Türkiye'ye uygulamak istemesi, fakat nihai olarak Ford Vakfı temsilcisinin tavsiyesi üzerine, Türkiye'nin bilim insanı problemini Ankara Fen Lisesi ve uzun yıllardır kullanılmakta olan yurtdışına gönderilen öğrencilerle çözmeyi tercih edilmesidir. Bu bölümde temel olarak, akademik kurumsal mantığın hakimiyeti elit bir fen lisesi kurularak, bir taraftan da büyük insangücü problemlerine kısmi bir çözüm olarak fen eğitiminin geliştirilmesi çerçevesinde göstermekteyim. Diğer alanların aksine, yani TÜBİTAK'ın 1963-1983 yılları arasında görece parçalı olarak bir tür politika mantığını MBEAE ekseninde taşımasına rağmen, eğitim alanında akademik bir kurumsal mantığın daha güçlü olarak hem TÜBİTAK Bilim Adamı Yetiştirme Grubu yetkililerince, hem de Milli Eğitim Bakanlığı bürokratlarınca benimsendiğini iddia etmekteyim. Dahası, elit bir lise olarak Ankara Fen Lisesi'nin sonraki yıllarda üniversiteye giriş sınavlarının merkezileşmesiyle beraber, lise öğretiminin oldukça sıkı bir biçimde “hiyerarşikleşmesi” ile ilgili ilk adımları oluşturduğunu ileri sürmekteyim.

Dördüncü Bölümde, TÜBİTAK genel sekreterliği ve Bilim Komitesi arasındaki ikiliği, sınır koyma-pratik dönüştürme ikili mekanizması çerçevesinde tartışmaktayım. Bu bölüm, tezin ana argümanını yani 1963 ve 1983 arasında TÜBİTAK'ta hakim olan akademik kurumsal mantığı ve onun karşısında politika mantığının mücadelesini tartışmaktadır. Buradaki en önemli aktörler Bilim Komitesi üyeleri ve TÜBİTAK'ın ilk Bilim Komitesi başkanı Cahit Arf ile ilk genel sekreter Mehmet Nimet Özdaş'ın faaliyetleri arasındaki farklardır. Cahit Arf'in TÜBİTAK'ın kuruluşundan itibaren, kurumu bürokratlara ve siyasetçilere tevdi etmenin yaratacağı problemleri dile getirmesi, TÜBİTAK'ı bir temel bilim örgütü olarak düşünmesi ve bu düşüncenin Erdal İnönü ve Bahattin Baysal gibi isimlerce paylaşılması kurumdaki akademik kurumsal mantığın hakimiyetini göstermektedir. Öte yandan Mehmet Nimet Özdaş öncülüğünde 1965'ten itibaren bir Araştırma Enstitü'sü kurulması girişimi ve nihai olarak 1972'de Marmara Bilimsel ve Endüstriyel Araştırma Enstitüsü'nün (bugün

TÜBİTAK-Marmara Araştırma Merkezi), TÜBİTAK'ta bu dönem ikili bir örgütsel yapının ortaya çıktığını göstermektedir. Bir taraftan Bilim Komitesi ve Araştırma Grupları çerçevesinde temel bilimin öncelendiği araştırma projeleri daha serbest bir biçimde geliştirilirken, MBEAE bünyesinde küçük sayıda da olsa özel sektör ve sanayi için, daha çok sayıda devlet projeleri için araştırma projesi merkezli bir örgütün kurulduğunu takip edebilmekteyiz.

