

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS AND  
SOCIAL SCIENCES**

**A STUDY OF THE SCIENCE-POLICY INTERFACES  
IN CLIMATE CHANGE POLICYMAKING:  
IZMIR AND ISTANBUL DEVELOPMENT AGENCIES**

**M.Sc. THESIS**

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**Department of Science, Technology and Society**

**Science, Technology and Society M.Sc. Programme**

**JULY 2020**



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**İKLİM DEĞİŞİKLİĞİ POLİTİKA OLUŞTURMA SÜRECİNDE  
BİLİM-POLİTİKA ARAYÜZLERİNİN İNCELENMESİ:  
İZMİR VE İSTANBUL KALKINMA AJANSLARI**

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*To my family,*



## **FOREWORD**

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## **ABBREVIATIONS**

<b>BBC</b>	: British Broadcasting Corporation
<b>EU</b>	: European Union
<b>IPCC</b>	: Intergovernmental Panel on Climate Change
<b>ISTKA</b>	: Istanbul Development Agency
<b>IZKA</b>	: Izmir Development Agency
<b>NGOs</b>	: Non-Governmental Organisations
<b>NUTS</b>	: Nomenclature of Territorial Units for Statistics
<b>STS</b>	: Science, Technology and Society
<b>UK</b>	: United Kingdom
<b>UN</b>	: United Nations
<b>UNFCCC</b>	: United Nations Framework Convention on Climate Change
<b>USA</b>	: United States of America





# **A STUDY OF THE SCIENCE-POLICY INTERFACES IN CLIMATE CHANGE POLICYMAKING: IZMIR AND ISTANBUL DEVELOPMENT AGENCIES**

## **SUMMARY**

This study aims to examine the climate change-related science-policy interfaces. The concept of science-policy interface refers to the relationships between knowledge producers and policymakers in policymaking processes. The main thesis of the study is that in order to turn the scientific knowledge on climate change into effective policies, co-production based science-policy interfaces should be established. In these interfaces, knowledge producers and policymakers co-produce knowledge, policy, and action by interacting, cooperating, and collaborating.

The methodological approach of the study is the qualitative case study. For the case study, two regional development agencies in Turkey were selected. These agencies are Izmir Development Agency (IZKA) and Istanbul Development Agency (ISTKA). However, firstly, an academic literature review focusing on science-policy interface studies, especially Science, Technology, and Society studies, was conducted. Thus, after the theoretical discussions on science-policy interfaces were analyzed, and the main perspective of the study was formed, the investigation of IZKA and ISTKA started. Within the scope of the research, the agency documents, such as activity reports, work programs, strategic plans, and regional plans, that can be evaluated as primary sources, were examined. Moreover, semi-structured interviews were held with the agency experts who previously participated in science-policy interfaces.

The evaluation of the findings of the case study, together with the literature review, reveals that, although there are some deficiencies and problems, both IZKA and ISTKA, through their structures and activities, have high potential and capacity to establish science-policy interfaces to combat climate change on the local scale. Nevertheless, their perspectives on the climate change issue are very different from each other. For IZKA, climate change is of primary importance, while ISTKA, at least in the recent past and for now, does not carry out activities focused on climate change and includes it only as a *co-benefit* in the other projects. This approach of ISTKA is clearly not suitable to produce and implement effective and transformative climate change policies and activities.

Another important finding of the study relates to barriers that negatively affect science-policy interfaces. These barriers are sometimes caused by general problems such as perspective, methodology, and mentality differences between knowledge producers and policymakers, time constraints, financial management problems, or low science literacy. Nonetheless, they sometimes occur because of region-specific conditions. In this study, the scale problem was identified as the most important regional barrier. ISTKA has difficulty in finding the right actor or choosing among them in the large-scale region of Istanbul, where there are many different and powerful actors. On the other hand, since Izmir has a relatively more optimal scale, IZKA can more easily

establish science-policy interfaces within the region and can act more independently in its activities.

This study consists of five chapters. Chapter 1, the introduction chapter, addresses the statement of the problem, purpose and research questions, theoretical framework, methodology, and the significance and limitations of the study. Chapter 2 involves the literature review on science-policy interface studies. Chapter 3 first describes regional development agencies in Turkey, then reveals the results of the document analysis of IZKA and ISKA and the interviews with the agency experts. Chapter 4 discusses what the case study findings mean in the scope of this study and how they relate to the literature. Chapter 5, which is the conclusion chapter, reviews the study, and makes some recommendations for future research.

# **İKLİM DEĞİŞİKLİĞİ POLİTİKA OLUŞTURMA SÜREÇLERİNDE BİLİM- POLİTİKA ARAYÜZLERİNİN İNCELENMESİ: İZMİR VE İSTANBUL KALKINMA AJANSLARI**

## **ÖZET**

Bu çalışmanın amacı, iklim değişikliği politikalarına ilişkin bilim-politika arayüzlerini incelemektir. Bilim-politika arayüzü kavramı, herhangi bir konuya dair politika oluşturma sürecinde, bilgi üreticiler ve politika yapıcılar arasında kurulan ilişkileri ifade etmek için kullanılır. Çalışmanın temel tezi, iklim değişikliği bilimsel bilgisinin etkin politikalara dönüştürülebilmesi için, ortak üretim anlayışını temel alan bilim-politika arayüzlerinin kurulması gerektiğidir. Bu arayüzlerde, bilgi üreticiler ve politika yapıcılar etkileşim, işbirliği ve birlikte çalışma yaklaşımlarından hareketle ortaklaşa bilgi, politika ve aksiyon üretirler.

Sheila Jasanoff'un 'ortak üretim' konseptinden geliştirilen bu arayüz modeli, bilim dünyası ve politika dünyası arasındaki ilişkileri niteleyen 'teknokratik' ve 'demokratik' görüşlerin eleştirisidir. Teknokratik yaklaşım, teknobilimsel bilgiyi mutlak otorite olarak kabul ederek, bilim dünyasının politika yapım sürecine hakim olması gerektiğini savunur. Demokratik yaklaşımda ise, politik çıkarlar ön planda tutularak, bilimsel bilgi politika yapım sürecinin dışında bırakılır. Yani, 'demokrasi' terimi, bu bağlam çerçevesinde, bilimsel bilgiyi yok sayan veya manipüle eden popülist/gerçek ötesi bakış açılarını işaret etmektedir. Bu iki görüşün karşısında yer alan ortak üretim anlayışı, bilimsel bilginin elzem olduğu ancak tek belirleyici olarak kutsallaştırılmadığı bir politika yapım modelini savunmaktadır. Dolayısıyla, ortak üretim modeli, etkin politika üretmenin yolunun bilimsel bilginin politik, sosyolojik ve ekonomik koşullarla beraber değerlendirilmesi olduğunu iddia eder. Bu modeli temel alarak oluşturulacak bilim-politika arayüzlerinde de, bilgi üreticiler ve politika üreticiler arasında dikey hiyerarşiler oluşturulmaz, yukarıda da belirtildiği gibi, taraflar etkileşim ve işbirliği içinde çalışırlar. Bununla birlikte, ortak üretim modeli, iki grubun bir bütün olması gerektiği anlamına gelmez. Aksine, bilgi üreticiler ve politika yapıcılar arasında, fiziksel olmasa bile entelektüel bir sınır çizilir. Bu sınırın amacı, tarafların, özellikle de bilgi üreticilerin, bağımsız çalışmalar yapmasını mümkün kılmaktır. Başka bir deyişle, Jasanoff'un da belirttiği gibi, iki grup arasındaki mesafe etkileşim kurabilecekleri kadar yakın, objektif kalabilecekleri kadar uzaktır.

Çalışmanın temel yöntemsel yaklaşımı niteliksel vaka çalışmasıdır. Vaka çalışması olarak Türkiye'deki iki bölgesel kalkınma ajansı seçilmiştir. Bu ajanslar, İzmir Kalkınma Ajansı (İZKA) ve İstanbul Kalkınma Ajansı (İSTKA)'dır. Ancak, bir önceki paragrafta kısaca bahsedilen teorik çerçevenin oluşturulabilmesi için, ilk olarak Bilim, Teknoloji ve Toplum çalışmaları literatürü başta olmak üzere iklim değişikliğine ilişkin bilim-politika arayüzlerine odaklanan akademik literatür araştırması yapılmıştır. Böylece, bilim-politika arayüzlerine dair teorik tartışmalar analiz edildikten ve çalışmanın temel perspektifi oluşturulduktan sonra İZKA ve İSTKA'nın incelenmesi süreci başlamıştır. Araştırma kapsamında hem ajansların faaliyet raporları, çalışma programları, stratejik planları ve bölge planları gibi birincil kaynak

olarak değerlendirilebilecek dokümanları incelenmiş hem de yine birincil kaynak olarak ajanslardan daha önce bilim-politika arayüzlerinde görev almış uzmanlarla yarı yapılandırılmış görüşmeler gerçekleştirilmiştir.

Kalkınma ajanslarına dair bulgular literatür araştırmasıyla beraber incelendiğinde her iki ajansın da yerel ölçekte iklim değişikliğiyle mücadele edebilmek için bilim-politika arayüzleri kurma potansiyelleri ve kapasitelerinin yüksek olduğu tespit edilmiştir. Her ne kadar Sanayi ve Teknoloji Bakanlığı'na bağlı çalıştıkları için tamamen bağımsız faaliyetler gerçekleştiremeseler de, kalkınma ajansları sorumlu oldukları bölgedeki kaynakları kullanarak ve bölgedeki aktörler arasında işbirlikleri sağlayarak bölgesel kalkınmaya katkıda bulunmak için çalışırlar. Bu misyonları, onları bilgi üreticiler ve diğer bölgesel paydaşlarla sürekli olarak etkileşim kurmaya yönlendirmektedir. Bu doğrultuda, bazı eksiklikler ve problemler yaşamakla beraber, İZKA ve İSTKA'nın sıklıkla bilimsel bilgiyi çalışmalarına dahil ettikleri, bilgi üreticilerle birlikte çalıştıkları ve bilim-politika arayüzleri oluşturdukları tespit edilmiştir. Ancak, bilim-politika arayüzlerine bakış açıları benzerlik gösterse de, İZKA ve İSTKA'nın iklim değişikliği tehdidine yaklaşımları birbirinden oldukça farklıdır. İZKA iklim değişikliğini çalışmalarının merkezine yerleştirmiş ve 'Yeşil Büyüme' ve 'Mavi Büyüme' birimlerini oluşturarak organizasyon yapısını iklim değişikliğine yönelik olarak dönüştürmüştür. Buna karşılık İSTKA, en azından yakın geçmiş ve şu an için, iklim değişikliğine odaklı faaliyetler yürütmemekte ve iklim değişikliğini diğer projelerine yalnızca ortak yarar olarak dahil etmektedir. İSTKA'nın bu yaklaşımı, ajansın iklim değişikliğine ilişkin etkin ve dönüştürücü faaliyetlerde bulunma imkanını ortadan kaldırmaktadır. Ancak, iki ajans arasındaki temel farklılığın bilim-politika arayüzleri anlayışlarından değil, iklim değişikliğine dair perspektiflerinden kaynaklandığı bir kez daha vurgulanmalıdır.

Çalışmanın bir diğer önemli bulgusu, bilim-politika arayüzlerinin kurulmasını ya da etkin faaliyet göstermesini engelleyen bariyerlere ilişkindir. Hem ilgili literatürde hem de ajans uzmanlarıyla yapılan görüşmelerde bilgi üreticiler ve politika yapımcılar arasındaki bariyerlerden sıklıkla bahsedilmiştir. Bu bariyerler, kimi zaman küresel veya teorik problemlerden kaynaklanmaktadır. Örneğin, bilgi üreticiler ve politika yapımcılar arasındaki zihniyet ve yöntem farklılıkları, zaman kısıtlamaları, finansal yönetim sorunları, bilim okur yazarlığının düşük olması ve bilimsel belirsizliklerin anlaşılabilmesi bu tarz bariyerlerdendir. Kimi bariyerler ise bölgeye özgü şartlardan meydana gelmektedir. Bu çalışma kapsamında, en önemli bölgesel bariyer olarak ölçek problemi tespit edilmiştir. İSTKA, İstanbul gibi çok fazla sayıda farklı ve güçlü aktörün bulunduğu büyük ölçekli bir bölgede doğru aktörü tespit etmekte ya da aktörler arasında tercih yapmakta güçlük çekmektedir. Ayrıca, İSTKA'nın merkezi hükümet ve özel sektörün odak noktasında olan İstanbul için bağımsız faaliyetler yürütmesinin oldukça zor olduğu söylenebilir. Öte yandan, İZKA'nın faaliyet alanı olan İzmir, görece olarak daha optimum bir ölçeğe sahiptir. Türkiye'nin üçüncü büyük şehri olan İzmir, yeterli insan ve kaynak sermayesine sahip olmakla beraber, İstanbul gibi devasa bir metropol de değildir. Bu bölgesel şartlar İZKA'nın bölge içinde bilim-politika arayüzleri kurmasını kolaylaştırmakta ve faaliyetlerinde ajansa özgür bir alan tanımaktadır.

Bu çalışma beş bölümden oluşmaktadır. Birinci bölüm olan giriş bölümünde, çalışmanın konusu, teorik çerçevesi ve metodolojisi sunulmaktadır. Ayrıca, vaka çalışması olarak kalkınma ajanslarının, özel olarak da Türkiye'deki yirmi altı kalkınma ajansı arasından İZKA ve İSTKA'nın seçilmesinin gerekçesi bu bölümde yer almaktadır. Giriş bölümü çalışmanın katkılarını ve sınırlılıkları da içermektedir.

İkinci bölüm literatür araştırmasını kapsar. Literatür araştırması bulguları dört ana başlıkta sunulmaktadır. Öncelikle, iklim değişikliği bilimi ve iklim değişikliği politikası arasındaki etkileşim tarihsel perspektifle özetlenmektedir. Daha sonra, çalışmanın bilim-politika arayüzü kavramına yaklaşımı açıklanmaktadır. Üçüncü olarak, bilim-politika arayüzlerinin nasıl kurulabileceğine dair literatürde tartışılan yaklaşımlar paylaşılmaktadır. Son olarak ise, bilim-politika arayüzlerinin kurulmasını engelleyen veya yavaşlatan bariyerler ve bu bariyerleri aşmaya yönelik olası çözüm önerileri sunulmuştur.

Üçüncü bölüm kalkınma ajanslarının incelendiği bölümdür. Bu bölümde ilk olarak, Türkiye’deki bölgesel kalkınma ajanslarının kuruluşları, organizasyon yapıları, görev ve sorumlulukları ve destekleri anlatılmıştır. Daha sonra, sırasıyla İZKA ve İSTKA inceleme bulguları aktarılmıştır. Her iki ajansın incelemesi de iki başlıktan meydana gelmektedir. Öncelikle ajansların dokümanları incelenerek bilim-politika arayüzlerine bakış açıları ve bu kapsamdaki faaliyetleri ortaya konulmuştur. İkinci olarak, bu arayüzlere dair detaylı arka plan bilgileri almak için ajans uzmanlarıyla yapılan yarı yapılandırılmış görüşmelerin sonuçları paylaşılmıştır.

Dördüncü bölüm tartışma bölümüdür. Bu bölümde, İZKA ve İSTKA incelemesinden elde edilen bulguların çalışma kapsamında kazandığı anlam ve literatür ile ilişkisi tartışılmıştır. Başka bir ifadeyle, dördüncü bölüm, ikinci bölümün bulguları ile üçüncü bölümün bulgularını birlikte değerlendirmektedir. Ayrıca, bu bölümde, vaka çalışmasına özgü bazı sonuçlar da ele alınmaktadır.

Beşinci bölüm ise sonuç bölümüdür. Bu bölümde çalışmanın genel değerlendirmesi yapılmakta ve öne çıkan noktalar vurgulanmaktadır. Son olarak ise, gelecek çalışmalar için bazı tavsiyelerde bulunmaktadır.



## **1. INTRODUCTION**

### **1.1 Statement of the Problem**

Human-induced climate change is one of the greatest dangers of our time. People feel its consequences clearly in their daily lives. A recently published article reveals that, for instance, climate change was the main reason for the heatwaves in 2018 (Vogel, Zscheischler, Wartenburger, Dee, & Seneviratne, 2019, p. 3). The summer 2019 heatwave in Europe was also associated with climate change (Gramling, 2019; Henley, 2019a, 2019b). Another example is from Cape Town, South Africa. In 2018, daily water consumption per person was limited to fifty liters for eight months to prevent the Zero Day, the day when no one can access the water (City of Cape Town, 2018; Pitt, 2018). More alarmingly, according to the Intergovernmental Panel on Climate Change's (IPCC) (2018) report, if global warming continues its current level of rising, we will face more dangerous scenarios in all natural and human life systems including public health, agriculture, clean water resources, biodiversity, and economic and political programs. A very recent report of The International Federation of Red Cross and Red Crescent Societies (2019), *The Cost of Doing Nothing*, estimates that climate change-related problems might increase the number of people in need of humanitarian aid from one hundred eight million to two hundred million by 2050.

Ninety to one hundred percent of climate scientists agree that, according to an extensive meta-study conducted by Cook and his colleagues (Cook et al., 2016), climate change is occurring due to human activities. In addition to identifying these activities, various organizations, and researchers from all around the world work on finding solutions to mitigate the impacts of climate change, provide adaptation, or develop resilience. Moreover, international organizations like IPCC, with their scientific reports, publish companion summary reports which contain recommendations and strategies for decisionmakers to take action. The main reason for preparing these political advice reports is the fact that a complex phenomenon such as climate change cannot be appropriately analyzed without scientific knowledge.

Nevertheless, these recommendations do not seem to cause enough change in politicians' decisions and practices. In response to these climate change-related problems and inadequate political decisions and practices, people from all over the world demand from the policymakers to take concrete steps at local, regional, national, and global levels. Recent youth movements, especially the movement of 'school strike for the climate', are some examples of international awareness and demand on this issue. The climate change movements insist that politicians should listen to scientists and that scientific knowledge on climate change should be taken into account in the policymaking process<sup>1</sup>.

Thus, human-induced climate change is a severe danger, and if action is not taken urgently, it will have enormous consequences in the future. Moreover, there is enough knowledge and advice to raise awareness about climate change and to take action. Indeed, scientists and the public want policymakers to produce policies based on scientific knowledge and recommendations. What has been done so far, however, has not been sufficient to mitigate the effects of climate change or to adapt to its inevitable consequences. Scientific knowledge is either not taking place effective enough or not at all in the policy implementation phase. In other words, despite the demand of scientists and the public, scientific knowledge on climate change does not turn into political action to respond to the current changes in climate patterns. In order to understand the process of the transition (or not-transition) of scientific knowledge to politics, the study focuses on the interfaces between knowledge producers and policymakers, namely the science-policy interfaces, in the climate change policymaking and implementing. The science-policy interface is a term used to describe the social processes that involve the relationships of stakeholders in the policymaking process and regulate the process of knowledge transfer between these stakeholders (Van den Hove, 2007). The main reason for focusing on science-policy interfaces is the fact that, as stated above, effective climate change policies would not be possible without climate change science.

The starting point of the study is based on the idea that producing effective policy and action on a subject requires relevant and usable knowledge. In the context of the study, this idea can be revised as follows: 'producing effective climate change policies

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<sup>1</sup> One of the most famous mottos of young movements is "Unite behind the science."



requires relevant and usable scientific knowledge on climate change'. From this point of view, the study claims that the best way to enable the relationship between scientific knowledge on climate change and climate change policies is science-policy interfaces. Thus, it can be deduced that science-policy interfaces are essential to produce effective climate change policies. Actually, in the process of climate change policymaking, there is always an interface and interaction between these actors. This interaction, nevertheless, seems inadequate at the policy implementation stage, and it does not produce the expected and necessary results. For this reason, the study argues that science-policy interfaces must be based on co-production. In such an interface, knowledge producers and policymakers should come and work together to 'co-produce' knowledge, policy, and action. To put it more precisely, the study defines an ideal science-policy interface as an interface in which climate change knowledge producers and climate change policymakers can interact, collaborate, and cooperate. This science-policy interface model will be referred to as the 'co-production based science-policy interface'. Consequently, the main thesis of the study is that in order to turn scientific knowledge on climate change into effective climate change policies and action, co-production based science-policy interfaces are indispensable.

There are two main reasons why a co-production based science-policy interface is necessary. First and foremost, in the context of climate change, as commonly underlined in the related literature, both policymakers and knowledge producers need each other (Dilling & Lemos, 2011; Hering, 2016; Iyalomhe, Jensen, Critto, & Marcomini, 2013; Kowalczywska & Behagel, 2019; Lemos, Kirchhoff, & Ramprasad, 2012; Lemos & Morehouse, 2005; Lemos & Rood, 2010; Tang & Dessai, 2012; van Kerkhoff & Lebel, 2015; Wan et al., 2020). Even if we assume they want to take action, climate change is too complicated for policymakers to cope alone. The development of effective policies on climate change is not possible without scientific data. Likewise, the findings of knowledge producers cannot be fully effective unless they turn into policies. Although it is indispensable, climate change scientific knowledge is not the only but one of the inputs in the policymaking process. Policymakers, ideally, evaluate scientific knowledge with many different parameters, such as economic situation, political agreements, ethics, values, and public opinion. Accordingly, by evaluating scientific knowledge with social factors and by arguing that more scientific research on an issue does not directly mean better policies (Jensen-Ryan & German, 2019, p.

1; Kropp & Wagner, 2010, p. 813; Sutherland, Spiegelhalter, & Burgman, 2013), this approach opposes the model of linear policymaking, which is based on the assumption that “the more knowledge we have, the better the political response will be” (Godin, 2006; Grundmann & Stehr, 2010, p. 903). In short, the co-production model implies that the mutual need of knowledge producers and policymakers requires cooperation between these two groups.

Secondly, the global scale knowledge produced by international organizations, such as IPCC, naturally, is likely to become invalid at the local scale where the real problems are faced. Global organizations develop general solutions and recommendations for climate change-related problems, such as emission reduction, pollution prevention, and the transition to alternative energy sources. At the local level, however, it is a separate question of how these recommendations can be transformed into policies within the specific conditions of the region. In this context, a science-policy interface is needed to ensure the transition from the international scale data to local actions considering the distinctive features of the region.

To sum up, the study claims that, on the one hand, we cannot tackle climate change-related problems by just making policies, which are not knowledge-based. On the other hand, we cannot make and implement effective policies by just producing more knowledge, which is not policy-related. Thus, robust science-policy interfaces are required to co-produce adequate knowledge and policies which are specific to the region.

## **1.2 Purpose and Research Questions**

It is the purpose of this study to examine ‘science-policy interfaces’ in which climate change knowledge producers and climate change policymakers interact and collaborate in the climate change policymaking process. The ‘science-policy interface’ is a commonly used concept, but, in this study, the term ‘knowledge producer’ is preferred instead of ‘scientist’. The reason is that, although it is not the precise meaning, the term ‘scientist’ generally reminds scholars, professors, academicians, or researchers who work at universities. In this study, nonetheless, the term ‘knowledge producer’ is used to point out not only university researchers but also independent institutes, private sector, non-governmental organizations (NGOs), think tanks, in short, everyone who produces knowledge on climate change. It is because in such a

period when scientific activities are carried out in many different places, universities cannot be considered as the only actors of knowledge production anymore (Jacobson, Butterill, & Goering, 2004). Respectively, the term ‘scientific knowledge’ refers to all kinds of scientific outcomes and findings on climate change – climate change measurements, climate models, future projections, risk assessments, etc.

As mentioned before, the main reason for examining the science-policy interfaces is the fact that both climate change knowledge producers and climate change policymakers need each other in order to turn the scientific knowledge into effective policies. In order to analyze these interfaces, the exploration is divided into two main parts. In the first part, through a comprehensive literature review, theoretical contributions on science-policy interfaces are examined to understand under which situations and conditions the interfaces become more effective and productive. The second part is designed as a case study to discover the practical dimensions of science-policy interfaces in two development agencies in Turkey, Izmir Development Agency (IZKA) and Istanbul Development Agency (ISTKA), which are the institutions that establish science-policy interfaces in their policies, projects, and activities. The case study aims to get information from the primary sources by interviewing agency experts who have taken active roles in establishing and maintaining science-policy interfaces. The reasons for conducting interviews only with agency experts will be explained in more detail in the last three paragraphs of the ‘Methodology’ section, but it would be appropriate to give a short summary at this point. Knowledge producers take part in a small number of science-policy interfaces compared to agency experts, and, in these interfaces, they contribute only to the parts related to their expertise. On the contrary, agency experts are involved in the whole process from the designing to completion of the interfaces. Moreover, examining and revealing the perspectives of all the actors in the science-policy interfaces, especially based on the data obtained in the interviews, is very unlikely as there are a large number of projects that involve very different actors. A different study might choose a single project and investigate it in detail in order to engage with all actors, yet this approach does not fit into the scope of this study. Thus, by interviewing the experts, the study aims to get more comprehensive information about the greater number of science-policy interfaces and limits its focus with practitioners to understand their part in establishing the interfaces.

Regarding the purpose of the study, there are two main research questions:

- 1) How is the science-policy interface between climate change knowledge producers and climate change policymakers established and sustained?
- 2) How is scientific knowledge on climate change transferred and how is it received and interpreted by policymakers, especially at the local level where the real-life implementation takes place?

Related to these leading questions, this study asks some additional questions:

- What are the basics of the relationship between knowledge producers and policymakers?
- What are the barriers that make establishing science-policy interfaces difficult?
- How can science-policy interfaces be improved?

### **1.3 Methodology**

This study started with the detection of a problem. The problem was the need for effective science-policy interfaces in which knowledge producers working on climate change and policymakers developing climate change policies can work together since climate change policies would be ineffective without the findings and contributions of climate change science. That is, the study did not begin from, as Carnap argues (1966), “direct observations of single facts” (p. 6). It did begin from the problems, or in Popper’s (1999) words, “from the fact that something inspires amazement in us” (p. 3). This methodological approach does not ignore the importance of observations, experiments, and other empirical data collection methods. On the contrary, it encourages testing the theories with empirical data and eliminating false theories. The difference between Carnap’s empiricist and Popper’s idealist/rationalist perspectives is related to the beginning of scientific research, and the methodology of this study, as already revealed, is closer to Popper’s approach.

After the detection of the problem, the qualitative case study method was adopted. Nevertheless, firstly, a literature review on science-policy interfaces was conducted to be able to address the case study systematically within a particular theoretical framework. Thus, the literature on science-policy interfaces, especially Science, Technology, and Society (STS) studies, which focus on the dynamic relationship

between the world of science and the world of politics, was researched. For the literature review, academic articles and books, which are secondary sources, were examined. During the research collection phase, the studies carried out in recent years were prioritized, but no definite time interval was determined. In this way, the theoretical contributions made at any time were taken into consideration. In addition, by collecting studies from different parts of the world, social, economic, and political influences on the relation of science and policy were considered.

Now, the case study method can be explained. Qualitative case studies are studies that researcher deeply investigates a case, such as special situations, processes, events, or people, by collecting detailed data on the subject (Creswell, 2013, p. 14). For this reason, the study focuses on two organizations, namely IZKA and ISTKA, to examine the practical components of the science-policy interfaces. Since the study tries to understand how science-policy interfaces are maintained at the practical level, the case study approach is inevitable. Furthermore, John Law (2017) contends that STS studies generally adopt case studies and “these evoke, illustrate, disrupt, instruct, and help STS to craft and recraft its theory”. Sheila Jasanoff also states that empirical research was necessary when she worked on the activities of science advisory committees in the regulatory process of the United States of America (USA) (1994, p. vi).

For the evaluation of development agencies, both primary and secondary sources were used. The official documents and reports of development agencies were examined as primary sources, while academic studies and news on development agencies were analyzed as secondary sources. However, it was also necessary to reach detail and background information about the agencies’ perspectives on science-policy interfaces. Thus, in-depth semi-structured interviews were conducted with the agency experts who worked in science-policy interfaces. In qualitative research methods, semi-structured interviews are the primary method of collecting data to directly obtain the participants’ experiences and perspectives by provides them an opportunity to express the issue in their own ways and words (Matthews & Ross, 2010, p. 221). In in-depth semi-structured interviews, the researcher, in addition to the predetermined questions, may want participants to provide detailed explanations to discuss the topic ‘in-depth’ (Lune & Berg, 2017, p. 69; Wengraf, 2001).

Before giving details about the case study, it is necessary to enlighten another methodological point of the study. The point is that literature findings and theoretical

contributions have continuously reconstructed this study. According to Maxwell, the design of qualitative research cannot remain unchanged as the work progresses, so some innovations need to be made regularly (Maxwell, 2013, p. 19). Maxwell formulates the endless transformation of a study as “the construction and reconstruction of the design” (Maxwell, 2013, p. 19). Indeed, this study adopted Maxwell’s interactive approach and reshaped the scope and content throughout the process. After explaining this methodological perspective, the continuation of this section will reveal the details of the case study. It will discuss first why development agencies were determined as case studies, secondly why IZKA and ISTKA were chosen among twenty-six development agencies, and finally why interviews were held only with policymakers.

There are three reasons that the case study is carried out at development agencies. First of all, since local is the area where real-life problems are encountered, and each region has its unique conditions that cannot be solved by external advice, the local and regional activities on climate change is crucial (Baker, Peterson, Brown, & McAlpine, 2012; Bulkeley, 2013; Fuhr, Hickmann, & Kern, 2018; Funfgeld, 2015). It means that as international organizations and knowledge producers are not capable of producing knowledge and policy suggestions at the local level, the local administrations have to develop their own policies based on scientific knowledge. For this reason, local and regional governments have a significant role in making the transitions between scales, namely, from the international-national level to the local level. Additionally, local and regional governments can act independently from central governments to some extent. Central governments, for example, determine the country’s general energy policies, transportation methods, and climate change strategies. Therefore, they experience difficulties in changing climate change policies due to international agreements, economic reasons, or path-dependency. On the contrary, local and regional governments can develop regional policies and projects apart from these general and national policies.

Secondly, although the local action is crucial in climate change, development agencies have some unique advantages among other local authorities. Local studies are usually associated with the municipalities, especially in Turkey, and the number of studies on development agencies, particularly in the context of climate change, is limited (see, e.g., Erbil & Erbil, 2019). Regional development agencies are, nonetheless, in a critical

place in terms of authority and position since they act as a bridge between international/national and local scales. They, on the one hand, work under the central government, the Ministry of Industry and Technology, on the other hand, their main aim is to contribute to the rural and local development in their region. As a result of this, they are precisely located between the central government decisions and local action. Also, since the mayors are elected and not appointed, and since they may have political conflicts with the central government, municipalities may experience some problems communicating with the central government or receiving political and financial support. Moreover, as the different mayors may have different perspectives on climate change, there might be changes in organizational structure and municipal staff related to climate change after every election. The authority and budget problems and the changes resulting from the elections held every five years might affect the long-term policy development activities negatively. Even though they are not completely independent from national political decisions and changes as they work under the Ministry of Industry and Technology, local political changes do not have a major impact on development agencies. As a matter of fact, as will be explained in the next paragraph, the purpose and organizational structure of development agencies are designed to focus on long-term and theoretical studies.

Finally, there is a difference between the working perspectives and priorities of development agencies and municipalities or other local authorities. Municipalities are responsible for the day-to-day contact with people, such as garbage collection, landscaping, maintenance of parks and green areas, etc. Plans and projects on climate change are often considered in the context of the general ‘environment management’. On the other hand, development agencies have the opportunity and power to carry out studies on a theoretical level, independent of these daily responsibilities. That is, municipalities have to spend most of their energy to manage daily life, while development agencies focus on long-term and holistic issues within the development goals. Thus, development agencies can provide more collaborative and broadly integrated solutions instead of relatively short-term projects. Indeed, these agencies work to identify and analyze the region’s needs, make use of international and national data, and aim to produce long-term policy and action specific to the region’s conditions. In this sense, they also cooperate with universities or other knowledge producer organizations. Their theoretical, holistic, and long term working principles

make them suitable for studying the science-policy interfaces within the scope of these institutions. Furthermore, as will be explained in detail in Chapter 3, mayors and governors of the region are members of the executive board of development agencies. Some agencies also have an advisory body called the development council that involves representatives from important organizations in the region, such as public institutions, NGOs, and universities. In other words, development agencies are upper-scale institutions that engage with many actors in the region and provide cooperation among them in order to carry out long-term and guiding studies for the needs of the region.

There are two main reasons for the selection of IZKA and ISTKA among twenty-six development agencies in Turkey. First, IZKA and ISTKA are two leading development agencies in terms of financial and human resources. Moreover, unlike the majority of development agencies, the region in which they are responsible is only one city. Although their geography and sociological conditions are not the same, these two institutions, with similar sources, endeavor to achieve the same goal, which is contributing to regional development using local potential. However, the perspective of these two institutions on climate change is entirely different from each other. While IZKA places more emphasis on climate change in its activities, the issue is not of primary importance for ISTKA. Additionally, since the activities of IZKA regarding climate change seem more active and transformative compared to passive activities of ISTKA, science-policy interfaces in these two agencies, which have different points of view on climate change, will be examined.

Secondly, the cities of Istanbul and Izmir are two of the largest economies of Turkey. According to 2014-based data, Istanbul has the highest gross domestic product (30.5%), and Izmir has the third-highest gross domestic product (6.2%) (TSI, 2016). Nonetheless, both Istanbul and Izmir are very vulnerable coastal cities. According to a climate risk assessment conducted in 2016, Istanbul's annual economic loss due to climate change is predicted to reach 201 million dollars by 2030 and to 1400 million dollars by 2050 while Izmir's annual loss is estimated at 132 million dollars by 2030, and 915 million dollars by 2050 (Abadie, Sainz de Murieta, & Galarraga, 2016). Thus, within the framework of the projection of 2050, Istanbul is expected to have the highest annual economic loss among the nineteen European coastal cities investigated in the study, while Izmir is expected to be the third one (Abadie et al., 2016). In the face of



this situation, contributing to the climate change studies carried out for these regions is one of the main motivations of this study.

There are also three reasons to conduct interviews only with experts from development agencies. The study focuses on the science-policy interfaces in the policymaking and implementation. Development agencies are organizations that decide whether to establish or not to establish science-policy interfaces in these processes. Also, the characteristics of the interfaces (such as interaction and partnership-based or unilateral knowledge demand-based) depend on development agencies. Accordingly, since they manage the establishment of science-policy interfaces from the very beginning, detailed information about these interfaces can be obtained from the agency experts.

Moreover, there are a large number of projects in which science-policy interfaces can be explored, and a large number of actors in these projects. Examining all these actors and getting their opinions require a very comprehensive study. Maybe another research can select only one project or practice and engage with all the actors of this activity, but this study does not cover such an aim. Thus, by doing interviews with experts from development agencies who take an active role in a considerable amount of science-policy interfaces, this study is intended to reach more experience and knowledge. Besides, the experience of development agencies is not only limited to relationships with knowledge producers. For many different projects, they bring together representatives from various organizations, such as public institutions, private sector, universities, NGOs, and form an interaction among them.

Finally, although development agencies are institutions that work under the Ministry of Industry and Technology to develop and carry out regional projects and policies, in fact, they also act as knowledge producers in many projects. As will be seen in Chapter 3, the agencies produce their own knowledge and share it with other organizations and individuals, and many development agency officials continue their academic studies. For this reason, it will be possible to explore the roles of both parts of science-policy interfaces (knowledge producers and policymakers) through interviews with agency experts.

## 1.4 Theoretical Framework

The study mainly draws from STS literature, which basically focuses on how scientific knowledge and technological outcomes are produced and how these outcomes relate to society. As STS studies question the boundaries between science and politics, it provides a suitable framework for an investigation on science-policy interfaces. In particular, this study is inspired by prominent STS scholar Sheila Jasanoff's 'the co-production model'. Jasanoff states that the term 'co-production' was introduced to the STS literature by Bruno Latour in his hugely influential book 'We Have Never Been Modern' (Jasanoff, 2004, p. 22). Since then, STS scholars (and other disciplines) have been using this concept in different meanings. In order to eliminate the conceptual confusion and express the meaning of the co-production for this study, let us explore the term 'co-production'.

In their recent article that addresses various definitions of co-production, Wybron et al. (2019) reveal that the term 'co-production' in STS studies means that, as Jasanoff and Wynne (1998) argue, "scientific knowledge and political order are co-produced at multiple stages in their joint evolution" (pp. 6-7), and, in the sustainability sciences, "the act of producing information or technology through the collaboration of scientists and engineers and nonscientists, who incorporate values and criteria from both communities" (Cash, Borck, & Patt, 2006, p. 467). Similarly, Jasanoff also underlines two different meanings of the co-production. The first one is "the commonsensical one", which is gathering different groups to be inclusive, and the second is "more STS one", which is "co-production of science and social order" (Jasanoff, 2014). As Lövbrand (2007) states, Jasanoff generally uses the term 'co-production' in the latter meaning, which is "the simultaneous making of the natural and social worlds" (p. 41). Thus, Jasanoff, as an STS scholar, refers to the epistemological dimension of the co-production in order to indicate that science and society constitute and shape each other<sup>2</sup>. In the context of sustainability science and public administration, on the other hand, 'co-production' points out partnership, interaction, and cooperation between different actors. In this sense, while the co-production model in the STS seems to be

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<sup>2</sup> By arguing science and politics produce each other, STS approach opposes both technoscientific determinism and social determinism (Jasanoff, 2004, p. 20).

only an epistemological approach, the sustainability science literature (or the commonsensical co-production model) implies a more practical collaboration.

However, as Miller and Wybron (2018) argue, the concept of co-production actually has a common theoretical framework for both disciplines. The ‘production’ part of the ‘co-production’ indicates that the world is constructed, not given (Miller & Wyborn, 2018, p. 3). The ‘co’ part is more controversial, but in fact, it points out both ‘multiple producers’ and ‘multiple products’ (Miller & Wyborn, 2018, p. 3), that is, the joint production of the social and scientific world. Also, there is not a single producer, which refers to the contribution of all relevant groups. Consequently, at the intersection of different disciplines, the term co-production means that multiple actors create multiple products in an ongoing relationship with each other. Therefore, the co-production understanding of different disciplines is not independent, but instead, they reinforce each other. Indeed, STS studies support the democratization of science and politics, which means the participation and contribution of different actors in knowledge and policy production. In this way, the concept of co-production creates a theoretical foundation for the interaction and collaboration of these different actors. Jasanoff also draws attention to the importance of inclusion activities. For instance, as cited by Meadow (2015, p. 181), Jasanoff and Wynne contend that, especially for climate change, more credible scientific explanations may develop “through inclusion rather than exclusion, through participation rather than mystification, and through transparency rather than black boxing” (1998, p. 77). All in all, as stated very succinctly by Wyborn (2015), the concept of co-production, as a normative goal and analytical perspective, forms a basis for adaptive governance. Based on this perspective, this study uses the co-production model to support the collaboration of different groups, in particular, knowledge producers and policymakers, in order to ‘co-produce’ knowledge, policy, and action on climate change. As Wall et al. (2017) state, this collaborative knowledge and policy producing concept can also be called “stakeholder-driven science, user driven science, actionable science, knowledge exchange, or transdisciplinary research” (p. 95). The science-policy interface understanding of the study is, as already mentioned, inspired by this co-production model.