TÜBİTAK kanununa güçlü bir genel sekreterlik ve güçlü bir bilim kurulu olarak yerleşen iki çelişkili kurumsal mantık, hemen TÜBİTAK'ın kurulduğu yıllarda Türkiye'nin OECD'nin bir bilim politikası projesine katılmasıyla DPT yetkilileri ve TÜBİTAK Bilim Kurulu üyeleri arasındaki ayrımı da gösterdiğini iddia ediyorum. Bu farklılık, OECD Pilot Takımlar Projesi bünyesinde Türkiye'nin bilim politikası çerçevesini kuran ilk Plancılar aklındaki TÜBİTAK'ı politika merkezli bir örgüt olarak tasarladıklarını göstermektedir. DPT'nin sonraki yıllarda MBEAE için verdiği destekler de (örneğin tarım araştırmalarını desteklememe tercihi) bu ikiliği göstermektedir. Bununla beraber, Nimet Özdaş'ın ilk bilim politikası tasarımlarının ortaya çıktığını iddia ettiği, 1965'te organize edilen *İnşaat Araştırmalarının Programlanması Kolokyum*'unda DPT yetkililerinin, daha açık bir biçimde Atilla Karaosmanoğlu'nun neden bilim politikası tasarımının önemli olduğuna dair görüşleri, bu ikiliği daha açıkça göstermektedir. Bununla beraber, bu karşıtlık ya da ikilik, yani politika mantığı ve akademik mantık ve grupların mücadelesi, 1970'lerin başından itibaren TÜBİTAK çerçevesinde daha görünür olduğu bir döneme girildiğini göstermektedir. Bu dönem itibarıyla taraflar, TÜBİTAK genel sekreterliği ve sekreterlik bünyesinde, daha ziyade Nimet Özdaş'ın kişisel inisiyatifi vasıtasıyla kurulan, MBEAE araştırma üniteleri (Yöneylem Araştırma Ünitesi, Elektronik Araştırma Ünitesi vb.) bunlara ek olarak Bilim Politikası Ünitesi'nin yanında, TÜBİTAK çevre örgütleri yani DPT ve diğer bakanlıkların, siyasetçilerin temsil ettiği politika mantığıyla, Bilim Komitesi ve üyeleri bünyesinde temsil edilen akademik mantıkla karşı karşıya geldiğini görmekteyiz. 1970'ler itibarıyla bu karşıtlığın ortaya çıktığı alanlar, siyasetçilerin TÜBİTAK'tan beklentilerini daha açık bir şekilde dile getirdikleri Danışma Kurulu toplantı dökümlerinde, Bilim Politikası Ünitesi'nin hazırladığı raporlarda ve DPT uzmanlarının hazırladığı bilim politikası raporlarında karşımıza çıkmaktadır. Bunlara karşılık, Bilim Komitesi üyelerinin sözlü ve yazılı akademik değerleri öne alan açıklamalarını takip edebilmekteyiz. Bu tartışmaların

1983'te, 12 Eylül 1980 Askeri Darbesi sonrasında Nimet Özdaş'ın TÜBİTAK ve Türkiye Atom Enerjisi Kurumundan Sorumlu Devlet Bakanı olarak atanması sırasında BTYK'nın kurulması ve Türkiye'nin ilk resmi bilim politikası metni Türk Bilim Politikası: 1983-2003'ün yayınlanmasıyla TÜBİTAK'ın politika temelli örgütsel dönüşümün ilk ayaklarını görebilmekteyiz. Nimet Özdaş'ın “300'e yakın bilim insanı ve uzmanla” işbirliği içinde hazırladığı Türk Bilim Politikası: 1983-2003 metni ve BTYK'nın bir üst politika kuruluşu olarak TÜBİTAK'ı icracı bir örgüt olarak ataması bu dönüşümün en temel göstergeleridir.

1983'te BTYK'nın kurulması ve Türk Bilim Politikası metninin yayınlanmasının hemen ardından, TÜBİTAK bünyesinde çalışmış, hatta 1960'larda askeri temsilcilerle ilk müzakereleri yürütmüş olan Bahattin Baysal'ın Cumhuriyet Gazetesi'nde yayınlanan, akademik değerleri savunan karşı yazıları 1983 itibariyle başlayan “sınır koyma” faaliyetlerinin ilk örneğini temsil etmektedir. Nimet Özdaş'ın öncülüğünde hazırlanan *Türk Bilim Politikası 1983-2003* metni, örneğin Frascati Kılavuzu'nda belirlenen araştırma harcamaları hedeflerini açıkça politika hedefi olarak koyan, belirli araştırma alanlarını öncelikli alan olarak belirleyen ve Türkiye'nin akademik araştırma çıktılarını uluslararası endekslerle ölçen ve buna göre hedefler koyan ilk metindir. Buna karşılık bu bölümü 1983'ten itibaren teoride TÜBİTAK'ın 1963-1983 arası akademik mantığı sonlandırması itibariyle bu tartışma ile kapatmaktayım. Bir sonraki bölümde, yani tezin Beşinci Bölümü'nde akademik mantığın yerini nasıl politika mantığının aldığını göstermekteyim.