The co-production model has at least two advantages. First of all, in this model, all stakeholders can share their knowledge, experiences, interests, problems, motivations,

weaknesses, strengths, and worldviews. Thus, the sharp distinction between the knowledge producer and the knowledge receiver is eliminated. The policymakers can be considered as knowledge producers since they also share their knowledge and experiences. That is, the production of climate change action becomes much more inclusive. However, as stated above, it does not mean that scientific knowledge would lose its importance and value due to other inputs in the policymaking process. Scientific knowledge should remain indispensable. Nevertheless, other inputs, such as ethics, public opinion, and economic situation, should also be taken into consideration.

The second advantage is also related to the first one. One of the main problems of turning science into policies is the difference between ‘useful knowledge’ and ‘usable knowledge’ (Tang & Dessai, 2012). Even when scientists consider their findings very useful, this knowledge may not have any chance to become usable in the policymaking process. For instance, Stehr and Grundmann, who define the practical knowledge as the knowledge that is actionable, claim that IPCC, arguably the most important science-policy interface organization for climate change, “has produced knowledge for practice but not practical knowledge” (2012, p. 38). In contrast, the co-production model can be seen as an efficient way to produce more acceptable, applicable, practical and usable knowledge since scientists, policymakers (and ideally the public) work together and understand the process from start to finish (Lövbrand, 2007, p. 41; Wall et al., 2017, p. 95).

In order to better understand Jasanoff’s understanding of co-production, it is necessary to share her two theoretical approaches to the relationship between science and politics. The first is her critique of technocracy and democracy, while the second is her effort to determine the intellectual boundary between knowledge producers and policymakers. To begin with, in her book on regulatory agencies of the USA, Jasanoff (1994) criticizes both the technocratic approach, the view that sees scientists and technical knowledge as the absolute authority, and the democratic approach, which puts the opinion of the majority against scientific knowledge (p. vii). According to Jasanoff, these two approaches are not sufficient, and a broader perspective is needed to have a better relationship between science and politics. Jasanoff’s critique of technocracy tells us that it is not possible to develop correct policies only by producing scientific knowledge (Jensen-Ryan & German, 2019, p. 1; Kropp & Wagner, 2010, p. 813; Sutherland et al., 2013). In other words, scientific knowledge alone is not enough

for effective policies; there are other parameters to be considered. Indeed, policymaking is a complex and holistic process. Many other factors, such as public opinion, economic situation, political constraints, ethics, values, habits, tradition, affect the policymaking process. It is unrealistic to ignore all these elements and believe that producing more knowledge will change the world on its own. What needs to be done is to be able to correctly incorporate scientific knowledge into the policymaking process and use it in accordance with other factors. From this point forth, Hering criticizes the famous motto of academicians “more research is needed” by claiming that we need correct and valid transfer and use of knowledge in the policymaking process rather than we need more research (Hering, 2016, p. 363). This approach requires collaboration between knowledge producers and policymakers instead of accepting scientific knowledge or scientific view as absolute authority.

Jasanoff’s critique of democracy should be examined more carefully. Since STS literature is highly interested in democratizing science, public understanding of science and public participation, her criticism of democracy would seem contradictory. She, however, uses the term in a different meaning. Jasanoff is not against democracy or democratized science, as can be understood from her support for participation and contribution of different actors in the world of policy and science. She, actually, criticizes the populism and anti-intellectual movements. The critique of technocracy has revealed that scientific knowledge should not be accepted as absolute authority. In contrast, the critique of democracy asserts that putting anti-intellectual and populist views against scientific knowledge is a more significant mistake. Even though scientific knowledge alone is not enough to produce effective policies, it still cannot be ignored. Therefore, Jasanoff’s critique of democracy should be understood as the criticism of ‘overlooking scientific knowledge for achieving political goals’. In summary, Jasanoff opposes technocracy by criticizing approaches that ignore the role of policymakers and opposes democracy (or, in this context, populism) by criticizing approaches that exclude the importance of scientific knowledge and knowledge producers. As Orhan (2018b) stated, both technical and political processes are required, and the reduction of one of them to another, that is, the absolute dominance of technical or political power, would destroy the other process (pp. 96-97). Based on

these criticisms, this study, as mentioned before, adopts the co-production model in which the policymakers and knowledge producers collaborate<sup>3</sup>.

Moreover, Jasanoff also discusses the boundaries between knowledge producers and policymakers. She criticizes the neutral and value-independent understanding of science by arguing that the boundaries between science and politics, facts and value, knowledge and power are not strict, but rather that these concepts shape each other in a continuous relationship (Jasanoff, 2004; Lövbrand, 2007). Even though, nonetheless, ‘the world of science’ and ‘the world of politics’ effect and transform each other, it is possible to make a distinction between ‘the knowledge producers’ and ‘the policymakers’. This distinction does not have any epistemic or ontological meaning. It directly refers to the people (practitioners) of these two worlds. According to Jasanoff, knowledge producers do not want to be at the center of the policymaking process since they may feel under the influence and pressure of policymakers. Nevertheless, at the same time, it is not appropriate for them to be entirely outside of the policymaking. In her words, “policy-relevant scientists want to be close to policy, but not too close” (Jasanoff, 1994). Therefore, Jasanoff argues that knowledge producers can still be a part of the world of politics, but also they can keep themselves independent. Another STS scholar Thomas Gieryn elaborates Jasanoff’s ideas on this issue as follows: “far enough to be objective and authoritative, close enough to be useful” (1995, p. 439).

As Sundqvist et al. (2017, p. 4) underline, the distance between knowledge producers and politicians emphasized by Jasanoff does not refer to spatial or physical distance, but the intellectual distance. It is not important whether a science-policy interface belongs to a political institution or it is in an external scientific consultancy unless their intellectual works are affected. Jasanoff reminds us that the importance of intellectual distance between the knowledge producers and policymakers in this collaboration should not be overlooked. The knowledge producers should be close enough to the politicians to make their voices heard, but at the same time, they should be far enough to continue their objective and independent studies. Sundqvist et al. (2017)

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<sup>3</sup> Wan et al. (2020), in their very recent article, define the model that politics dictates science as ‘the decisionist model’, and the model that science dictates politics as ‘the technocratic model’. The model that scientists and policymakers jointly create decision, which this study also advocates, is called ‘the co-evolutionary’ model. Even if the terms differ, the theses of two studies are almost same.

conceptualize this intellectual distance as ‘One World’ and ‘Two Worlds’. ‘One world’ refers to a close relationship while ‘two worlds’ emphasizes being distant. According to the authors, both one world and two worlds have desirable and undesirable versions, so there is no determined perfect model.

Before finishing the explanation of the theoretical framework, it is necessary to make one more point clear. One can ask whether the co-production model of the study overlooks the role of public and public participation by focusing on the relationship between knowledge producers and policymakers. On the contrary, this study accepts that, as Cash et al. (2003) argue, meeting the needs of people and protecting nature at the same time can only be possible with the cooperation of knowledge producers, policymakers, and the public from the local level to the international level. Indeed, as stated above, science is undoubtedly not the only factor in the policymaking process as this process is holistic and requires the inclusion of social factors as well as scientific knowledge. Therefore, the fact that this study addresses the interaction of the world of science and the world of politics in order to explore ways for scientific knowledge on climate change to be part of the policymaking process is related to the scope of the study. It does not mean that the study ignores or underestimates the importance and necessity of other factors. The study takes this interaction and the actors as a mechanism and focuses on understanding the interaction between knowledge producers and policymakers through the policymakers' lenses and experiences.

Besides the indicated main point, Turkey's hierarchical government approach puts more emphasis on the central authority rather than public participation, especially for the environmental policymaking process (Orhan, 2014, p. 281). The possible participation of activists or NGOs is only to the extent permitted by decisionmakers; that is, public participation is not totally excluded, but is weak. In other words, as Orhan (2014) explains, “participation is mainly on paper, and state barely listens to them” (p. 286). Finally, the development agencies that this study focuses on operate in Istanbul and Izmir regions. These regions have a very high population and population density. In fact, one-quarter of Turkey’s population live in Istanbul and Izmir regions. Since public opinion cannot be homogeneous in such regions, studying all points of view in public is very challenging and goes beyond the scope of the study. However, of course, without evaluating all the opinions, it is possible to design another research that focuses on a single project to explore different participants' roles and to what

extent they participate. Yet, such research is outside the framework of this study. For all these reasons, this study's co-production context is limited to the mechanism established between scientific knowledge producers and policymakers.

### **1.5 Significance and Limitations**

The contributions and significance of this study can be explained in four main headings. First of all, the number of academic studies that can be considered regarding science-policy interfaces on climate change policy and action production in Turkey is limited (see, e.g., Demirci, 2014; Krellenberg & Turhan, 2017; Orhan, 2018a, 2018b; Şahin, 2014). There are some studies on ‘the entrepreneurial university model’ that encourages universities to share their knowledge with the public, private sector and society (see, e.g., Caty, Bilgin, Kesici, & Kethuda, 2016; Çiftçi, 2010; Ökmen, 2013; Özdemir, Boyacı, Kılınç, & Koşar, 2019; Sakınç & Bursalıoğlu, 2012; Yıldırım, 2014), on the cooperation between knowledge producers (mainly universities) and the private sector/industry (Alkan, 2014; Cihan, 1994; Erdil, Pamukçu, Akçomak, & Erden, 2013; Ermeç Sertoğlu, Alkıbay, Orhaner, & Korkmaz, 2012; Kiper, 2004, 2010; Yardımcı & Bilgehan Müftüoğlu, 2015), and more broadly, on the public-university-industry interaction (Arslan, 2017; Kılıç & Ayvaz, 2011; Koç & Mente, 2007; Kuş, 2017; Yalçintas, 2014). Furthermore, some studies examine the collaborations between different actors on the regional scale (Sungur, 2015; Üçler, 2014) and even address them specifically concerning development agencies (Dağlar, 2018). In addition to academic studies, the Ministry of Industry and Technology prepares strategy and action plans for ‘Public-University-Industry Cooperation in Turkey’ as guiding documents on cooperation between different actors (Republic of Turkey Ministry of Industry and Technology, 2015, 2018). However, as mentioned above, the literature examining the activities of the science-policy interfaces on climate change policymaking and implementation in Turkey is missing. The study aims to fill this gap.

Second, this study explores the potential and capacity of development agencies, which are institutions operating at the regional level, to combat climate change. Combating climate change requires multi-level governance, and the regional activities of development agencies are crucial for this governance model since they participate at all scales (international-national-regional-local) and establish dialogue and



coordination between different levels, institutions and sectors (Dannevig & Aall, 2015; Goh, 2019, p. 4). Linking climate science to climate change policy is not a straightforward, spontaneous process; it requires a coordinated and deliberate contribution of different types of efforts and activities at different scales. In this regard, the regional scale is especially critical to transform the development approach to a more sustainable one. In particular, development agencies in Turkey are very suitable institutions to study science-policy interfaces in the context of climate change as they bear the duty and responsibility of being a bridge between local governments and the central government and improving the cooperation of different actors in the region, such as the public institutions, private sector, universities, and NGOs. Nevertheless, the number of studies on this issue is also minimal (see, e.g., Erbil & Erbil, 2019). Thus, the study intends to reveal the contribution of development agencies to the activities of science-policy interfaces in climate change policymaking processes.

Another significance is to realize a practical study by drawing from the theoretical perspective of STS studies. STS literature focuses on both theoretical issues, such as the relationship between science and politics, knowledge and power/authority, knowledge-producing and policymaking, and practical issues such as the relationship between knowledge producers and policymakers. With this broad perspective, it provides a profound background for studying science-policy interfaces. By applying the STS perspective to the climate change policymaking process, the study aims to demonstrate that the STS approach can be fruitful in analyzing the world better, detecting deficiencies, and recommending suitable social policies.

Finally, as already stated, the study claims that international, national, and regional climate change policies are insufficient, and the establishment of science-policy interfaces based on co-production is an essential step to be able to make better policies. In this regard, the study tries to identify the barriers that cause problems in the process of establishing these interfaces and to find possible solutions to overcome these barriers. In this sense, the outcomes of the study contain information about how the world of science and the world of politics can interact and collaborate more easily with each other. Consequently, even though this is an academic study and the main target group is researchers who conduct academic studies on the relationship between science and politics, especially STS scholars, policymakers and decisionmakers can also benefit from the findings of the study.

The main limitation is the fact that this is a case study. There is a difference between case studies and sample studies. Sample studies are the studies that only one sample which represents an entire group is selected, and studies on this sample are valid also for the other members of the group; on the contrary, in a case study, the selected case is unique and independent (Maxwell, 2013, pp. 82-83). For this reason, the science-policy interfaces in IZKA and ISTKA may not be similar in other institutions such as central government organizations or municipalities. In fact, IZKA and ISTKA may have different policies comparing to both each other and other development agencies. That is to say, the results obtained from the examination of the IZKA and ISTKA may be invalid for other organizations. Still, however, it is possible to give an overview of how these organizations establish and use the science-policy interface, and under what conditions it produces more effective results.

## **1.6 Structure of the Study**

The study is organized into five chapters. After the introduction chapter, which provides a general framework for the study, Chapter 2 includes the literature review. It begins by briefly summarizing the historical relationship between climate change science and climate change policy. Then, it presents the science-policy interfaces approach of the study and theoretical perspectives on how these interfaces can be established. Lastly, it describes the barriers that prevent the establishment of interfaces or negatively affect their operations and possible solutions to overcome these barriers. The purpose of the chapter is, by examining different opinions comparatively, to create a theoretical ground for the discussion of science-policy interfaces.

Chapter 3 serves as an examination of regional development agencies in Turkey. First, it states the establishment of development agencies, their organizational structure, their duties and responsibilities, and their supports in the region. After giving this background information about the agencies, it focuses on the cases of the study: IZKA and ISTKA. As separate sections, it shows document analyses of both agencies and interview results with agency officials. Thus, it reveals the science-policy interface perspectives and activities of both agencies, especially in the context of climate change.

Chapter 4 is the chapter of the discussion. By evaluating Chapter 2 and Chapter 3 together, it addresses what the results of Chapter 3 mean in the context of the study

and how they relate to the literature. Moreover, at the end of the chapter, it discusses some findings specific to the case study.

Chapter 5, as a concluding chapter, reviews the study and highlights three important points of the study in a concise and precise way. The points are co-production based science-policy interfaces, the findings of the analysis of development agencies, and barriers between knowledge producers and policymakers. In addition, it involves suggestions for future studies.



## **2. LITERATURE REVIEW**

The introduction chapter briefly explored what the science-policy interface is and the importance of the science-policy interfaces on climate change. Scientific knowledge is essential to produce effective policies, but it should be evaluated together with other factors in the climate change policymaking process through science-policy interfaces. Besides, science-policy interfaces have the potential and capacity to turn scientific knowledge produced at the international level into action at the local level.

As explained in the ‘Theoretical Framework’ section of the introduction chapter, the study draws from the STS perspective and literature. In particular, it approaches the science-policy interfaces in the context of the co-production model. In the co-production based science-policy interfaces, knowledge producers and policymakers co-produce knowledge and action together with an ongoing interaction and collaboration. This model idealizes an interface where all actors can share their knowledge, experiences, expectations, and problems. The knowledge and action produced to combat climate change in such an interface would be more relevant, usable, understandable, and thus effective.

The literature review chapter explores science-policy interfaces in more detail by engaging with academic studies. The chapter is divided into four main sections. The first section summarizes the relationship between climate change science and climate change policy to present a historical perspective and a theoretical basis for science-policy interfaces related to climate change. The second section deals with the definition of science-policy interfaces. By examining various approaches in the literature, it reveals the science-policy interface understanding of the study. The third section discusses how science-policy interfaces can be established. It contains information on how to design and maintain an effective science-policy interface. Finally, the fourth section focuses on barriers that prevent the establishment or effective operation of science-policy interfaces and some possible solutions to overcome these barriers. As it enriches the theoretical background of science-policy interfaces with the literature findings and insights, the Literature Review chapter can

also be seen as a guide for case studies. As a result of this, it will be easier and more effective to examine, analyze, and compare IZKA and ISTKA.

## **2.1 Brief History of Climate Change Science and Climate Change Policy**

It is expected and well accepted that policies that have the power to shape the whole society should be based on scientific knowledge. This expectation and requirement, as the related literature emphasizes, become even more critical for climate change policies since they would be utterly arbitrary without climate change science (see, e.g., Dilling & Lemos, 2011; Hering, 2016; Iyalomhe et al., 2013; Kowalczywska & Behagel, 2019; Lemos et al., 2012; Lemos & Morehouse, 2005; Lemos & Rood, 2010; Orhan, 2018a, 2018b; Tang & Dessai, 2012; van Kerkhoff & Lebel, 2015; Wan et al., 2020). Indeed, scientific research and reliable scientific knowledge about the complex climate system are indispensable to make effective policies, prepare people for future conditions, and give information about how to respond to these conditions. However, as stated before, producing knowledge is not sufficient unless it turns into politics by taking into account the social, political, and economic conditions as well. In other words, policymaking needs scientific knowledge, and scientific knowledge needs policymaking. Accordingly, it can be deduced that developing a knowledge-based policy on climate change obliges a relationship between knowledge producers and policymakers. This study focuses on this relationship through the concept of science-policy interfaces. Nevertheless, before making a theoretical and practical evaluation of these interfaces, it would be appropriate to explore the historical development process of the interaction between climate change science and climate change policy because these two have been shaping each other in the progress of time. On the one hand, as climate science has developed and its findings and predictions have become highly accurate, the world of politics has begun to add the issue to its agenda. On the other hand, as the world of politics has taken concrete steps on climate change, climate science has developed and started to produce more systematic, internationally cooperative and reliable knowledge. In this regard, this section focuses on the interrelation of scientific studies and political activities on climate change, especially after the 1980s. Thus, it will try to uncover the foundations of the cooperation between climate change science and climate change policy.

The 19th century introduced the first ideas and theories which are close to our contemporary climate change understanding. For instance, French physicist Joseph Fourier used the expression of the ‘greenhouse effect’ for the first time in the literature in an article dated 1827 (Fleming, 1999, p. 72). Then, at the end of the century, Swedish chemist Svante Arrhenius revealed the relationship between the increase in carbon dioxide concentration in the atmosphere and the increase in the temperature of Earth (Rodhe, Charlson, & Crawford, 1997, p. 2; Sample, 2005). In the 20th century, scientific and technological developments helped to make researches more systematic. In the 1930s, by using the data he collected from one hundred forty-seven different stations around the world, British engineer Guy Callendar revealed that the Earth temperature had risen, and this may be related to the increase in carbon dioxide concentrations (Applegate, 2013; Black, 2013; Fleming, 2013). Nevertheless, until the 1970s, the findings on global climate were not yet widely accepted by the scientific community, and ‘global warming’ or ‘climate change’ was not a part of the political agenda. In 1972, the first United Nations (UN) environmental conference ‘United Nations Conference on the Human Environment’ was held in Stockholm. At this conference, various topics such as wildlife conservation, pollution of the seas, the use of non-renewable energy sources, international laws on environmental damage, elimination of nuclear weapons were discussed (Boudes, 2014). The Stockholm Conference is considered as a breaking point in bringing environmental problems to the international political agenda (Black, 2012; UN, 2020c). However, the First World Climate Conference in 1979 was the main event that identified human-induced climate change as a separate and severe problem (Childress, 2012; United Nations Framework Convention on Climate Change [UNFCCC], 2000; Zillman, 2009). These first attempts were followed by several conferences held in the 1980s such as Villach Conference (October 1985), the Toronto Conference (June 1988), the Hague Conference and Declaration (March 1989), the Noordwijk Ministerial Conference (November 1989), the Cairo Compact (December 1989) (UNFCCC, 2000).

Arguably the most important milestone that has changed the relationship between climate change science and climate change policy was the establishment of the IPCC by the World Meteorological Organization and the United Nations Environment Programme in 1988 (IPCC, 2020). The purpose of IPCC was and still is to provide governments at all scales with scientific knowledge to produce effective climate

change policies. By the end of the 1980s, climate change was seen as a global problem in the political and civil world. Prominent political figures began to discuss climate change openly. For example, UK Prime Minister Margaret Thatcher, in her speech to the UN in 1989, stated that it is urgent to start an international solidarity for climate change based on scientific knowledge, and she asked: “The evidence is there. The damage is being done. What do we, the international community, do about it?” (Thatcher, 1989). It was clear that climate change was going to be a part of the political agenda in the 1990s. Earth Summit in Rio de Janeiro in 1992, in which one hundred and seventy-two governments participated, was another vital benchmark. At this summit, one hundred and fifty-four states signed the United Nations Framework Convention on Climate Change (UNFCCC) to prevent and reduce negative anthropogenic impacts on the climate system (UN, 2020a; UNFCCC, 2000). This international cooperation was continued with the Kyoto Protocol, the first international agreement to reduce greenhouse gas emissions, which was signed by one hundred and ninety-three countries in 1997 (Carbon Brief, 2014; UNFCCC, 2020a). In 2005, the Kyoto protocol became international law (Black, 2013).

The activities of international and national organizations around the world, especially IPCC, continued to raise awareness on climate change in the 2000s. One of the topics of the G8 summit in 2005, for instance, was climate change (British Broadcasting Corporation [BBC], 2005; Jeffery, 2005). In the same year, the European Union Emissions Trading System was launched. In addition to being the first carbon market in the world, this trading system was announced as the European Union’s (EU) fundamental policy in combating climate change (EU, 2020). In 2006, former American vice president Al Gore’s movie, *An Inconvenient Truth*, was released, and it became very influential in making the findings and predictions of climate science popular. One year later, the Nobel Peace Prize was awarded to Al Gore and IPCC “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change” (The Nobel Peace Prize 2007, 2007). In 2009, the Copenhagen Climate Change Conference was held in order to make a new climate change agreement at the global level, yet the states could not reach a consensus (UNFCCC, 2009). The Copenhagen Conference, in which one hundred and ninety-two countries participated, is therefore considered as a failed attempt (BBC, 2009). On the other hand, however,



carbon emissions and the global surface temperature continued to increase. According to IPCC's Fifth Assessment Report (IPCC, 2014), the ratio of carbon dioxide, methane, and nitrous oxide in the atmosphere has reached an unprecedented level in 800,000 years (p. 4). Moreover, the report projected that global surface temperature at the end of the 21st century would increase between 1.5 degrees and 2 degrees relative to 1850-1900 (IPCC, 2014, p. 10). It also revealed that ninety-five percent of scientists had reached a consensus that this change in climate patterns is happening due to human activities (IPCC, 2014, p. v). The most critical incident in recent years regarding climate change on the global scale is the Paris Agreement, which was adopted on 12 December 2015 at the 21st Conference of the Parties of the UNFCCC (UN, 2020b). As of 27 April 2020, the one hundred ninety-seven countries signed the Paris Agreement, and one hundred eighty-nine of them ratified (UNFCCC, 2020b).

In summary, climate change has been an essential part of the political agenda since 1979. Especially with the establishment of IPCC in 1988, an ongoing and reflexive interaction between climate change science and climate change politics has started. The above-mentioned political activities, congresses, protocols, and agreements would not have been possible without the findings of climate science. Indeed, the researchers have developed climate science through measurements, analysis, reviews, and modelings. Although findings and developments do not cause direct and sudden transformations in policymaking, climate science provides a basis for the political world to take a stance on climate change and to develop related policies. Furthermore, as the public feels or observes adverse effects of climate change on human life, the environment, and the economy, and as the hidden or long-term consequences are conveyed to the public through both scientific or popular science publications, the world of politics could not have ignored the climate change. In response to this, the addition of climate change to the political agenda also affected the development of climate science. The fact that policymakers have more knowledge and awareness on climate change has increased the importance of climate science and support for related research. Today, a climate policy discussion independent of climate science and its findings is unimaginable. Similarly, climate science aims to influence the political world and to make changes in the real world with its findings and predictions. Thus, these two worlds, the world of climate science and the world of politics, and the practitioners of these two worlds, knowledge producers and policymakers, should

share their knowledge, experience, and suggestions, or in short, they should interact, collaborate, and cooperate.

This section has attempted to briefly explore the mutual development of climate change science and policy. The next section will examine the relationship between climate change scientists and policymakers through the concept of science-policy interfaces. However, before ending this section, it is necessary to clarify that the narrative of this section should not give the impression that the awareness and activities on climate change have been making linear progress. There were significant achievements, but there were also periods of stagnation and even retrogression. For instance, although the USA, one of the world's leading carbon emitters, signed the Kyoto Protocol in 1998, it has never ratified it (UNFCCC, 2020a). Canada, on the other hand, signed the Kyoto Protocol in 1997, ratified it in 2002, yet officially withdrawn from the Protocol as of 15 December 2012 (UNFCCC, 2020a). Furthermore, some countries do not support the Paris Agreement. Currently, Turkey is the only G20 country that has not endorsed the Paris Agreement officially. On 1 June 2017, President Donald Trump also announced that the USA is withdrawing from the Agreement (BBC, 2017). Above all, it should be noted that the approval of these protocols or agreements should not mean that states do or will fulfill the obligations. Climate change is directly related to the basic policies of states, such as energy policies, industrial activities, and trade agreements. That is why path-dependency stands out as a big obstacle in applying climate policies. In other words, the fact that climate science is advanced and makes predictions with less uncertainty does not mean that climate change policies will surely get better.

## **2.2 What Does the Science-Policy Interface Mean for the Study?**

Even though the term 'science-policy interface' does not have a universally valid meaning (Bultitude, Rodari, & Weitkamp, 2012), it, in general, refers to all social relations between knowledge producers and policymakers in the policymaking process (Van den Hove, 2007). That is, a science-policy interface may mean transferring scientific reports or articles to policymakers, face-to-face meetings, science consultancy, virtual or physical workshops, science committees, science-policy forums, policy recommendations, conferences, personal contacts, etc. (Choi et al., 2016, p. 9; Mitton, Adair, McKenzie, Patten, & Perry, 2007, p. 744). This broad scope

of science-policy interfaces may cause incomprehensibility. In this section, therefore, what science-policy interfaces mean for this study will be explored. The explanations of the section are related to the general science-policy interface concept. However, the examples used to elaborate on the subject are given from the science-policy interfaces related to climate change since they are the focus of the study.

In science-policy interfaces, knowledge producers and policymakers interact for a common purpose (Bultitude et al., 2012; Hara, Solomon, Kim, & Sonnenwald, 2003, p. 953). The purpose is to be able to produce knowledge-based policies and actions, especially against complex problems such as climate change (Bednarek et al., 2018; Cvitanovic et al., 2015; Hayden, Petrova, & Wutti, 2018, p. 252). Thereby, science-policy interfaces increase the effectiveness of scientific knowledge, enable the use of it in new areas, and support the collective understanding of scientific knowledge (Blackman & Benson, 2010, p. 575).

The primary importance of science-policy interfaces is, therefore, to transfer of reliable and usable scientific knowledge from knowledge producers to policymakers. Policymakers thus can use scientific knowledge to produce knowledge-based effective policies. Indeed, with the rise of the effects of climate change and the awareness of the importance of scientific knowledge in combating climate change, policymakers began to demand scientific knowledge more frequently (Dilling & Lemos, 2011, p. 680; Steel, List, Lach, & Shindler, 2004, p. 1). As Kropp and Wagner (2010) state, politicians do not want to act without expert opinion, especially when the risks are high (p. 813). On the other hand, the function of science-policy interfaces is not limited to the transfer of scientific knowledge. It also includes turning knowledge into policy. Scientific knowledge is neither the only nor the most significant factor in the policymaking process (Hering, 2016, p. 367) since values, emotions, people's concerns, public opinion polls or anecdotes are also effective (Choi et al., 2005, p. 636; Gluckman, 2016, p. 969). Science helps the decisionmaking process, does not make decisions (Cortner, 2000, p. 28; Haller & Gerrie, 2007, p. 142). For this reason, producing scientific knowledge does not make better policies at once or without any other effort (Jensen-Ryan & German, 2019, p. 1; Kropp & Wagner, 2010, p. 813; Sutherland et al., 2013). Accordingly, the concept of science-policy interface is also related to how policymakers receive and interpret scientific knowledge, and more importantly, how they turn it into policy. The inclusion of scientific knowledge in the

policymaking process becomes even more critical in producing regional and local policies. The scientific knowledge on climate change is produced mostly at the international or national scale (such as reducing carbon emissions, developing alternative energy sources, creating awareness on consumption habits, etc.). Turning this knowledge into local policy and action by considering the specific dynamics of the region cannot happen without the knowledge and experience of policymakers (and other regional/local actors) about the region. The UN published a report in 2017 to highlight the importance of science-policy interfaces for the correct use of scientific knowledge. In this report, science-policy interfaces are considered as structures that may fill the gap between scientists and politicians for environmental issues. By deriving from Interact Programme of European Union, the report defines useful and active science-policy interfaces as follows “the right information, for the right people, in the right form, through the right channel and at the right moment” (United Nations Environment Programme, 2017, p. 36). In other words, an effective science-policy interface refers to using scientific knowledge at the right time and place in harmony with other inputs for the holistic policymaking process.

Another importance of science-policy interfaces is the fact that knowledge producers may receive some practical benefits by working with policymakers. The main contribution of policymakers often seems limited to the financial support provided to knowledge producers for their scientific researches. However, through science-policy interfaces, knowledge producers may also have a chance to engage with the other factors of the policymaking process (such as ethics, economic situation, public opinion, etc.). Combining these experiences with their scientific knowledge may help them to think of new research topics, explore new methods, and develop more practical insights (Geuna & Muscio, 2009, p. 109; Hayden et al., 2018, p. 251; Hering, 2016, p. 365). Moreover, scientists are always, directly or indirectly, affected by feedbacks from politicians (Bultitude et al., 2012). They may constitute their researches according to requests from policymakers, or even if there is no such request, they may work to complete what they deem missing in policy implementation. If politicians can share their demands, potential, and restrictions to knowledge producers through science-policy interfaces, turning scientific knowledge into policy would be easier.

In summary, the knowledge producers and policymakers need each other. On the one hand, policymakers are not able to make effective policies without scientific

knowledge. On the other hand, turning scientific knowledge into policy requires that scientific knowledge should be used correctly with other inputs by policymakers in the holistic policymaking process. In this case, the knowledge and experience of policymakers gain importance. Otherwise, producing scientific knowledge alone is not enough to transform the real world. Besides, by working with policymakers, knowledge producers can find the opportunity to improve their research. For all these reasons, this study considers ideal science-policy interfaces as interfaces in which knowledge producers and policymakers interact, cooperate, and collaborate. Thus, complex issues such as climate change are handled together by both groups. In these interfaces, knowledge producers and policymakers co-produce knowledge, policy, and action together. As previously emphasized, within the scope of the study, this approach is called ‘the co-production based science-policy interface’.

The relationships between knowledge producers and policymakers are not always evaluated in terms of co-production, interaction, and collaboration. For example, technocratic approaches argue that the scientific world should shape the political world. In this approach, scientific knowledge is essential, and what policymakers need to do is to apply scientific knowledge to the real world as it is. In contrast to the technocratic approach, this section revealed that scientific knowledge alone was not enough to produce effective policies. It cannot become sufficient, usable, and practical unless it is used with other inputs of the policymaking process. Unlike technocracy (or scientism), populist approaches can consider scientific activities as tools that serve the world of politics. In order to achieve their political goals, policymakers may choose the knowledge that supports their views (cherry-picking), they may manipulate the knowledge, or, worst of all, they may completely ignore the knowledge. Nevertheless, as already stated, combating climate change obliges scientific knowledge, so it cannot and should not be misused or ignored. The science-policy interface approach of this study, by criticizing these two views, advocates interaction, collaboration, cooperation, and co-production instead of a one-sided dictation, no matter which side dictates. Similarly, Cvitanovic et al. (2015), for instance, argue that, in science-policy interfaces, there should be interdependency and interconnectedness between all stakeholders. According to the authors, since all stakeholders have their own knowledge and experience, everyone in an interface can be regarded as both knowledge producer and user (Cvitanovic et al., 2015, p. 27). Kropp and Wagner

(2010) define such an interface approach as the “dialogue-reflexive interface between science and politics” (p. 815). In contrast to the technocratic or populist models, these models do not ignore the role of the knowledge recipients who interpret and change the knowledge by making their own contributions (Broner, Franczak, Dye, & McAllister, 2001, p. 82).

In the approaches that one side dictates another one, there is not cooperation but a unilateral transfer of knowledge; nonetheless, the term ‘knowledge transfer’ is frequently used interchangeably with the term ‘science-policy interface’. Even though some scholars define ‘knowledge transfer’ as “an interactive interchange of knowledge between research users and research producers” (Mitton et al., 2007, p. 729) or as “production, sharing, storage, mobilization, translation and use of knowledge” (Cvitanovic et al., 2015, p. 26), the traditional meaning of knowledge transfer is ‘the one-way transmission of knowledge from knowledge producers to the end-users’. In this case, the end-user can be anyone such as policymakers, project developers, private sector employees, the public, or even other knowledge producers (Hayden et al., 2018, p. 244; Jacobson et al., 2004). This approach implies that only one group conveys its findings to another group, rather than the two groups working together. In such a non-reflexive system, actors cannot benefit from each other’s knowledge and experience. Therefore, the unilateral knowledge transfer does not correspond to the science-policy interface definition of this study. This study advocates science-policy interfaces based on the interaction, dialogue, and collaboration of the two groups, rather than the interfaces where one side is dominant. Another problem of one-way knowledge transfer models is the assumption that transferring knowledge from one actor to another is sufficient. As will be discussed in detail in the ‘Barriers and Possible Solutions section’, since the jargon, language, experiences, and presumptions used by these two groups are often different (Cash et al., 2003, p. 8088), knowledge transfer between two individuals, groups or organizations alone is not enough (Huzair, Borda-Rodriguez, Upton, & Mugwagwa, 2013). It is indispensable to translate this knowledge from the language of the knowledge producers to the language of the knowledge receivers. The knowledge translation includes “synthesis, dissemination, exchange and ethically-sound application of knowledge” (Huzair et al., 2013, p. 43). Knowledge translation implies making sure that the other group understands the transferred knowledge correctly, and it requires continuous interaction and reflexivity

between knowledge producers and policymakers. Science-policy interfaces that provide dialogue-based collaborations can provide such an opportunity.

This section has attempted to explore the science-policy interface approach of the study in order to eliminate the conceptual confusion about the term ‘science-policy interface’. For this study, again, the science-policy interface refers to collaboration and interaction of knowledge producers and policymakers in order to co-produce knowledge, policy, and action in constant interaction. In other words, it is based not only on the transfer of knowledge and experience but also on working and producing together. Within the scope of the study, this understanding of the science-policy interface is called ‘co-production based science-policy interface’.

### **2.3 How to Establish a Science-Policy Interface?**

The previous section has explained the concept of the science-policy interfaces. This section focuses on how these interfaces can be established. It deals with different theories and ideas on the design and realization of science-policy interfaces. First, some of the general theoretical approaches to the constitution of science-policy interfaces will be shared. Then, two different views on the design and implementation of these interfaces will be discussed separately. The first of these is called the third stream activities of the universities, and the second is called the mediators.

First of all, in order to establish a science-policy interface, knowledge producers should be willing and able to share their knowledge, while knowledge users should be willing and able to receive knowledge (Fongwa & Marais, 2016). In other words, these two groups must want to work with each other. Nonetheless, the attitude of policymakers is often of great importance in the establishment of these interfaces. It is because politicians often have the power to make decisions without collaborating with scientists, especially in countries, like Turkey, where political power is dominant to other factors. Therefore, policymakers should be willing and encouraging to establish science-policy interfaces.

Even if both groups are disposed to collaborate, many factors, such as geography, culture, tradition, and economy, affect the design of science-policy interfaces. For instance, Choi et al. (2016) compare the science-policy interface approaches of China and Canada by interviewing knowledge producers and policymakers from both

countries. According to the authors, the knowledge producers and policymakers of these two countries have different perspectives and different projections for science-policy interfaces, and thus the understandings of the science-policy interfaces are not static but variable in time and space (Choi et al., 2016, p. 10). However, the most crucial finding of the research is that even though the participants come from different backgrounds, work in different socio-economic conditions in different countries, and have different views on the method of a successful science-policy interface, they agree on the importance of the cooperation between science and policy (Choi et al., 2016, p. 8). Accordingly, this section focuses not on geographical and cultural differences but the establishment of ideal science-policy interfaces that are based on collaboration.

Dilling and Lemos (2011) discuss three different methods of establishing a science-policy interface. The first method is called the ‘science push’, and it can be associated with technocratic approaches. In this method, researchers determine what kind of science should be produced. In other words, the science push model implies that the world of science is superior to the world of politics. The second method is the ‘demand pull’ method. In this method, on the other hand, decisionmakers determine what kind of science they need and demand it from knowledge producers. This method evokes the populist approach, (or in Jasanoff’s words, democratic approach (Jasanoff, 1994, p. 6)), and ignores scientific knowledge for the sake of political goals. Dilling and Lemos call the third model the ‘co-production model,’ which is the combination of ‘science push’ and ‘demand pull’. In the ‘co-production model’, knowledge producers and policymakers discuss and decide how and what kind of knowledge to produce by an ongoing and iterative interaction (Dilling & Lemos, 2011, p. 682). According to the authors, the third model is more effective than other models in turning science into policy since the agenda is determined together by both groups.

On the other hand, Pölzl and Rametsteiner (2009) illustrate the relationship between the world of science and the world of politics with two models: the transfer model and the transaction model. The authors argue that the transfer model sees science and politics as two completely independent phenomena. In this model, scientists are expected to produce ‘objective value-independent knowledge’ while politicians are expected to take action using this knowledge (Pölzl & Rametsteiner, 2009, p. 745). Nevertheless, as STS scholars contend (see Gieryn, 1995; Jasanoff, 1994), the boundaries between science and politics are, in fact, not static, but dynamic and



transitive (Pülzl & Rametsteiner, 2009, p. 745). That is, knowledge producers are not able to produce appropriate and usable knowledge without being aware of the world of politics. In order to turn the knowledge into policy, there must be an interaction between the two groups. Indeed, the transaction model of Pülzl and Rametsteiner is a model that supports the mutual exchange of knowledge and experience between knowledge producers and policymakers. It is based on reflexive and blur boundaries instead of delineated boundaries, mixing of values and facts instead of separation of values and facts, two-way transfer instead of one-way transfer, process instead of product, and reflexive use instead of instrumental use (Pülzl & Rametsteiner, 2009, p. 746). Therefore, both Dilling and Lemos' emphasis on the importance of co-production and Pülzl and Rametsteiner's emphasis on the transaction are in line with the science-policy interface understanding of this study.

Science-policy interface models encourage knowledge producers and policymakers to come and work together. Nonetheless, there are different ways to establish these interfaces. A group of researchers argues that knowledge producers should interact directly with other actors. Some researchers, in contrast, contend that there should be some mediators, and the interface between knowledge producers and policymakers should be established through these mediators. The rest of the section will explore these two points of view.