Beşinci bölümde 1980 Askeri Darbesi sonrası kurulan ilk sivil hükümet olan Özal hükümeti Devlet Bakanı Tınaz Titiz ile TÜBİTAK Bilim Kurulu üyeleri arasında gerçekleşen, TÜBİTAK yasası değişikliği tartışmaları ile açmaktayım. Bu tartışmalar, TÜBİTAK bünyesinde akademik mantığın son “sınır koyma” pratiklerini temsil etmektedir. 1984-1987 arasında, Sevtap Kadioğlu'nun TÜBİTAK üzerine yazdığı doktora tezinin eklerinden takip edilebileceği gibi, Bilim Kurulu üyeleri Kemal Kafalı, Mithat Özsan gibi isimlerle TÜBİTAK'tan sorumlu Devlet Bakanı Tınaz Titiz arasında bir dizi kanun değişikliği tartışması gerçekleşmiştir. Bu tartışmanın ana eksenini ise TÜBİTAK'ın bir “hizmet” organizasyonuna dönüştürülmesi, Bilim Komitesi yerine Yönetim Kurulu getirilmesi ve kuruluş kanununda Genel Sekreterlik pozisyonu olarak ihdas edilmiş makamın, bu kanun değişikliği ile TÜBİTAK Başkanlığına çevrilmesi oluşturmaktadır. Bu tartışmaların mahiyetine, Kemal

Kafalı'nın "Nasıl Bir TÜBİTAK?" isimli Tınaz Titiz'e yazdığı mektuptaki fikirlerinden ulaşabilmekteyiz. Bu metne göre Tınaz Titiz'in TÜBİTAK'tan beklediği bir "hizmet" örgütüne dönüştürülmesi meselesi, dönemin Bilim Kurulu başkanı Kemal Kafalı tarafından şiddetle karşı çıktığını, herhangi bir politika tasarımının bilimsel değerleri dikkate almadan işlemeyeceğine dair uyarıları ile reddedildiğini görmekteyiz. Buna rağmen 1987'de ikinci Özal hükümeti döneminde TÜBİTAK kanununun değiştirildiğini ve bu kanunla TÜBİTAK'ta bir Yönetim Kurulu ve Başkanlık sistemine geçildiğini takip edebiliyoruz. 1987'deki bu kanun değişikliği, 1983'te Nimet Özdaş önderliğinde BTYK'nın kurulması ile başlayan politika mantığının TÜBİTAK'ın örgütsel dönüşümünü tamamlaması olarak kabul edebiliriz. Yine de 1987'den sonra atanan ilk TÜBİTAK başkanı Mehmet Ergin döneminde bu çalkantılı dönem sonlanmamış, 1990'da bürokratik çevrelerce "meşru" kabul edildiği anlaşılan Kemal Gürüz'ün TÜBİTAK başkanı olmasıyla TÜBİTAK'ın örgütsel dönüşümünü tamamladığını izleyebilmekteyiz.

Bu sırada 1983'te kurulmasına rağmen 1989'a kadar yıllık toplantılarını gerçekleştiremeyen BTYK'nın da 1993 itibarıyla Tosun Terzioğlu'nun TÜBİTAK Başkanı ve Bilim Kurulu başı olarak düzenli bir şekilde toplandığını takip edebiliyoruz. 1993 yılı aynı zamanda TÜBİTAK kanununun tekrar değiştirildiği, bilim kurulunun tekrar ihdas edildiği fakat bu kez ilk kuruluş kanununda öngörülen Genel Sekreterliğin TÜBİTAK Başkanı olarak 1987 kanunu ile 1963 Kuruluş Kanunu'nu mezcettiğini iddia etmekteyim. Yani 1993'teki bu değişiklik, bu kez ilk politika girişimcilerinden Erdal İnönü'nün hükümet ortağı olarak gerçekleşen bu kanun değişikliğinin, TÜBİTAK kuruluş kanununda Bilim Kurulu'na bahsettiği geniş idari, bilimsel ve finansal özerklik yerine 1987 kanunu ile getirilen Başkanlık makamını koruduğunu kanun metinlerinden izleyebiliriz. Dolayısıyla 1990'dan itibaren, özellikle Kemal Gürüz'ün başkanlığıyla beraber TÜBİTAK'ın politika merkezli bir örgüt olarak dönüşümünü tamamladığını, 1993 itibarıyla de BTYK ile düzenli olarak 1983'te TÜBİTAK'a verilen icracı organizasyon görevini yerine getirdiğini görebilmekteyiz.