### **2.3.1 Third stream activities of universities**

Science-policy interfaces are structures in which knowledge producers and policymakers interact to produce knowledge-based policies. That is, in order to establish science-policy interfaces, knowledge producers must share their knowledge with other stakeholders. Knowledge exchange and interaction functions of knowledge producers are conceptualized in different ways, such as Mode 2 knowledge production (Gibbons, 1994), triple helix (Etzkowitz & Leydesdorff, 1995, 1998, 2000), regulatory science (Jasanoff, 1994) or entrepreneurial universities. Although the terms change, as Olson and Pinto da Silva (2019, p. 1) explicitly reveal, each of these approaches challenges the Mertonian understanding of science that is objective, independent from society, and disinterested.

In this section, these approaches are examined with the inclusive concept 'third stream activities of universities'. The concept of 'third stream activities of universities'

indicates that universities (or other knowledge producers) have a third duty in addition to their first duty, educating students, and second duty, doing researches. The third duty is commercialization, exploitation, utilization, and transfer of knowledge from universities to the policymakers and the public (Etzkowitz & Leydesdorff, 2000; Geuna & Muscio, 2009, p. 94; Hayden et al., 2018, p. 240). More simply, it is producing practical knowledge for policymakers, industry, or the public. According to Hayden and his colleagues, the third duty of knowledge producers is a moral obligation, a civic duty, and, more importantly, a justification of researchers' economic costs (Hayden et al., 2018, p. 240). The reason that the related literature defines this concept as the third stream activities of universities is that universities were accepted as the main actors of producing knowledge for a long time. However, within the scope of this study, research centers, institutes, private sector, NGOs, and independent researchers are also considered as knowledge producers. Therefore, this concept should have been called third stream activities of knowledge producers. Nevertheless, as education is usually performed by them, 'the third duty' statement is more suitable for universities. Also, those who are interested in the subject can conduct literature research more easily by using this terminology.

As mentioned above, the approaches that support the knowledge producers' collaboration with other stakeholders show significant similarities with each other. The concept of 'Triple Helix', which was developed by Henry Etzkowitz and Loet Leydesdorff in the 1990s, for instance, refers to cooperation between the academy, the state, and the industry for knowledge-based societies (Etzkowitz & Leydesdorff, 1995, 1998, 2000; Etzkowitz & Zhou, 2017). On the other hand, entrepreneurial universities, which have become common in Europe since the 1990s, are the universities that do not only produce knowledge but also share this knowledge with the society and industry (Kalar & Antoncic, 2015a, p. 1). That is, in order for a university to be defined as an entrepreneurial university, it should collaborate with the private sector and the state by sharing knowledge, technology, experience, and expert staff.

Mode 2 knowledge production is an older and more comprehensive theory. Gibbons and his colleagues (1994) described two types of knowledge production model in the 1990s: Mode 1 and Mode 2. According to the authors, Mode 1 refers to the traditional method of producing knowledge. In Mode 1, knowledge production is limited to the academic framework, and the notions of transferability, practical knowledge,

applicable knowledge, available knowledge, usable knowledge are ignored. The latter, Mode 2, nonetheless, is the method of transdisciplinary knowledge production. It is based on the idea that people from different disciplines should come together to work on some particular problems which are related to the real world. Mode 1 is sometimes called the linear model or loading dock approach, while Mode 2 is called post-normal or use-inspired science (Tang & Dessai, 2012, p. 301). Thus, Mode 1 is disciplinary, homogeneous, hierarchical, and limited to the academy, while Mode 2 is transdisciplinary, heterogeneous, heterarchical, and problem-focused (Gibbons, 1994). Furthermore, knowledge production in Mode 1 is controlled by conventional methods such as peer-review journals. In Mode 2, social, economic, and political criteria are also considered. For example, the quality control of Mode 2 knowledge production asks questions as follows: “Will the solution, if found, be competitive in the market?”, “Will it be cost effective?”, or “Will it be socially acceptable?” (Gibbons, 1994, p. 8). With these questions, Mode 2 underlines the importance of “application, transdisciplinarity, heterogeneity and organizational diversity, social accountability and reflexivity, and quality control.” In short, Mode 2 knowledge production, as an interactive research model (Lemos & Morehouse, 2005, p. 59), implies the collaboration between different actors (Abbas, Avdic, Xiaobao, Hasan, & Ming, 2017, p. 3) to produce usable and applicable knowledge. Mode 1 knowledge production is criticized for being elitist, being limited to academic literature and theoretical debates, and finally not being associated with the practical world (Bager, 2018, p. 173). Therefore, as it aims to provide more practical knowledge for the problems of industry and society, policymakers and other actors prefer Mode 2 knowledge production (Fongwa & Marais, 2016; Hayden et al., 2018, p. 240). Nevertheless, Mode 2 knowledge production is also criticized for not being subject to academic peer-reviewed evaluations (Bager, 2018, p. 173).

The concept of third stream activities of universities indicates that the sole responsibility of universities, research centers, institutions, in general, all knowledge producers is not producing knowledge. In order to establish science-policy interfaces, knowledge producers need to organize their activities to cooperate with other actors. Naturally, there would be some barriers, which will be discussed in detail in the next section, that prevent knowledge producers from interacting with other actors. The concepts discussed in this section, such as Mode 2 knowledge production, triple helix,

or entrepreneurial universities, would be beneficial to enable knowledge producers and policymakers to interact and collaborate.

### **2.3.2 Mediators**

The third stream activities of universities generally advocate a direct collaboration between knowledge producers and policymakers. Some argue that, on the other hand, it would be better to establish this relationship through third parties or institutions. These third actors, which are called mediators in this section, ensure the relationship between knowledge producers and policymakers and to enable the science-policy interfaces to work more effectively.

Different researchers use different concepts to explore mediators. Bednarek and colleagues (2018), for instance, use the terms ‘boundary spanning’ and ‘boundary spanners’. According to the authors, boundary spanning is providing exchange between knowledge producers and knowledge users on a particular subject, and boundary spanners are individuals or institutions that perform this process. Due to this reason, boundary spanners should focus not only on communication but also on an interactive exchange of knowledge and trust-based social relationships between different stakeholders.

Hering (2016), on the other hand, prefers the term ‘knowledge brokers’. According to the author, knowledge brokers should be in contact with both knowledge producers and policymakers, and they should improve themselves in communication skills (Hering, 2016, p. 364). Thus, scientists do not have to work as mediators, and the risk of scientists leaving their duties due to timelessness or lack of incentives can be eliminated (Hering, 2016, p. 364). Dilling and Lemos (2011) also uses the concept of knowledge brokers by drawing from an empirical study. The authors reveal that knowledge brokers have increased the use of seasonal climate forecasts in the Pacific Island of America for planning and decision-making by working between university-based climate knowledge producers and public officials (Dilling & Lemos, 2011, p. 685).

Bultitude and colleagues (2012) call these mediators ‘science communicators’. The authors argue that science communicators may focus on practical and communication mechanisms to improve science-policy interfaces since policymakers often interact with multiple knowledge sources and cannot always choose which one to trust and

which to ignore. Therefore, ‘science communicators’ can work as interpreters (through mass media), facilitators (through training and consultancy) and intermediaries (through new, dedicated channels) to improve communication between researchers and policymakers (Bultitude et al., 2012).

Another concept proposed in the establishment and development of science-policy interfaces is boundary organizations. Boundary organizations operate between the world of science and politics (Guston, 1999), in other saying, between science and the use of science (Dilling & Lemos, 2011, pp. 685-686). These organizations operate at the institutional level rather than individual mediators. Dilling and Lemos contend that boundary organizations can be more effective than individual boundary spanners, knowledge brokers, or science communicators since they can benefit from better resources and organizational capacity (Dilling & Lemos, 2011, p. 686).

Although the concepts slightly differ from each other, the common purpose of the approaches that support third stream activities of universities or mediators is to establish an interface between knowledge producers and policymakers. Undoubtedly, the literature on the establishment of science-policy interfaces is not limited to these approaches. As mentioned at the beginning of this section, the establishment of science-policy interfaces is a dynamic process, and it differs in each region and country. Nevertheless, what is prevalent in all regions and experiences is that establishing science-policy interfaces requires dramatic changes and actions. The next section discusses the barriers that delay or entirely prevent these changes and possible solutions to overcome them.

## **2.4 Barriers and Possible Solutions**

The process of producing knowledge-based climate policy draws from a fundamental idea: Knowledge producers and policymakers come together, they share their knowledge, experiences, and potential with the other group, and consequently, they co-produce knowledge-based policy and action (Choi et al., 2005, p. 632). The system seems reasonable for everyone, and it is expected to work in practice. This collaboration, however, always experiences problems in real life (Choi et al., 2005, p. 632; Lövbrand, 2007, p. 44). In this section, these problems that prevent the establishment of science-policy interfaces or their effective operation are called ‘barriers’. Four types of barriers are grouped as follows: (i) cultural differences, (ii)

scientific uncertainties, (iii) scientific myths, and (iv) incentives for knowledge producers. Each sub-section will address these barriers and then share some potential solutions.

### **2.4.1 Cultural differences**

#### **Barriers**

First of all, knowledge producers and policymakers are two distinct groups with different priorities. As Choi et al. (2005) state, both groups feel responsible for different individuals or organizations while dealing with their own responsibilities. In general terms, knowledge producers feel responsible for other knowledge producers or academic journals while policymakers feel responsible for political parties, government, and the public. Besides, their perspectives on terms, concepts, ideas, or events may differ from each other. The concept of ‘evidence’, for example, can have different meanings for both groups. As stated before, public opinion polls or anecdotes can be considered as evidence by politicians (Gluckman, 2016, p. 969). These fundamental distinctions are called ‘cultural differences’. Cultural differences directly affect the communication between related groups since the world views, responsibilities, language, and jargon of knowledge producers and policymakers are dissimilar (Cash et al., 2003, 8088).

In particular, one of the main cultural differences is that both groups spend their time with their own obligations and do not have time to understand or collaborate with the other group. On the one hand, knowledge producers are interested in advancing science, and the current academic system encourages them to “publish or perish” (Choi et al., 2005, p. 632). In this sense, collaboration with other groups may seem not attractive for researchers due to its time-consuming characteristic compared to theoretical studies they carry out by themselves (Bager, 2018, p. 174). On the other hand, politicians do not have time to read academic publications while struggling to gain popular support in the world of politics (Choi et al., 2005, p. 632). Lövbrand’s (2007) interviews with Swedish carbon cycle scientists and government negotiators revealed the importance of the time problem. For example, a scientist stated that they understand their obligations to answer societal questions, but according to him/her, science does not end there, they also need time to do long-term basic research (Lövbrand, 2007, p. 43). Similarly, a government official says that they do not have

enough time and staff to read scientific studies, draw conclusions and turn them into politics, so someone else should do it for them (Lövbrand, 2007, p. 43). Another problem with time is the timing of the transfer of scientific knowledge. According to Hering, the scientific literature does not address policymakers, many studies are not usable for the policymaking process, and even when the knowledge is accessible and relevant, knowledge transfer does not happen at an appropriate time (Hering, 2016, p. 364). That is, it is not enough for both parties to have time; it is also necessary to establish the interface at the right time.

Even if the time problem is solved and the stakeholders come together, it may not always be possible for the two groups to understand each other. The knowledge that is considered as ‘useful knowledge’ by knowledge producers does not always mean ‘usable knowledge’ for policymakers (Tang & Dessai, 2012). As previously emphasized, scientific knowledge is not the only input in the policymaking process. Therefore, ‘useful knowledge’ may not be transformed into ‘usable knowledge’ due to factors such as regional conditions, economic or political limitations, or public opinion. If useful knowledge does not turn into usable knowledge, science-policy interfaces cannot fulfill their founding purpose, which is producing knowledge-based policies and action. This problem affects the effectiveness of the interfaces rather than their establishment.

### **Possible solutions**

Cultural differences reveal that the two groups have different worlds and that it is not easy for these groups to leave their worlds to cooperate. Especially the time problem comes into prominence. Knowledge producers are busy looking for evidence, while policymakers are busy looking for political solutions (Hering, 2016, p. 364). A possible solution in this regard would be to use mediators. If the boundary spanners, knowledge brokers, science communicators, or boundary organizations undertake the task of establishing communication between knowledge producers and policymakers, these two groups can devote more time to their own duties and responsibilities. However, these intermediaries need to be familiar with the world of both groups. Otherwise, there may be deficiencies during knowledge transfers. If competent intermediaries establish communication channels, time-related problems can be eliminated. Mediators turn political issues into the right scientific questions for knowledge producers and deliver scientific knowledge to politicians. Thus, they can

ensure that “policymakers are using ‘the right science’, and that scientists are doing ‘the science right’”(Choi et al., 2005, p. 635).

Another cultural barrier is the difference between useful knowledge and usable knowledge. In order to solve the problem, it is necessary to design science-policy interfaces in a way that knowledge producers and policymakers can interact more. If the actors of the two worlds better understand each other’s needs, priorities, and capacities, they can transfer knowledge and experience accordingly. For example, as knowledge producers interact more with policymakers, they have more insight into the economic, political, and social constraints of the problem they are trying to solve. Consequently, they can produce more feasible solutions or recommendations.

Besides, knowledge producers should make sure that the knowledge they transfer meets some specific criteria. According to Tang and Dessai (2012, p. 302), scientific knowledge must be considered as credible, salient, and legitimate by policymakers. The authors define credible knowledge as being “accurate, valid, of high quality, supported by some form of peer review, and funded from one or more recognizable or established institutions”; salient knowledge as being “context sensitive and specific to the demands of a decision-maker across ecological, spatial, temporal, and administrative scales”; and legitimate knowledge as being “produced and disseminated in a transparent, open, and observable way that is free from political suasion or bias” (Tang & Dessai, 2012, p. 302).

#### **2.4.2 Scientific uncertainties**

##### **Barriers**

Scientific uncertainties are also seen as obstacles to produce knowledge-based policies. Indeed, a climate scientist indicates that the first question politicians ask is generally ‘how certain are you?’ (Landström, Hauxwell-Baldwin, Lorenzoni, & Rogers-Hayden, 2015, p. 12). However, scientific outputs are not short, clear, and precise statements; on the contrary, they always contain uncertainties, especially on a complex issue such as climate change. Politicians may use these uncertainties as an excuse not to listen to knowledge producers or not to collaborate with them. They, for instance, may argue that there is no consensus among scientists on climate change, so it is not clear which group we should ask for advice. For instance, Landström et al. (2015, p. 3) revealed that, in the past, tobacco companies and the oil industry in the



US used scientific uncertainties to counter government policies that restrict cigarette advertisements and greenhouse gas emissions. By pointing out uncertainties, a politician described scientific knowledge as “nothing more than one voice among many” (Kropp & Wagner, 2010, p. 814).

### **Possible solutions**

Scientific uncertainties are part of science as science does not hold the absolute truth, even if such a thing does exist. There are some duties for both knowledge producers and policymakers so that scientific uncertainties do not prevent action on the relevant subject. Knowledge producers, to begin with, should be able to express that their findings are sufficient to take action even if they contain some uncertainties. In order to explore the importance of uncertainties, Shackley and Wynne (1996) examined the IPCC’s first report that was released in 1990. The authors argue that “the potentially damaging effects of uncertainty can be limited if certainty about uncertainty can be achieved” (Shackley & Wynne, 1996, p. 281). In this case, since the authors examined a report on climate change, it can be deduced that uncertainties should not prevent taking action to combat climate change. Besides, knowledge producers should use the language very carefully when expressing their scientific findings that contain some uncertainties (Landström et al., 2015, p. 4).

Policymakers also have a responsibility to understand scientific uncertainties. A concise paper was published in *Nature* in 2013 to advise politicians, civil servants, political advisers, in short, anyone who communicates with science and scientists on how to interpret scientific claims (Sutherland et al., 2013). Some of the suggestions, especially climate change policymakers should learn, are: no measurement is exact, correlation does not imply causation, randomization avoids bias, study relevance limits generalizations, data can be dredged or cherry-picked (Sutherland et al., 2013). Nonetheless, arguably the most critical point of the paper is that people should learn the imperfect structure of science.

If policymakers improve their science literacy and learn more about science and production of science, they can more easily deal with scientific uncertainties. Landström et al. (2015) revealed that it is difficult for politicians who are not trained in the scientific method to interpret scientific uncertainties correctly (p. 12), while those who have a mathematical-statistical background better understand them (p. 9). In summary, science-policy interfaces would be more effective if knowledge

producers expressed scientific uncertainties more accurately, and policymakers learned how to approach them.

### **2.4.3 Scientific myths**

#### **Barriers**

The previous sub-section discussed that science is not an activity that provides absolute truth; in contrast, it always includes some uncertainties. However, many people tend to consider science as superior to all other social activities. According to this technocratic point of view, science does bring or will bring definitive solutions to all subjects from a technical perspective. These approaches, in this sub-section, are defined as scientific myths. Although scientific myths seem to glorify science, they actually pose an obstacle for scientific knowledge to become applicable. Those who see science superior to other activities tend to see scientists superior to other groups. Based on this attitude, some knowledge producers avoid cooperating with other actors. They, even, consider this isolation as academic dignity. That means they do not work with policymakers, do not provide them with their knowledge, and do not go to their meetings because of the so-called ‘the neutral stance of a scientist’. Indeed, Jacobson et al. (2004) revealed that the academic community generally do not support knowledge transfer related activities such as “outreaching, building partnerships with nonacademic organizations, and plain language communication” (p. 248). Lövbrand (2007) also points out that climate scientists want to stay away from determining political agenda and want a clear boundary between politics and science, so they do not risk themselves by getting into the political world too much (p. 44). Similarly, Ramos-Vielba, Sánchez-Barrioluengo, and Woolley (2015) identify ‘risk to scientific autonomy’ and ‘risk to scientific credibility’ as two main barriers that prevent researchers from collaborating with other partners. Moreover, Bager (2018) lists some of the myths that cause the scientific world to stay away from the political world: ‘theoretical work is more important than practical work’, ‘case studies cannot be generalized’, and ‘a scientific contribution cannot be made through case studies’ (pp. 174-175).

#### **Possible solutions**

In order to eliminate these scientific myths, which prevent the establishment of science-policy interfaces, the understanding of science needs to change. By referring

to Thomas Kuhn's famous concept of 'paradigm shift' (Kuhn, 1962), Cortner (2000) argues that we need to replace the idea of objective value-free science with a holistic, integrated, and civic understanding of science (p. 26). Indeed, science is not superior to other social factors in decisionmaking (Haller & Gerrie, 2007), and scientific research is not independent but influenced by social factors (Cortner, 2000, p. 28). Based on the fact that social relations affect both scientists' daily research practices and how their findings are used, Lövbrand also states science should be considered as an ongoing social activity in order to prevent the gap between the production and use of science (Lövbrand, 2007, p. 45). Policymakers can and should benefit from science, but decisions are generally ethical and political, not factual (Haller & Gerrie, 2007, p. 142). For instance, Haller and Gerrie (2007) claim that even if global warming and its possible consequences are in the scope of the natural sciences, we cannot make decisions only with scientific knowledge about whether the distribution of the effects of global warming is fair or not (p. 142).

As STS literature often discusses, we need a society where science culture is reconsidered, and borders between citizens and scientists, as well as politics and science, are more transitive (Cortner, 2000, p. 29). Of course, knowledge producers and scientific knowledge should be more effective in the policymaking process. Still, one should remember that science is not an absolute truth producer, but it is only one of the factors in the policymaking process. Other factors (such as ethics, political and economic situation, and public opinion) in the policymaking process and the importance of interaction and collaboration should not be ignored. Steel et al. (2004) revealed that some scientists are already quite skeptical about their mission to find the truth and facts and, instead, they support 'integrative' or 'post-normal' science approaches in which they are more active in politics and management (p. 11).

In order to establish successful science-policy interfaces, then, scientists must abandon scientific myths, such as 'academic dignity', 'value-free science', or 'neutral science'. Researchers, from time to time, should leave their laboratories in order to communicate with the politicians, the public interest groups, and the citizens (Steel et al., 2004, p. 11). If it is really desired, academic dignity can be preserved with the formula of Jasanoff: "be close to politicians, but not very close" (Jasanoff, 1994).

## **2.4.4 Incentives for knowledge producers**

### **Barriers**

Knowledge producers need to collaborate more with policymakers. Nevertheless, if they are not encouraged to participate, it would be unfair to expect them to take part in the science-policy interfaces. Two basic factors can prevent knowledge producers from collaborating with other stakeholders. The first is that knowledge producers do not sufficiently benefit from science-policy interfaces. In the face of such a situation, they would naturally not want to waste time and energy working in these interfaces. The second is that being science-policy interfaces do not help them advance in the academic world. The current academic system measures academic success only by traditional promotion systems such as peer-reviewed publications or academic conferences (Jacobson et al., 2004, p. 249). Undoubtedly, the policy of ‘publish or perish’ of current academic structure adversely affects the participation of knowledge producers in science-policy interfaces.

### **Possible solutions**

In order for knowledge producers to consider science-policy interfaces beneficial, they need to evaluate taking part in these interfaces as ‘social capital’ (Kalar & Antoncic, 2015b). Social capital basically refers to how being involved in a group or being part of collaborative work would benefit the person and the community (Aldrich & Meyer, 2014, p. 3). The higher the social capital of the person, the more likely that person is involved in the science-policy interfaces (Kalar & Antoncic, 2015b). One of the factors that will increase social capital is, of course, financial support. Indeed, it is a rightful desire for academics to expect financial support in response to time and knowledge contributions. Accordingly, knowledge producers may be reluctant to be a part of a science-policy interface unless there is funding (Fongwa & Marais, 2016; Ramos-Vielba et al., 2015). As an academic clearly states: “You know these academics will only do something if there is something in it for them [financially]. They feel their time is worth money...” (Fongwa & Marais, 2016, p. 203).

In addition to financial support, science-policy interfaces have some other benefits for knowledge producers. As stated in the first section of this chapter, ‘What does the science-policy interface mean for this study?’, knowledge producers have the opportunity to turn their theoretical knowledge into practice by taking part in science-

policy interfaces. Indeed, many researchers consider applying their knowledge to the real world as a great motivation (Ramos-Vielba et al., 2015). Besides, interacting with other actors can help them identify new problems and develop new ways of thinking. However, in order to ensure this interaction, knowledge producers should not be seen as an external data provider. In contrast, they should regularly communicate with other stakeholders.

As they often turn the knowledge, experience, and technology gained from collaborations with universities into monetary gain, the industry and private sector do not hesitate to provide financial support to knowledge producers. Indeed, knowledge transfer from knowledge producers to industry occurs more frequently than from knowledge producers to policymakers (Kochenkova, Grimaldi, & Munari, 2015, pp. 407-408), and most of the literature focuses university-industrial relations instead of university-politics relations (Llopis, Sánchez-Barrioluengo, Olmos-Peñuela, & Castro-Martínez, 2018, p. 2; Ramos-Vielba et al., 2015). The attitude of the governments also has an effect on the development of the industry-private sector relationship. Governments consider university-industry cooperation as a basis for economic development, especially in developing countries (Abbas et al., 2017, p. 2), or as an alternative solution to the decline of government assistance (Kochenkova et al., 2015, p. 408). Although policymakers' budgets are often not as much as the private sector, science-policy interfaces motivate knowledge producers as they can have the opportunity to generate public interest. Thus, policymakers can facilitate the establishment of science-policy interfaces by trying to meet both the financial and intellectual expectations of knowledge producers.

In order to solve the second problem, academia does not support 'non-academic events', the academic world must consider to make some regulations. In particular, researchers should not be forced to decide between advancing a scientific career and playing an active role in practical projects. If working with other actors can be considered as an academic success, just like publishing articles or doing research projects, it is very likely to see more participation in collaborative projects. Bager (2018), for instance, proposes that academic journals should publish more Mode 2 model knowledge production researches and that universities and other organizations should encourage researchers to be a part of Mode 2 knowledge production activities (p. 180). Universities supporting such Mode 2 knowledge production activities have

been mentioned before as entrepreneurial universities. Based on interviews with 1266 people from four European universities, the University of Antwerp, University of Amsterdam, University of Ljubljana, and the University of Oxford, Kalar and Antoncic (2015a) revealed that scholars who see their university departments as entrepreneurs tend to interact and collaborate more with other actors. Furthermore, they are less likely to believe that taking part in technology and knowledge transfer activities are damaging their academic careers. These findings show that the way organizations structure themselves is very effective in encouraging scientists to collaborate with other stakeholders. According to the authors, it is vital to convincing the scholars that working with other stakeholders and sharing knowledge is not harmful to their academic careers, or the so-called academic dignity (Kalar & Antoncic, 2015a, p. 9).

Therefore, effective science-policy interfaces require questioning the organizations of the knowledge users (policymakers, decisionmakers, or other groups) as well as the organizations of the knowledge producers (Jacobson et al., 2004, p. 256). On the one hand, policymakers need to encourage knowledge producers to collaborate with them. On the other hand, universities and other research centers should support participation in science-policy interfaces. Especially some universities may switch from the classical university structure to the entrepreneurial university structure so that scholars make sure that working with different actors in solving social and political problems does not harm their academic career (Kalar & Antoncic, 2015a, p. 8). If working with other actors can be considered as an academic success, just like publishing articles or doing research projects, it is very likely to see more participation in collaborative projects. However, this entrepreneurial university proposal is not to advocate that all universities should become the knowledge and technology suppliers for policymakers or the private sector. It is very likely that such a situation would not support theoretical and philosophical studies, basic researches that do not aim to achieve short-term results, and, more importantly, social scientists who take a critical stance towards the political-economic system. Universities should maintain their autonomy and objectivity and be able to continue their studies as much independent as possible of political and economic pressure. What is meant by encouraging entrepreneurial universities is nothing more than suggesting that some departments in some

universities can do research, make projects, and collaborate with other stakeholders for the needs of the region and the people of the region.

To sum up, even though ‘science’ and ‘politics’ always affect and transform each other, ‘knowledge producers’ and ‘policymakers’ belong to two different worlds. Cultural differences, scientific uncertainties, scientific myths, and incentives are some of the barriers between these two worlds. The two worlds need to engage with each other to overcome these problems. This can be achieved by interacting in sustainable, long-term, and institutional science-policy interfaces. Thus, knowledge producers would learn the complex world of policymaking, which considers not only scientific data but also values, ethics, culture, and public view. At the same time, politicians would learn the complex world of science, which includes long-time studies, uncertainties, and complex findings.





### **3. DEVELOPMENT AGENCIES**

The ‘Development Agencies’ chapter addresses the case study. In particular, it focuses on two Turkish (Regional) Development Agencies: Izmir Development Agency (IZKA) and Istanbul Development Agency (ISTKA). As the introduction chapter explains, the study aims to reveal the practical dimension and applications of science-policy interfaces by examining these two development agencies.

The introduction chapter explained the reasons for the selection of development agencies and particularly the selection of IZKA and ISTKA as case studies. To summarize, the reasons for focusing on development agencies are as follows:

1. Local and regional policies and actions are critical in combating climate change.
2. Local and regional actors are able to carry out region-specific activities regardless of the central government’s national-scale projects, policies, and actions.
3. Regional development agencies are in a unique trans-scale position between the international/national scale and local scale.
4. Regional development agencies have the power and potential to do long-term, theoretical, and holistic plans, projects, and policies, unlike the short-term and daily life solutions of other local actors, such as municipalities.

The reasons for choosing IZKA and ISTKA are:

1. The study aims to examine two different organizations operating within the same scope and purpose.
2. IZKA seems more aware and active than ISKTA in combating climate change so that the study can make a comparative analysis.
3. Izmir and Istanbul are densely populated regions and are essential for the Turkish economy. However, both cities are very vulnerable to climate change; hence, climate change studies in these regions become crucial.

This chapter consists of three sections. The first section addresses the establishment, organizational structures, duties and responsibilities, and supports of regional development agencies in Turkey. The second and third sections focus on IZKA and ISTKA, respectively. The examination of both agencies involves both the analysis of agency documents and interviews with the agency experts.

### **3.1 Turkish (Regional) Development Agencies**

#### **3.1.1 Establishment and historical development**

The ‘region’ and ‘regional studies’ started to be considered as multi-dimensional political concepts after the second world war and especially after the EU’s emphasis on ‘governance’ and ‘decentralization’ instead of traditional ‘national’ approaches for the development policies since the 1980s (Karakılçık, 2018, p. 21-22). In general terms, countries utilize the regional understanding of development in order to analyze their region’s specific conditions, unleash their potential, and encourage the development by using their own resources. In Turkey, the regional development approach began to become part of the public administration in the early 1960s through Five-Year Development Plans and it increased, albeit with some limitations, in the 1990s, within the framework of the concepts of ‘the localization’ and ‘the European Union Regional Development’ (Erbil and Erbil, 2019, p. 14).

Development agencies, whose numbers are hundreds across the world, are considered one of the most important institutions to carry out activities at the regional scale for the regional development policies (ISTKA, 2016b, p. 2). In Turkey, the first discussions and studies on regional development agencies started in the 1990s, and, by the beginning of the 2000s, their establishment was officially added to the political agenda (Karakılçık, 2018, p. 304). The theoretical foundation of Turkey’s development agency model was to comply with the EU standards and adopt the regionalization approach by opposing ‘the centralization’ and ‘the bureaucratic institutionalization’ (Karakılçık, 2018, p. 311; Karasu, 2015, p. 277). Accordingly, Turkey’s goal was to realize the concept of development from the local scale to the national scale (bottom-up approach) as an alternative to development from the national scale to the local scale (top-down approach).

In 2006, Law on the Establishment, Coordination, and Duties of Development Agencies (Law Number 5449) was adopted. Within the framework of this law, two development agencies (Izmir Development Agency and Cukurova Development Agency) were established as pilot institutions. The law specified the main purpose of development agencies as to reduce interregional and intraregional development disparities. In order to achieve this goal, development agencies were designed as semi-autonomous institutions that are based on the ‘governance approach’ to develop regional plans and policies by providing cooperation between local actors and acting as a bridge between the center and the local governments (Karakılçık, 2018, pp. 310-311).

As of today, twenty-six development agencies are operating in Turkey. The number of these agencies was determined using the Nomenclature of Territorial Units for Statistics (NUTS) classification system (Şengül, Eslemian Shiraz, & Eren, 2013). The EU has identified this statistical classification as a criterion for Turkey’s EU membership negotiation process as the NUTS aims to ensure that regional analyses can be done more effectively. As a candidate country, Turkey used the NUTS and determined 12 ‘Level 1 regions’, 26 ‘Level 2 regions’, and 81 ‘Level 3 regions’, which is equal to the number of cities in Turkey. Development agencies operate in Level 2 Statistical Regional Units. Level 2 regions were created by grouping neighboring provinces that are economically, socially, and geographically similar.

When they were first established, development agencies were affiliated with the State Planning Organization. As a result of the State Planning Organization’s conversion to the Ministry of Development in 2011, they became linked to the Ministry of Development. Finally, after Turkey moved into the presidential government system in 2018, the Ministry of Development and General Directorate of Budget and Finance Control of the Ministry of Finance were merged, and Directorate of Presidential Strategy and Budget was established. Since then, development agencies have been continuing their activities under the Ministry of Industry and Technology’s coordination.

In his evaluation made in 2015, Karasu (2015) stated that, since they were first established, the development agencies lost their motivations and efficiency, they now work with a very low capacity, and the government gives priority to metropolitan municipalities instead of development agencies in its local and regional activities.

Based on these inferences, Karasu concluded that development agencies are no longer able to fulfill the function of contributing to regional development and argued that, in the future, the government could close down the agencies, as the UK government did, or turned them into low-profile institutions with a limited scope. In the meantime, development agencies have not been closed, but, in 2018, they were affiliated to the Ministry of Industry and Technology. It has not been enough time to make an overall assessment of how this change has affected development agencies; nonetheless, it would be useful to share a few opinions.

Development agencies were initially designed as semi-autonomous institutions that could make quick decisions and promote local participation. However, the growing centralization in Turkey (Orhan, 2014, 2018a, p. 138) has also influenced development agencies. Especially after being linked to the Ministry of Industry and Technology, the central government's coordination power over the development agencies has increased. This coordination has both negative and positive aspects. The negative side is that, as noted above, the autonomy of the agencies has been reduced. On the other side, institutional standardization can be considered a positive aspect. Also, establishing closer relations with the central government can increase the agencies' political and economic powers. New financial structures such as Regional Development Fund, Technology and Innovation Fund, Regional Venture Capital, which are mainly carried out through development agencies with the coordination of the Ministry of Industry and Technology, are some examples of new connections between the government and development agencies (Anadolu Agency, 2019a, 2019b). In summary, compared to the period when they were first established, development agencies appear to have been in a tendency towards centralization in recent years. Even though it is too early to say anything about how they will have a transformation from now on, development agencies, as a relatively new model, need time to adapt to the traditional management structure and understanding in Turkey (Karakılçık, 2018, pp. 337-338). The preferences of the Executive Boards of the development agencies and, above all, the Ministry of Industry and Technology will be effective in determining the future of the development agencies. However, despite all these changes in the development agencies and management approach in Turkey, regional studies, especially in the context of climate change, maintain their importance in terms of being an intermediate spatial level between the central government and local government

(Karakılçık, 2018, p. 28), connecting various institutions and sectors, establishing relationships between knowledge producers and knowledge users at different levels, and, in short, operating as boundary organizations (Dannevig & Aall, 2015). Accordingly, although they nowadays cannot adequately meet their founding purposes, development agencies in Turkey are still critical for ensuring and improving the multi-level governance, which is crucial for producing effective, applicable and transformative climate change policies.

### **3.1.2 Organizational structure**

There are four main components of the organizational structure of development agencies:

1. Development Council
2. Executive Board
3. Secretariat General
4. Investment Support Office

The Development Council consists of representatives of public institutions and organizations, private sector, NGOs, universities, and local governments of the region. The Council, which serves as a consultant in development agencies, is in charge of forming cooperation among the actors of the region mentioned above.

The Executive Board is the decision-making body. The governor, the metropolitan mayor, the chairman of the provincial council, the chairman of the chamber of industry, the chairman of the chamber of commerce are the members of this board. Some duties of the Board are to accept the annual working program and submit it to the approval of the Ministry of Industry and Technology, to make financial arrangements, to deal with personnel recruitment.

The Secretariat General is the executive body of the development agencies. It is the Secretariat's duty and responsibility to implement the decisions of the Executive Board, to prepare the annual working program and budget, to carry out activities to improve the project production and implementation capacity of individuals, institutions and organizations of the region, to monitor, evaluate, supervise and report the supported projects and activities.

Lastly, Investment Support Offices carry out promotional and incentive activities to attract investments to the region from home and abroad. For this purpose, by participating in national and international events, it introduces the potential of the region and thus tries to improve the business and investment environment of the region.

### **3.1.3 Duties and responsibilities**

Some important points, Presidential Decree, published in the Official Gazette on July 15, 2018, stated about the duties and responsibilities of development agencies as follows :

1. Providing technical support to the planning works of local governments.
2. Contributing to the rural and local development considering regional plans and programs, and supporting projects in this context.
3. Developing cooperation between public, private, and NGOs of the region to achieve regional development goals.
4. Using and distributing internal and external funds for regional development.
5. Conducting research to identify the capacity and resources of the region, to accelerate economic and social development, and to increase competitive capacity.
6. Promoting the region's business and investment opportunities at the national and international levels.
7. Promoting Turkey's international activities in the region and supporting the development of projects considering these activities.

In short, development agencies are legal entities that carry out and support activities to guide regional and local policies, while also considering the policies of the central government at the national scale. Thus, as Erbil and Erbil (2019, p. 10) state, they operate as intermediate-scale institutions on regional level development by preparing and encouraging regional policies, projects, and plans. In this way, they try to minimize the development differences both between regions and within a region itself.

One of the tasks of development agencies that need to be specially emphasized is to prepare regional plans. Development agencies prepare these plans as a road map to ensure regional development. Regional plans try to establish a relationship between

national policies, plans, and local activities (Serhat Development Agency, 2018). These plans determine how development agencies will distribute their activities and resources in the long term. Furthermore, when development agencies decide to support a project, they also check the compliance of the project with the regional plans. With these features, regional plans are upper-scale and binding plans for all actors operating in the region. They shape the policies, projects, and strategic plans of the local governments. According to Turkish Zoning Law, for instance, the environmental and zoning plans must comply with the regional plans.

#### **3.1.4 Supports**

In order to achieve regional development, development agencies, in addition to their own activities, support the projects or activities of local administrations, universities, state institutions and organizations, professional organizations, NGOs, for-profit businesses, cooperatives, unions, and other natural and legal persons. Supports are in two forms, technical and financial support. With technical support, agencies help various stakeholders in the region by providing agency staff or external staff procurement in order to increase their institutional capacity and to strengthen their contribution to regional plans and projects (Serhat Development Agency, 2018).

Financial supports require a more detailed explanation. Development agencies have the authority to provide financial support to the actors in the region for their projects. There are three types of financial support. The first is the Interest Support. Interest Support covers the interest expenses of the profit-oriented natural and legal persons in return for the loans they receive from intermediary institutions. For instance, small and medium-sized enterprises, farmers, self-employed people can benefit from this outright support.

The second type of support, Interest-Free Credit Support, is given for the projects of the profit-oriented natural and legal persons. This support provides interest-free loans to projects that meet the criteria set by the referenced development agency. Those who receive support then repay this loan by installments without paying any interest.

Direct Financing Support is the third financial support, and it provides free financial support to various projects and activities. Development agencies often make a call for proposals to determine projects that will receive support. However, agencies can also give support in the form of ‘Feasibility Support’ and ‘Guided Project Support’ without

calling for project proposals by mitigating the obligations on project preparation or directly managing the project preparation process.

In Feasibility Support, development agencies provide direct financial support to the feasibility studies of projects that prioritize regional development. Institutions, organizations, associations, and cooperatives such as local governments, universities, state institutions and organizations, professional organizations, NGOs, organized industrial zones, small industrial areas, technoparks, technology development zones, industrial zones, business development centers, and cooperatives can benefit from Feasibility Supports (Ankara Development Agency, 2010). This support is not provided to the institutions and organizations that focus solely on profit purposes (ISTKA, 2020b).

Guided Project Support provides financial and technical support to projects that will operate in line with the priorities specified in the regional plan. These projects are supported to accelerate regional development and improve entrepreneurship and innovation capacity in the region. The above institutions and organizations that can apply for Feasibility Support can also benefit from Guided Project Supports. ISTKA stated that partnerships of universities, public sector, private sector, and NGOs are encouraged in Guided Project Supports (ISTKA, 2020b). Moreover, individuals and organizations from all segments can apply for these support programs if there is an open support program, if the application complies with the requirements in the Application Guidelines prepared by the development agency, if it is a project that serves the priorities of the agency, and if the application is made at the proper time and format.

To sum up, development agencies aim to contribute to the regional development by using the regional potential and by providing cooperating among the actors in the region. Indeed, Executive Boards and Development Councils were designed to strengthen the interaction between the leading institutions of the region. In addition, expert staff working under the Secretariat General are required to be capable of conducting knowledge-based and theoretical activities. Thus, it can be claimed that development agencies are inclined to establish science-policy interfaces within the framework of their duties, visions, and responsibilities. In this regard, the next two sections will reveal the perspectives of IZKA and ISTKA on science-policy interfaces



and how they establish and maintaining these interfaces, through both the analysis of agency documents and interviews with agency experts.