Tezin Beşinci Bölümü'nde 1990 sonrası bu dönüşümün bir başka sebebinin ise 1980 itibarıyla ülkenin ekonomi politikasının ihracata yönelik olarak yeniden örgütlenmesi çerçevesinde gerçekleştiğini iddia etmekteyim. 12 Eylül 1980 Darbesi'nin hemen

öncesinde Turgut Özal öncülüğünde kabul edilen 24 Ocak Kararları, ülkenin ekonomi politikalarının, ekonomik krizlerin sebebi Dış Ödemeler Dengesi ve Döviz kıtlığını çözmek üzere ihracat odaklı büyüme ve serbest piyasa koşulları çerçevesinde dönüşmesine yönelmesiyle sonuçlanmıştır. Buna ek olarak 1980 Askeri Darbesi ile birlikte bu yıldan itibaren kurulan Sağ hükümetler boyunca, Başbakanlık teşkilatı içinde bir dizi ekonomi politikasını belirleyici karar mekanizmalarının oluşturulduğunu ve bu karar mekanizmalarıyla beraber ihracatı ve kamu yatırımlarını finanse edecek bir dizi Fon'un kurulduğunu takip edebilmekteyiz. Bunlardan en önemlileri 24 Ocak Kararları ile beraber kurulan Para ve Kredi Koordinasyon Kurulu, 1984'te kurulan Toplu Konut ve Kamu Ortaklığı İdaresi ve Fonu, 1985'te kurulan Savunma Sanayi İdaresi ve Fonudur. Bu dönemde bütün bu yeni devlet organlarının Başbakanlık bünyesinde kurulduğunu görmekteyiz. Bunlarla beraber Hazine ve Maliye Müsteşarlığı ile Dış Ticaret Müsteşarlığı'nın (Bugün bakanlık düzeyinde Ticaret ve Maliye Bakanlıkları) 1990'dan itibaren örgütsel olarak ciddi bir büyüme gerçekleştirdiğini takip etmekteyiz.

1980 öncesinde DPT'nin ve TÜBİTAK'ın da esasen Başbakanlık bünyesine bağlı olarak kurulduğu göz önüne alındığında, bu değişikliklerin TÜBİTAK'ın örgütsel dönüşümünü doğrudan etkilediğini iddia etmekteyim. 1993'ten 2010 ve sonrasındaki BTYK Toplantı dökümleri ve kararları incelendiğinde TÜBİTAK'ın araştırma ve geliştirme proje desteklerine ek olarak DPT'nin Savunma Sanayi Başkanlığı'nın ve Dış Ticaret Müsteşarlığı'nın TÜBİTAK desteklerinin daha doğrusu BTYK'nın koordine ettiği araştırma projeleri desteklerinin bütününe oluşturduğunu görebilmekteyiz. Örneğin Dış Ticaret Müsteşarlığı'nın sağladığı teşviklerin, daha ziyade ihracata yönelik sanayi ve teknoloji firmalarına sağlanan desteklerin derece derece TÜBİTAK'a devredildiğini izleyebilmekteyiz. Dolayısıyla 1980 itibarıyla Başbakanlık teşkilatı bünyesinde gerçekleşen siyasi ve ekonomik güç temerküzünün ve örgütsel genişlemesinin, doğrudan TÜBİTAK'ın örgütsel dönüşümünü de etkilediğini iddia etmekteyim.