### **3.2 Izmir Development Agency**

This section addresses the Izmir Development Agency (IZKA) and consists of two sub-sections. By drawing from their regional plans, strategy reports, study reports, annual reports, and websites, the first sub-section provides general information about the Agency, reveals its perspective on science-policy interfaces, and gives examples of its science-policy interface related activities, especially in the context of climate change. The second sub-section reveals the results of the interviews with experts from the Agency. Agencies' documents include general information on science-policy interfaces and collaborations with other stakeholders. However, the interview findings include detailed information about Agency experts' science-policy interface experiences and perspectives.

#### **3.2.1 Agency documents**

##### **Establishment and organizational structure**

The decree of the Council of Ministers, which envisages the establishment of Development Agencies in some Level 2 Regions, was published in the Official Gazette on July 6, 2006. With this decree, IZKA was established in TR31 (Izmir) Level 2 region. It is one of the first two pilot agencies in Turkey.

In its 2020 Work Programme, The Agency states its vision and mission as follows:

“The vision of IZKA: To be a pioneering and effective internationally recognized agency in sustainable local development.

The mission of IZKA: To develop and implement participatory tools that will mobilize local potential with an integrated approach for sustainable development of İzmir” (IZKA, 2020a, p. 10).

The Development Council, which is the advisory body of the Agency, consists of representatives of the private sector, NGOs, public institutions, local governments, and universities in the Izmir region. The Executive Board, which is the decisionmaking body of the Agency, includes the Governor of Izmir, the Mayor of Izmir Metropolitan Municipality, the Chairman of the Izmir Chamber of Commerce, the Chairman of the

Aegean Region Chamber of Industry and three members elected from the Development Council.

The General Secretariat, which carries out the activities of the Agency, consists of five units:

1. Innovation and Entrepreneurship Policies Unit
2. Green Growth Policies Unit
3. Blue Growth Policies Unit
4. Project Application and Monitoring Unit
5. Corporate Governance Unit

Since it is directly related to the scope of the study, it would be appropriate to explain the units of Green and Blue Growth Policies in detail. Green Growth Policies Unit aims to realize green transformation in the Izmir region with its green growth approach based on environmentally oriented sustainable economic growth. In this regard, it provides producers and industrialists with the necessary support and knowledge to use the regional resources in an environmentally sensitive manner. It supports the ‘agricultural and industrial production’ and ‘clean energy and clean technologies’ potential of Izmir in order to strengthen the investment environment and competitiveness of the region. It develops strategies to prevent the adverse effects of climate change on water resources, natural wealth, and agricultural production in the region. Finally, the unit supports the development of applications that will increase renewable energy use and resource efficiency (IZKA, 2020c).

The Blue Growth Policies Unit focuses on the advantages of Izmir being a coastal city. Izmir, which has twenty-two ports, earns three-quarters of its total exports (approximately fifteen billion dollars) from sea transportation. The unit aims to use this superiority of the region to contribute to the sustainable growth of the city, primarily through the development of maritime transport and port sector. For this reason, it focuses on the coastal economy and carries out studies for the sustainable growth of maritime sectors and increasing the tourism-oriented economic diversity on the coasts (IZKA, 2020b).

### **Agency's science-policy interface vision**

First of all, IZKA, just like other agencies, has prepared a guiding regional plan: 2014-2023 Izmir Regional Plan. This plan was approved on December 30, 2014, and came into force. IZKA has determined the main purpose of the regional plan as creating a sustainable development plan that takes into account the participation of all actors in the region and the local dynamics of Izmir (IZKA, 2014a, p. 7). Indeed, in the preparation process of the plan, IZKA interviewed with two thousand two hundred people in order to ask the opinion of the people in the region and introduce the plan. These meetings were held under the headings of 'Izmir Citizen Meeting', 'Izmir Development Workshop', and 'District Meetings' (IZKA, 2014a, p. 13).

At the end of the document of the Regional Plan, IZKA shared the full list of stakeholders who took part and contributed to the process of preparing the plan (see IZKA, 2014a, pp. 208-240). This list also shows the institutions of the participants. According to the list, IZKA collaborated with representatives from municipalities, district governments and other public institutions, universities, foundations, professional chambers, cooperatives, NGOs, briefly with a large group of participants operating in the region.

For instance, a working group that can be considered as a science-policy interface is 'Urla-Cesme Karaburun Peninsula Sustainable Development Strategy'. The Strategy aims to determine the economic, social, and cultural values of the region with the contributions of local people in the peninsula and to try to develop these values sustainably (IZKA, 2014b). In line with this goal, the Agency worked with thirteen knowledge producers from three different universities in Izmir (Izmir Institute of Technology, Ege University, and Dokuz Eylul University).

Cooperations of IZKA are not limited to universities in Izmir. In another project, 'Extension of Eco-efficiency (Cleaner Production) Practices in Izmir', IZKA carried out joint studies with Middle East Technical University, an Ankara-based university. Furthermore, another partner of the project is the Technology Development Foundation of Turkey, which is a non-profit intermediary/implementing foundation (IZKA, 2014a, p. 209). That is, IZKA also works with knowledge producers outside the academy. The Economic Policy Research Foundation of Turkey and the Turkish Foundation for Combating Soil Erosion are other examples of this kind of knowledge producers that collaborated with IZKA.

An example of IZKA's understanding of civil engagement is the 'Civil Society Analysis City Council Focus Group Meeting', which was organized to get the opinions of different segments of the society while preparing the Regional Plan. Fifteen different non-governmental organizations attended this meeting, as well as two professors from Ege University Faculty of Communication (IZKA, 2014a, p. 238). In this meeting, the non-governmental organizations were mainly women's solidarity associations, youth associations, and associations for the protection of disability rights. One can say that IZKA wanted to interact with those who have difficulty making their voices heard.

Another participatory project of IZKA, which is more current and related to climate change, is its 'industrial symbiosis' activities. As a circular economy approach, industrial symbiosis aims to make industrial systems engaged and related, which also serves as a Green Development approach. This dependence and relationship refer to the sharing of all resources that can be used collectively, including waste, by-product, energy, infrastructure, superstructure, and human resources, in order to ensure joint development of the stakeholders in the region through partnership, solidarity, and collaboration (Eymirli, 2020a). IZKA partners with the Ministry of Environment and Urban Planning and Bursa Eskisehir Bilecik Development Agency in the industrial symbiosis project coordinated by the General Directorate of Development Agencies of the Ministry of Industry and Technology. In January 2019, IZKA hosted the 'Local Stakeholder Workshop' to exchange information with stakeholders in the region (IZKA, 2019b, p. 61). Furthermore, in March 2020, it organized 'Industrial Symbiosis Capacity Development Training' in partnership with the United Nations Development Program. In this training, stakeholders shared their opinions on the project to create a common road map for Izmir (IZKA, 2020e). To sum up, IZKA regularly informs stakeholders in the region for industrial symbiosis activities and receives their opinions.

In the Regional Plan of IZKA, the environment and climate change are frequently mentioned. The Agency emphasizes that the environmental resources of the region should be protected because Izmir has poor water resources, has vulnerable marine space, coastal and cultivated areas, and it is the largest hazardous waste-producing region of Turkey as it produces a quarter of Turkey's total hazardous waste production (IZKA, 2014a, p. 12). For these reasons, IZKA aims to protect environmental

resources while carrying out regional development plans and projects. In order to realize this sustainable development approach, the Agency has identified three main axes:

1. Strong Economy
2. High Quality of Life
3. Strong Society

Climate change and environment studies are generally addressed within the scope of the High Quality of Life axis. IZKA associates its climate and environmental vision with the concept of the ‘sustainable environment’ within the context of this axis (IZKA, 2014a, p. 13). The axis consists of four different strategies

1. Health for all
2. Sustainable environment
3. Quality urban life
4. Accessible Izmir

Some of the goals regarding climate change and environmental issues within the scope of these strategies are:

- Sustainable wastewater, potable, and utility water management will be provided.
- Air pollution control will be provided in dense industrial areas.
- Renewable and clean energy use will be expanded for domestic heating.
- Industrial, agricultural, and urban pollution prevention and control will be provided, especially in vulnerable areas.
- The biodiversity of the Izmir region will be tried to be protected.
- Environmental planning, green transportation, efficient, and clean energy use will be prioritized in planning urban development (IZKA, 2014a, p. 15).

The Regional Plan became active in 2014, but IZKA’s emphasis on the importance of global climate change continues in its current studies. The 2020 Work Program, for instance, states that, based on green growth and blue growth approaches, the concept of ‘sustainable production’ has been adopted (IZKA, 2020a, p. 6). The Agency has divided this approach into three titles as Result Oriented Programs :

1. Innovation and Entrepreneurship Result Oriented Program
2. Clean Energy and Clean Technologies Result Oriented Program
3. Marine Economics Result Oriented Program

Clean Energy and Clean Technologies Result Oriented Program is directly related to the climate change and environmental policies of the IZKA. The Agency states that global threats such as climate change, population growth, reduction of natural resources, increased environmental pollution are the rationale for determining the program. IZKA determined the objectives of this program as follows:

“General Purpose: To promote sustainable production and renewable energy practices so that İzmir can grow in a competitive and inclusive manner while protecting its natural resources.

Special Purpose 1: Development of clean energy cluster to strengthen domestic equipment production and vocational training capacity

Special Purpose 2: Introducing İzmir’s investment opportunities and increasing investments in clean energy sectors

Special Purpose 3: Developing sustainable production capacity, especially in industry and agriculture sectors in İzmir” (IZKA, 2020a, p. 29).

### **Activities**

The previous sub-section has explained IZKA’s vision and goals regarding science-policy interfaces and climate change policies. This sub-section will focus on IZKA’s activities. These activities will give insight into the Agency’s potential for implementing plans and programs in real life.

In their study, which examines climate change-related activities of all development agencies in Turkey between 2010 and 2017, Erbil and Erbil (2019) ascertained that IZKA had one hundred ninety-five activities that could be associated with climate change. With this number, after the South Aegean Development Agency, which actualized two hundred eighteen activities in the specified years, IZKA is the second agency carrying out the most activities regarding climate change among twenty-six development agencies .

While examining these activities, Erbil and Erbil took into account the development agencies’ various financial and technical supports, publications, events, and meetings

between 2010 and 2017. This study, in addition to these years, examined IZKA's 2018 Activity Report and 2019 Interim Activity Report and determined that the number of climate change activities is increasing. It is beyond the scope of the study to examine all of these activities, which are around two hundred. Nevertheless, some examples that will give information about IZKA's activities regarding science-policy interfaces in climate change policymaking and implementation are given below.

1. In 2012, IZKA prepared the 'Izmir Eco-efficiency Strategy' in cooperation with the Technology Development Foundation of Turkey to reach detailed information on the environmental vulnerability, potential, and resources of the Izmir region (IZKA, 2013, pp. 35-36). By drawing from the outcomes of this strategy, the Izmir Eco-efficiency (Cleaner Production) Program, IZKA's one of the most important programs regarding climate change policies, has been developed.

The program aims to encourage industrial enterprises in Izmir to use fewer resources and to make more environmentally friendly production. For this purpose, companies have been trained, cleaner production studies have been prepared, and applications have been carried out. According to the data of IZKA, the benefits of the program are:

“125.8 tons of annual reduction in salt use

7.285 tons of annual reduction in CO<sub>2</sub> emissions

27,049 m<sup>3</sup> of annual reduction in wastewater

321 tons of annual reduction in solid waste

57.6 tons of annual saving in chemical use

71,049 m<sup>3</sup> of annual water saving

838.8 TEP (tons of equivalent oil) of annual energy saving

100 tons of raw material saving” (IZKA, 2020d)

2. Like all other development agencies, IZKA provides technical and financial support to projects and activities that are in line with the Regional Plan. Among these programs, there are also clean energy-oriented programs. More precisely, the Agency has given eighty seven million Turkish lira financial support to fifty-five clean energy-focused projects (IZKA, 2020d). Apart from energy-oriented

projects, the agency has supported and continues to support climate change projects of many universities, public institutions and organizations, industrial enterprises, commercial institutions, district municipalities, and many other local stakeholders.

3. In 2019, IZKA participated in the ‘Environment Days Event’ organized by Dokuz Eylul University to raise awareness on environmental and waste management issues. Within the scope of this event, the Agency received information about the work of academics and made a presentation on the Agency’s sustainability activities and their results (IZKA, 2019b, p. 62).
4. In 2019, within the scope of the ‘Project of Development of the Green Organized Industrial Zone Framework for Turkey’, that aims to transform existing organized industrial zones into eco-industrial parks and to design the future industrial zones (IZKA, 2019b, p. 70), IZKA organized the ‘Izmir Green Organized Industrial Zone Information Seminar’ in cooperation with the World Bank. In this seminar, resource and energy efficiency opportunities for industrial zones, significant project results, and IZKA’s studies on sustainable production were discussed. Officials from the World Bank Group, Ministry of Industry and Technology, Izmir Metropolitan Municipality, Izmir Industry and Technology Provincial Directorate, and Organized Industrial Zones in Izmir attended the meeting (IZKA, 2019a, p. 70).
5. In 2018, IZKA launched the ‘Startup and Corporate Company Meeting Program in Green Technologies-GreenTech Izmir’ in cooperation with the Economic Policy Research Foundation of Turkey. The program was designed to bring startups and corporate companies together under the theme of sustainability and to encourage collaborations (IZKA, 2019a, p. 52). GreenTech Izmir Program targets startups working on environmentally friendly green technologies and companies that can cooperate with these startups.
6. In 2017, within the scope of the ‘sustainable production’ activities, IZKA participated in the ‘Environmental Footprint Project for Business World’ in cooperation with the Aegean Forest Foundation and Lifelong Learning, Vocational Training and Development Association (IZKA, 2018, p. 75).



7. In 2017, within the scope of the ‘Clean Production, Eco-innovation, Eco-design, Green Entrepreneurship’, collaborations regarding sustainable production were planned for Turkey and Izmir in cooperation with the Ministry of Science, Industry, and Technology and Productivity General Directorate (IZKA, 2018, p. 75).
8. In 2017, within the scope of ‘Climate Change, Sustainable Agriculture, Rural Development’ activities, IZKA decided to implement a joint project with the World Bank on the identification, risk analysis, and continuity of key agricultural products in Izmir Kucuk Menderes Basin (IZKA, 2018, p. 75).
9. In 2020, IZKA started the projects of the ‘Sustainable Development Dictionary’ and ‘Development Diary’ on its website. The main purpose of the Dictionary is to apprehensibly explain the concepts of sustainable development such as green growth, blue growth, carbon footprint, sustainable tourism, sustainable agriculture. On the other hand, in the Development Diary, agency employees write articles about the Agency’s activities, especially those about sustainable development. For example, in June 2020, two agency experts, Eymirli and Ulusoy Sungur, shared two detailed and explanatory texts titled ‘Carbon Trade in Combating Climate Change’ and ‘Starting the Green Transformation in the COVID-19 Process’ (see Eymirli, 2020b; Ulusoy Sungur, 2020).

The above activities represent only a small part of all IZKA activities related to climate change. However, in general, it can be said that IZKA has developed effective and transformative policies and projects regarding climate change and collaborated with various actors to put them into practice. Moreover, it has provided significant financial and technical supports to projects that can reduce the impacts of climate change in the region. The next part will reveal the background and detailed information about the Agency’s approach to the climate change-related science-policy interfaces by sharing the results of the interviews made with agency experts.

### **3.2.2 Interview findings**

This section reveals the responses of five IZKA experts (Respondent I, Respondent II, Respondent III, Respondent IV, and Respondent V) to interview questions about

- (i) the Agency’s perspective on scientific knowledge

(ii) the Agency's perspective on science-policy interfaces, and collaborations with other stakeholders

(iii) the barriers the Agency face in establishing science-policy interfaces and possible solutions to overcome these barriers.

### **The Agency's perspective on scientific knowledge**

There is a consensus among experts that scientific knowledge is the basis of not only climate change-related activities but every project or policy of IZKA. Respondent I states that the Agency always does scientific research before taking action, and then it does field research to verify the research or to fill the gaps in it. Respondent II, also, points out that acting based on knowledge is not an option but an obligation because regional development issues, such as using resources or guiding stakeholders or sectors, should be based on scientific knowledge in order to be effective. Respondent III and Respondent V underline the importance of scientific knowledge in the process of preparing plans, strategies, and financial support programs. According to Respondent III, all these activities are carried out using the knowledge conveyed from universities, academicians, NGOs, and other stakeholders. Moreover, Respondent V reveals that, in the legislation of development agencies, there is a clause which obliges any institution that owns data to respond when the development agencies request data, and this clause, although it does not always work very effectively, is very advantageous in IZKA's data collection process. Finally, Respondent IV states that, in addition to scientific knowledge, IZKA considers its impact on other actors in the region and its contributions to the policy the Agency plans to implement.

### **The Agency's perspective on science-policy interfaces and collaborations with other stakeholders**

All respondents argue that IZKA always objectively tries to establish a relationship with all the stakeholders that are relevant to the scope of the project. Some organizations that they mention are academia (rectors and academics), public institutions and organizations, professional associations, chamber of industry, chamber of commerce, commodity exchange market, local governments (especially metropolitan municipality), private sector, organized industrial zones, free trade zones, technology development zones, and companies. In addition, as Respondent IV points out, the Agency meets with the public in order to better access local knowledge, local values, and cultural resources.

Nevertheless, Respondent I asserts that, within the Agency's broad spectrum of partnership, different actors come to the forefront depending on the content: "In almost every work, we try to get the contribution of the private sector, academia, NGOs, local administrations, and public organizations but, of course, weighting differs....". Respondent II also reveals that different actors gain importance in different projects. For instance, in some projects, the Agency prefers to cooperate with NGOs, associations, and unions, while in some other projects, it cooperates with universities, university departments, and some specialized academics in these departments. Respondent IV puts forward that IZKA does not limit itself only to the academy when it comes to obtaining knowledge, that is, when a science-policy interface is to be established: "We try to reach where the knowledge is produced." As an example, Respondent IV says that IZKA cooperates with some associations, such as the Business World and Sustainable Development Association, or some foundations, such as the Technology Development Foundation of Turkey, if they produce the data using scientific methods.

The above comments were about establishing science-policy interfaces in general. Respondents also give details about science-policy interfaces and collaborations with other actors related to the Agency's climate change activities. As Respondent III reveals, IZKA has recently changed its organizational structure and identified two Result Oriented Programs, Green Growth and Blue Growth, that aim to manage the sustainable development by identifying and mitigating the effects of climate change on the region. Within the framework of these programs, Respondent III claims that "IZKA is in cooperation with all relevant actors", such as the Provincial Directorate of Environment and Urbanization, the Directorate of Agriculture, which works on agriculture and sustainability, associations, universities, university professors, cooperatives, many international organizations like the World Bank, United Nations Development Programme or World Wildlife Fund, and other development agencies. Respondent III also specifies that IZKA is a part of the many climate change committees in the region such as the Environment Working Group of Aegean Region Chamber of Industry, Kucuk Menderes Basin Water Management Studies of the General Directorate of State Hydraulic Works, Green City Action Plan Working Group of Izmir Metropolitan Municipality.

Respondent II shares a specific example in order to elaborate on how IZKA cooperates with other actors in terms of climate change activities. The Agency recently organized a workshop on climate change with foreign stakeholders. First, it carried out a needs analysis together with many actors, from the Ministry of Industry and Technology to the local institutions. The Agency officials visited some actors in the region, such as companies, industrial zones, the Provincial Directorate of Environment, and Urbanization, to identify which topics they need in such a workshop. Finally, IZKA actualized the workshop with the participation of all of the relevant actors. Another example given by Respondent II is the KAPRA project that IZKA collaborates with the World Bank to determine the impact of climate change on agricultural activities in the Kucuk Menderes Basin.