Bu değişikliklere ek olarak, tezin Beşinci Bölümü'nde 1980'de alınan ihracata yönelik büyüme tedbirlerinin 1970'lerin başından itibaren Dünya Bankası ve Birleşmiş Milletler Sinai Kalkınma Teşkilatı'nın (UNIDO) teşvik ettiği küçük ve orta ölçekli sanayi kuruluşlarının geliştirilmesi projelerinin de TÜBİTAK'ın dönüşümünde etkili

olduğunu tartışmaktayım. 1973'te UNIDO öncülüğünde Gaziantep'te kurulan Organize Sanayi Bölgesi'nin 1990'da büyük Dünya Bankası kredileriyle Gebze ve Ankara'daki organize sanayi bölgelerinin kuruluşu ve geliştirilmesi için kullanılmasıyla ülkenin ihracata yönelik olarak küçük ve orta ölçekli sanayi kuruluşlarını destekleme politikasının yerleşikleştiğini, bu politikayı izleyecek bir idari mekanizmanın, 1990'da ilgili Dünya Bankası kredisinin kullanılması ile Küçük ve Orta Ölçekli Sanayi Geliştirme ve Destekleme Başkanlığı'nın kurulduğunu ve TÜBİTAK'ın da bu yönde politikalar geliştirdiğini izleyebilmekteyiz. 1990'daki bu dönüşüm, Dünya Bankası kredisinin içeriği, TBMM'de kabul edilen antlaşma çerçevesinde, bu bölümde tartıştığım üzere, bir taraftan TÜBİTAK bünyesinde sanayi ürünlerinin kalitesini takip edip standardize edecek bir Metroloji Enstitüsü kurulması gayesiyle verildiğini, diğer taraftan da sanayi kuruluşlarına ek olarak teknoloji girişim firmalarına fon dağıtacak özerk bir kuruluşun yani Türkiye Teknoloji Geliştirme Vakfı'nın (TTGV) kurulmasını öngördüğünü izleyebilmekteyiz. Bu anlamda TTGV'nin kurulması, TÜBİTAK'ın 1990 sonrası geçirdiği dönüşümler, DTM ve Savunma Sanayi Geliştirme Başkanlığı gibi yeni örgütsel aktörlerin de oyuna dahil olduğu bir dizi değişikliklerle ilgili olduğu savını kuvvetlendirmektedir. 1990'daki bu Dünya Bankası kredisinin ikinci ayağının 1990'ların ortasında bu kez TÜBİTAK-MAM'ın modernize edilmesi ve Gebze Organize Sanayi Bölgesi bünyesinde bir teknopark'ın kurulması için kullanılmasıyla Türkiye'nin küçük ve orta ölçekli sanayi kuruluşlarını desteklemesi, ihracata yönelik ekonomik liberalizasyonla beraber, teknoloji geliştirmeye yönelik girişimci firmaların da desteklenmesi ile genişlediğini görmekteyiz. Bu dönüşümler, bugün de özel olarak savunma sanayi ve küçük ve orta ölçekli sanayi kuruluşlarının TÜBİTAK'ça 1993 itibariyle doğrudan teşvik edilmesiyle devam etmektedir.

Tezin bu bölümünde ek olarak, uluslararası ve ulusal düzeyde politika çerçevelerinin dönüşümünde de tarihsel bir izleğin olduğunu iddia etmekteyim. İkinci Dünya Savaşı sırasında İngiltere'de ortaya çıkan hareket araştırması yöntemlerinin yıllar içinde gelişmesi, önce İngiliz ve Amerikan ordularında geniş bir biçimde kurumsallaşması ve daha sonrasında NATO bilim kuruluşları çerçevesinde üye ülkelere dağılmasının son halini 1980'ler itibariyle OECD bünyesinde bir tür sistem yaklaşımına dönüştüğünü ve “ulusal inovasyon sistemi” kavramı ile bu dönüşümün tamamlandığını iddia etmekteyim. Bu dönüşümün TÜBİTAK'taki karşılığı ise

1990'lar itibariyle bir Ulusal İnovasyon Sistemi'nin kurulmasının BTYK'ca kararlaştırılması, yine benzer bir sistem yaklaşımının bu kez Avrupa Birliği bilim politikası ana araçlarından Çerçeve Programlarda (FP) Avrupa Araştırma Alanı olarak kavramsallaştırılan araştırma ekolojisi kavramsallaştırmasının Türkiye için de Türkiye Araştırma Alanı (TARAL) olarak 1990 sonrasında BTYK'ca kararlaştırıldığını görmekteyiz.

Bu gelişmelerle beraber TÜBİTAK bünyesinde örgütsel olarak da dönüşümler gerçekleştiğini takip edebilmekteyiz. Bunlardan en önemlisi 1990'larla beraber ihracata yönelik ekonomik kalkınma politikasının, küçük ve orta ölçekli sanayi kuruluşlarını doğrudan finansal olarak teşvik etmek üzere TÜBİTAK'ta bir Teknoloji ve Yenilik İzleme ve Değerlendirme Başkanlığı'nın (TİDEB, bugün TEYDEB) kurulmasında gözlemleyebilmekteyiz. Bir diğer değişiklik ise organize sanayi bölgelerinin bir benzeri olarak bir dizi teknoparkın kurulması, bunlardan bir kısmının üniversiteler bünyesinde kurulması sebebiyle önce Üniversite-Sanayi İşbirliği Platformu'nun (ÜSİMP) kurulması daha sonrasında TÜBİTAK bünyesinde bu işbirliklerini düzenleyecek, kontrol edecek; üniversite ve üniversite dışı kurulmuş olan teknoparklar ve (ki ilki 1991 yılında TÜBİTAK-MAM bünyesi ve Gebze Organize Sanayi Bölgesi bünyesinde kurulan Teknopark, hemen sonrasında ilk olarak Orta Doğu Teknik Üniversitesi ve aynı yıllarda İstanbul Teknik Üniversitesi bünyesinde kurulan teknoparklar) teknoloji geliştirme merkezlerinin TÜBİTAK örgütsel genişlemesi içinde TÜBİTAK'ın üç başkan yardımcısından birinin sorumlu olduğu bir dönüşümü takip edebilmekteyiz.

Tezin bu bölümünde 1972'de kurulan Marmara Bilimsel ve Endüstriyel Araştırma Enstitüsü araştırma ünitelerinin sonraki yıllarda, özellikle ilk aşamada 1983 sonrasında bir dizi özerk araştırma enstitülerine dönüştüğünü takip edebilmekteyiz. Bunlardan en önemlisi MBEAE'nin Marmara Araştırma Merkezi'ne dönüşmesidir. MAM'ın kurulması ile beraber, MAM bünyesindeki, örneğin Elektronik Araştırma Ünitesi'nin ve 1980'lerde İTÜ bünyesinde kurulan Yarı İletken Teknolojileri Araştırma Laboratuvarı gibi araştırma ünitelerinin iki farklı Enstitü'ye dönüştüğünü daha sonrasında ise Araştırma Merkezleri'ne dönüştüğünü izleyebilmekteyiz. Bunlardan ilki, 1960'ların ortasından itibaren Posta Telgraf Teşkilatı(PTT) bünyesinde PTT-ARLA olarak kurulmuş bugün iletişim teknolojileri firmalarının, Ulusal Akademik Ağ

ULAKBİM'in öncülü bu kuruluşun, 1980'lerden itibaren Ulusal Elektronik ve Kriptoloji Araştırma Enstitüsü'ne dönüştüğünü izleyebilmekteyiz. Öte yandan 1972'de MAM bünyesi dışında askeri araştırmalara yönelik olarak kurulan GÜDÜMLÜ Araçlar Teknolojisi İzleme Enstitüsü'nün (GATÖM), önce 1983'te Balistik Araştırmaları Enstitüsü'ne daha sonrasında ise Savunma Sanayi Araştırma ve Geliştirme Enstitüsü'ne (SAGE) dönüştüğünü izleyebilmekteyiz. Bu dönüşümler, 1960'ların ortasından itibaren özel olarak devlet teknoloji geliştirme projelerinin ve inisiyatiflerinin belirli alanlarda, yani savunma sanayi araştırmaları kapsamında TÜBİTAK bünyesinde örgütsel olarak genişlediğini, bu alanlarda örgütsel bağlamda bir tür patika bağımlılığı gösterdiğini görebilmekteyiz. Öte yandan PTT-ARLA'nın Türkiye'nin iletişim sektöründeki önce kamu girişim olarak kurulmuş NETAŞ gibi özel kuruluşlarının, diğer taraftan Ulusal Akademik Ağ ve E-Devlet gibi girişimlerin öncüllerini oluşturduğunu izleyebilmekteyiz.

Bu tezde, TÜBİTAK'ın 1963 ve 1983 yılları arasında akademik bir kurumsal mantık çerçevesinde gelişmesi, 1983 yılı sonrasında politika mantığına yönelik olarak dönüşmesi ve nihai olarak 1990 sonrasında tam olarak bir politika örgütüne dönüşmesini tartışmış bulunmaktayım. Tezin Sonuç kısmında ise teorik çerçevenin birden fazla seviyede, yani bir yandan örgüt düzeyinde, örgütsel alan ve kurumsal çevre düzeyinde ulusaşırı seviyede bilim politikasının ortaya çıkışını ve Türkiye'de askeri araştırma kuruluşları ve TÜBİTAK'taki yansımalarını yakalamak üzere verimli bir teorik çerçeve oluşturduğunu iddia etmekteyim. Bununla beraber daha sonraki araştırmalarda, temel olarak Türkiye'nin 1960 Darbesi sonrası ekonomik kalkınmasını planlama ve ithal ikameci bir ekonomi politikasından ve görece daha demokratik ve "çoğulcu" anayasal düzeninden, 1980 sonrasında bürokratik-otoriter ya da merkeziyetçiliğe kayan literatür çerçevesinde gelişmesini önermekteyim. Buradaki temel tartışmalar, yani planlı kalkınma ve ithal ikameci ekonomi politikasının "başarısızlığı" tartışmasının iki ana argümanla açıklandığını tartışmaktayım. Bunlardan ilki ithal ikameci ekonomi politikalarının arka planını oluşturan geniş sınıf koalisyonlarında güçlü bir "işçi sınıfı" sesinin yokluğu, bir diğeri ise güçlü planlı ekonomi politikası uygulayıcısı "devlet otonomisi" yokluğu ile ilgili açıklamalardır. Bu açıklamalara ek olarak, TÜBİTAK'ın dönüşümünün yine bu çerçevede Türkiye devlet teşkilatının, özelde başbakanlık teşkilatı bünyesinde güç temerküzü ile düşünülmesi gerektiğini iddia etmekteyim. Tezin ana sonuçlarından bu argümanın,

literatürdeki iki argümanla desteklenebileceğini savunmaktayım. Fakat bu iki argümanın da, yani “işçi sınıfı” sesinin “yokluğu” ve “devlet otonomisi”nin yokluğu meselesi, dolayısıyla bir tür iktidar krizinin açıklayıcılığını devlet örgütlerini ve politika çerçevelerini, bir tür Bourdieücü bürokratik alan çalışmaları ile desteklemek gerektiği kanaatindeyim.

Bu önerilere ek olarak sonuç kısmında, tezin ana kısıtlarını tartışmaktayım. Bu kısıtlardan en önemlisi teorik ve ulusal-uluslararası politik bağlamı tartıştığım önceki kısımlarda öne sürdüğüm, kurumsalcı yaklaşımın geniş sosyal sınıf koalisyonları ve politikanın dönüşümü ile ele alınması meselesi olduğunu ileri sürdüm. Diğer ana kısıtlar ise tezin arşiv materyalleri ile ilgilidir. Bu arşiv materyallerinden en önemlisi, resmi olarak başvurmama rağmen dilekçenin TÜBİTAK bürokrasisinde kaybolduğu, TÜBİTAK’ın ana arşivleri ve Bilim Kurulu’nun toplantı dökümleri oluşturmaktadır. Bunlara ek olarak dönemin uluslararası bağlamını kuran NATO ve OECD dışındaki örgütlerin, örneğin CENTO gibi örgütlerin arşivini kullanmamış olmam oluşturmaktadır. Yine de oldukça geniş bir arşiv materyalini, derinlemesine analiz ettiğim bu çalışmada, bu ek arşiv materyalinin tezin ana argümanlarını değiştirmeyeceğini düşünmekteyim. Sonraki araştırmaların, sonuç kısmında yaptığım bu tartışma çerçevesinde geliştirilmesi, Türkiye’deki bürokratik örgütlerin tarihi ve dönüşümüne dair literatürün genişlemesi çerçevesinde yapılmasını önermekteyim.

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