Respondent V mentions IZKA's partnerships with local governments. Respondent V thinks that, in addition to collaborating to develop projects, the Agency has raised awareness of local governments on environmental and climate change issues. For instance, IZKA has carried out projects to establish solar power plants in partnership with the metropolitan municipality and some district municipalities. After these projects, Bornova Municipality expanded its perspective and it has started to levy less real estate tax from the buildings that use renewable energy sources. However, arguably, IZKA's most critical project on climate change is the Izmir Eco-efficiency Strategy. Respondent IV explains how the Agency cooperates with the other actors in this strategy. Respondent IV says that IZKA's main partner was the Technology Development Foundation of Turkey, but as a part of the project, the Foundation cooperated with the academy on behalf of the Agency. That is, IZKA sometimes establishes science-policy interfaces through other institutions.

Another important point is the Agency's attitude in partnerships. According to Respondent IV, IZKA does not act as a sole authority while working with other organizations or individuals as it allows its partners to shape the process. Nevertheless, if there is anything the Agency deems necessary for the region, it can also be persistent: "In some issues, (contributions from other institutions) shape our policies and projects, but in some issues, we regard the issue critical, and we insist." Nonetheless, Respondent IV makes clear that these kinds of projects or policies are also based on scientific data or global trends. For instance, when the Agency decided to expand sustainable and renewable energy, there were not many companies or awareness in the

region, but it continued its insistence as it considers the issue very important. Respondent IV emphasizes that, indeed, turning the international development agenda, such as climate change, sustainability, eco-efficiency, digitalization, industry 4.0, to the local agenda through supports, meeting, financial sources, more generally, orientation and assistance is one of the biggest contributions of the development agencies. Furthermore, Respondent V thinks that IZKA does not have to be insistent on its climate change-related activities since there is an environmental sensitivity in the people and local governments of Izmir that facilitates the implementation of environmental policies. For instance, Respondent V says, when the Agency has recently turned its organizational structure into a more climate change-focused perspective, both the Ministry of Industry and Technology and local stakeholders provided very positive feedback.

The contributions of all experts regarding interaction, cooperation, and collaboration with other actors, especially knowledge producers, to combat climate change can be summarized in Respondent II's following statements: "...in other words, we deal with the issue (climate change) together with many organizations at local, national and international level. It is actually an obligation rather than an option because you need to make the local activities together with different organizations, regardless of scale."

### **The barriers the Agency face in establishing science-policy interfaces, and possible solutions to overcome these barriers**

Both Respondent I and Respondent II state that the main problem they face when they want to collaborate with knowledge producers is the strict and non-cooperative structure of the academy. Particularly, Respondent I asserts that the academy has weak relations with the social life: "The academy still defines its role as only producing knowledge and educating the human resources, and it does not go beyond it." Moreover, according to Respondent I, universities do not educate the students as individuals who will be involved in social issues in the future. Similarly, Respondent II argues that the topics IZKA deals with generally concern different disciplines, yet the academicians are confined to their fields and do not pay attention to other issues. In the words of Respondent II: "horizontal collaborations are required. I have to work with an engineer, an economist, but also, for example, with a sociologist. These specialties do not coexist on the academy side, and there is no suitable environment for them to come together." Respondent II elaborates on perspective differences by

arguing that the main focus of IZKA, which is achieving results in the short term, does not correspond to the academy's more theoretical approach. That is, the Agency, by its job definition, works on solving regional problems and accelerating regional development. Since these problems cannot be solved without knowledge, they want to work with the academy. However, according to Respondent II, academics do their studies only for the academy. Respondent IV also contends that academicians' perspective on the private sector or other stakeholders and their abilities to turn knowledge into practice can sometimes become a barrier because some academics do not have the feeling of working, sharing, and succeeding with the private sector or associations. Respondent IV believes that academic knowledge should be transferred to the private sector, the civil society, or cooperatives by relevant academics; nonetheless, this skill, unfortunately, does not exist in some of the academicians.

Furthermore, Respondent IV and Respondent V state that financial and bureaucratic problems are also significant. As the development agencies are public institutions and they have their own procurement procedure, transferring money to academics, and in general financial management, can be challenging, mainly when the Agency works with a commission that involves multi-stakeholders, for example, multiple universities. Respondent II refers to the problem of bureaucracy as follows: "When we say 'Let's have a workshop with professors', this is not easily actualized because permits or procedures are required from the Rectorate or Dean's Office."

The respondents believe that there are problems specific to the Izmir region or IZKA. Respondent I, for instance, thinks that the institutions in Izmir tend to be content with the existing conditions and not to make an effort to improve it. Therefore, this lack of motivation and unwillingness can sometimes affect the Agency's activities negatively. Respondent IV also thinks that the Izmir region has some unique characteristics: "I think one of the important issues in Izmir is that it is a 'relax' city... Sometimes the effort and focus here may not be like in Ankara or Istanbul. For example, when the summer comes, the private sector does not work from Friday to Monday. People go to (holiday spots) like Cesme or Fethiye." Respondent I points out the weak awareness of climate change among civil society organizations as another problem. According to Respondent I, NGOs working directly on climate and environment in Izmir do not carry out any activities, except to define themselves 'environmental organizations'. Respondent III states that the Agency's previous activities or decisions may cause

some little problems: “Sometimes you go to an institution or a stakeholder that has not received financial support from the Agency. There can be responses like, “We applied to the financial support, but we did not get it... Whom does IZKA provide the support?””

In order to eliminate these barriers, which are underlined by different perspectives and working priorities, financial and bureaucratic reasons, and region and IZKA specific conditions, the respondents share some possible solutions. Respondent I believes that the academy needs to change and expand its understanding of the mission: “... I think the role of the academy should be evaluated as raising individuals who are more sensitive, more willing to strengthen social resilience, and more voluntary...” Moreover, Respondent I says that institutions in Izmir, especially local authorities and academia, should be more motivated and open to collaboration. In particular, they should be those who bring the idea of cooperation with the Agency. Respondent II draws attention to a similar point by stating that the academy should take more responsibility in this regard. According to Respondent II, knowledge producers can offer solutions to policymakers instead of waiting for a request from the other party besides developing themselves in terms of working with different disciplines.

Respondent II also claims that what universities should do is to be aware of the problems of the region because “if regional issues and the issues that universities are working on coincide, collaborations that will benefit the region will be established more easily.” That is, the universities should know the unique conditions, challenges, and opportunities of its region and act accordingly. Respondent II contends that “For example, if it is a university in Izmir, it has to look at what Izmir’s problem is. Climate change is one of them... We need to ensure this focus.” Respondent IV agrees with Respondent II’s point that regional solutions require regional collaborations: “The studies of a university or a knowledge producer unit should be in line with our (IZKA) institutional goals so that the knowledge the region/local needs is produced with the scientific knowledge.” Although this mentality change is considered essential, Respondent II does not forget to note that these are mainly structural issues rather than changes in human behavior.

Respondent IV believes that there are also some responsibilities that policymakers should fulfill to establish science-policy interfaces. For instance, they need to follow what the academicians or other knowledge-producing organizations are doing. More

importantly, policymakers should take a more inclusive approach towards knowledge producers: “You have to work with those people, not from the perspective of service procurement, but with the feeling that you are stakeholders working together at the same table. If you do not look at the issue as a team, it does not go anywhere... We have to replace ‘the logic of service procurement’ with the logic of ‘working together’.”

Finally, even though Respondent III and IV mentioned that there are specific problems to IZKA and Izmir region, they also think that these unique conditions can sometimes be effective in overcoming barriers. For instance, Respondent III states that IZKA, in general, has a positive reputation in the region: “Being in IZKA, working with IZKA, coming from IZKA has always been welcomed among stakeholders ... In general, when I say that ‘I am coming from IZKA’, since its activities are well known in the region, I, speaking for myself, have always received positive returns.” Furthermore, Respondent IV asserts that the Izmir region has an ideal scale that is neither too small nor too big. Respondent III agrees with this point: “I think Izmir as a region has an optimal size to carry out different studies, at least in terms of population. That is, other development agencies consist of several provinces, but we are composed of only one province. On the other hand, however, Izmir is the third-largest city of Turkey.” Respondent V thinks that, even though sometimes it is necessary to contact bigger institutions in Istanbul or Ankara, universities and human capital in Izmir are at an optimum level. In fact, Respondent V emphasizes that the Agency tends to prefer regional and local institutions: “At the end of the day, we are a ‘regional’ development agency. If there is a local stakeholder, even with insufficient capacity, it is a reasonable choice to work with the local stakeholder, and thus improve its capacity, rather than going to a different city. It is because our aim is to improve regional capacity”. Respondent IV states that another advantage of Izmir is the fact that political conflicts do not affect the collaborations between different institutions. According to Respondent IV, if there is a financial resource or an intermediary, establishing cooperations is not generally problematic. For example, Respondent IV says, the governor, as the state official, has a different political stance than the municipality, but there is a good culture of working together.



### **3.3 Istanbul Development Agency**

This section, which focuses on the Istanbul Development Agency (ISTKA), has the same sub-section titles with the Izmir Development Agency (IZKA) section. That is, it includes two sub-sections. The first one gives general information about the Agency, its science-policy interface approach, and its science-policy interface activities, especially regarding climate change. The second sub-section is about the interview findings. It shows the Agency experts' opinions and experiences on science-policy interfaces.

#### **3.3.1 Agency documents**

##### **Establishment and organizational structure**

ISTKA was established in TR10 (Istanbul) Level 2 region by the decision of the Council of Ministers on November 10, 2008. The Secretary General was appointed in August 2009, and the Agency became operational in December 2009.

As of 2020, the Agency states its vision and mission as follows:

“Vision: A people oriented, environmentally sensitive, effective and guiding solution center, working for the global city of Istanbul.

Mission: Adopting participation and representing collective wisdom, and taking up a position in the center of the cooperation networks to transform resources into common values for Istanbul” (ISTKA, 2020a).

Besides, the Agency defines the core values and working principles in its activities and projects as follows:

“Participation, innovation, impartiality, transparency, reliability, solution-orientation, efficiency, sustainability, scientificity, environmentally and culturally conscious, social responsibility, effectiveness, accessibility, accountability, holistic approach” (ISTKA, 2020a).

The Development Council, which operates as the advisory body of the Agency, consists of members selected from public institutions and organizations, private sector, NGOs, universities and local governments of the Istanbul region. The Executive Board, the decisionmaking body, involves the Governor of Istanbul, the Mayor of the Istanbul Metropolitan Municipality, the Chairman of the Istanbul Chamber of

Commerce, the Chairman of the Istanbul Chamber of Industry, and three members of the Development Council.

There are five units within the General Secretariat of ISTKA:

1. Planning, Programming, and Coordination Unit
2. Program Management Unit
3. Control and Evaluation Unit
4. Investment Support Office
5. Support Unit

As it is directly related to the scope of the study, it would be appropriate to explain the first unit in detail. The Planning, Programming, and Coordination Unit is responsible for conducting analysis and research to determine the current economic, social, cultural, and environmental situation of the Istanbul region. It is also in charge of preparing the Istanbul Regional Plan. Besides, it operates to ensure that the visions and priorities of the Istanbul Regional Plan are adopted and implemented by regional stakeholders. It is another task of the unit to develop cooperation and coordination among the public sector, private sector, and NGOs in the region (ISTKA, 2020c).

#### **Agency's science-policy interface vision**

ISTKA prepared the 2014-2023 Istanbul Regional Plan, which was approved and came into force on December 30, 2014. The Agency states that the primary document directing the Agency's activities is the Regional Plan (ISTKA, 2020c). Accordingly, this plan is the main document that can provide insight into ISTKA's perspective on science-policy interfaces.

During the preparation process of the Regional Plan, after performing the current situation analysis, the Agency organized Thematic Workshops on twelve topics. The purpose of the workshops is to get the ideas of the actors in the region and to introduce the plan by drawing from the participatory approach (ISTKA, 2014a, pp. 26-27). Thus, more than two thousand representatives from different organizations participated in the preparation process of the Istanbul Regional Plan (ISTKA, 2014a, p. 39).

As IZKA did, ISTKA also shared the list of those who contributed to the preparation process of the Plan and the institutions to which they belong (see ISTKA, 2014a, pp. 514-524). The list shows that the Agency cooperated with participants from the public

sector, private sector, universities, local governments, institutions, associations, foundations, and NGOs. In other words, the Agency brought together various actors in the region and created an environment for mutual exchange of ideas.

In these meetings, science-policy interfaces related to climate change were established. For instance, academics from Bogazici University and Istanbul Technical University, two of the leading universities in Istanbul, attended the Sustainable Resource and Waste Management thematic meeting. Officials from the Ministry of Environment and Urbanization and Istanbul Provincial Directorate of Environment and Urbanization of Governorship of Istanbul also contributed to the meeting (ISTKA, 2014a, p. 516).

Furthermore, in order to prepare the Regional Plan with a participatory perspective, ISTKA communicated with various NGOs that could be considered as knowledge producers. Indeed, NGOs such as the Turkish Foundation for Combating Soil Erosion and Environment Friendly Green Buildings Association participated in the Sustainable Resource and Waste Management meeting. Apart from climate and environmental issues, some non-university knowledge producers that cooperated with the Agency are the Economic Policy Research Foundation of Turkey, Technology Development Foundation of Turkey, and Economic Development Foundation.

‘The Transportation and Accessibility Workshop’ can be considered an example of ISTKA’s participatory approach. In addition to public institutions and universities, employee associations, professional chambers, disability associations, and transportation-oriented non-governmental organizations participated and contributed to this workshop (ISTKA, 2014a, pp. 517-518). Thus, ISTKA pursued the goal of including the views of civil society in the planning and decisionmaking processes.

Istanbul Regional Plan is based on three main axes (ISTKA, 2014a, pp. 11-13):

1. Globally Decisive, High Value-Added, Innovative and Creative Economy
2. Fair Sharing, Inclusive and Learning Society
3. Joyful Authentic Urban Spaces and Sustainable Environment

The vision related to climate change is explained under the third axis which has nine priorities:

1. Sustainable urban development, participatory planning
2. Spatial quality, authentic design

3. Holistic and inclusive urban transformation
4. Protected Istanbul memory and cultural heritage
5. Effective disaster management
6. Sustainable transport and accessibility
7. Sustainable and efficient logistics infrastructure
8. Quality and sustainable environment
9. Environmentally friendly energy (ISTKA, 2014b, pp. 14-15)

ISKTA identified twenty-one strategies within these priority areas. Some of the strategies that are related to climate change and/or science-policy interfaces are as follows:

- Dissemination of participatory based, collaborative, inclusive and holistic planning
- Enhancement of transport facilities for and encouragement of walking and cycling
- Sustainable development and enhancing efficiency of transport infrastructure and services
- Ensuring the sustainable management of basins and water sources
- Reducing solid waste and wastewater, and ensuring their sustainable management
- Ensuring energy efficiency and clean energy usage

The preparation process of the regional plan was completed in 2013. Although this plan gives insight into the Agency's general vision of cooperation and partnership with other stakeholders, it would be appropriate to examine more current studies. A document ISKA prepared more recently is the 2016-2020 Strategic Plan. The Strategic Plan revealed the activities that the Agency planned to focus on in the relevant years. The five main strategies of the plan are:

1. Increasing the effectiveness of the agency's investment support office activities
2. Developing knowledge-based regional development tools
3. Strengthening the cooperation and coordination function of the agency
4. Having a robust institutional structure
5. Increasing the effectiveness of support programs (ISTKA, 2016b)

The third strategy is related to the Agency's approach to collaboration and partnership with other stakeholders. It emphasizes the importance of interacting and cooperating with local actors for their adoption and implementation of the vision and priorities of the Istanbul Regional Plan (ISTKA, 2016b, p. 19). Moreover, in addition to working with local stakeholders, it aims to increase ISKA's international partnerships (ISTKA, 2016b, p. 20).

Even more recent document is the ISTKA's 2018 Work Program . This program has identified five Result Oriented Programs:

1. Istanbul as an International Entrepreneurship Center Result Oriented Program
2. Innovative Istanbul Result Oriented Program
3. Creative Industries Result Oriented Program
4. Children and Young People Result Oriented Program
5. Corporate Transformation Result Oriented Program (ISTKA, 2018b)

### **Activities**

According to Erbil and Erbil's (2019) research, ISTKA carried out one hundred thirty-five activities related to climate change between 2010 and 2017. These activities include collaborations, financial and technical supports, publications, events, and meetings. With this number of activities, ISTKA was the seventh most active agency on climate change among the twenty-six development agencies in the specified years. Just as all the activities of IZKA were not shared, some selected activities of ISTKA will be examined. The examples will give an idea of the plans, projects, and policies implemented by ISTKA within the framework of science-policy interfaces regarding climate change.

1. In 2017, ISTKA participated in working groups of the preparation of the Istanbul Climate Change Action Plan by the Istanbul Metropolitan Municipality. An expert from the Agency worked in the Public Infrastructure sectoral working group. Within the scope of the workshop, the criteria to be used in the evaluation of greenhouse gas reduction and climate change adaptation solutions were defined, and sectoral solution suggestions for greenhouse gas reduction and adaptation actions for greenhouse gas reduction were determined (ISTKA, 2018a, p. 30).

2. In 2017, ISTKA attended the ‘Livable Cities Symposium’ organized by the World Resources Institute-Turkey and Consulate General of the Netherlands. At the meeting, the participants discussed the possibilities of making Istanbul a more livable city (ISTKA, 2018a, p. 33).
3. In 2016, ISTKA participated in the ‘Hello Tomorrow: Future of Energy’ event hosted by Sabanci University International Energy and Climate Center (IIEEC) (ISTKA, 2017, p. 40). At this event, six hundred entrepreneurs, investors, business, and industry representatives from Turkey and around the world discussed the methods of transitioning to clean energy (Hello Tomorrow Turkey, 2016).
4. In 2015, within the scope of ‘Likeminds – German-Turkish Junior Expert Initiative’, ISTKA collaborated with the Robert Bosch Foundation, European Academy Berlin, and Sabanci University Istanbul Policy Center. In this event, senior officials, decisionmakers, diplomats, civil society, and business representatives from Germany and Turkey came together to exchange views on the future and applications of global and local energy policies (ISTKA, 2016a, p. 34).
5. In 2015, within the scope of ‘Direct Activity Support’, ISTKA supported Istanbul Technical University’s Project of Development of an Integrated Basin Management Plan Based on Ecosystem Services in the Omerli Basin (ISTKA, 2016a, p. 28). The purpose of the project is to identify possible threats and problems related to climate change and urbanization in the Omerli Basin and to prepare the participatory basin management plans (Tezer et al., 2016).
6. In 2015, ISTKA participated in the ‘EU-Turkey Partnership for Sustainable Transportation’ seminar (ISTKA, 2016a, p. 33). This event, also known as GAIT (Green, Accessible, Intelligent Transport) 2015, was organized by the Delegation of the European Union to Turkey and the Ministry of Transport. The seminar aimed to start a discussion on sustainable transportation by bringing together all the local and international stakeholders operating in the transportation sector (Republic of Turkey Ministry of Transport and Infrastructure, 2015).
7. In 2014, ISTKA cooperated with the Ministry of Energy and Natural Resources and Istanbul Technical University Energy Institute to work on the promotion of local content rate in nuclear power plants that will be built in Turkey. Within the scope of the cooperation, a survey was conducted in companies residing in

Istanbul. Technical and logistical support was provided by ISTKA, Istanbul Technical University, and the Ministry during the field and company visits (ISTKA, 2015, p. 52).

8. In 2012, ISTKA supported the project of Okan University, one of the foundation universities in Istanbul, 'Feasibility Analysis for Integration of Intelligent Transportation Systems for Metrobuses'. The project aimed to increase the effectiveness of metrobuses, one of the important transit systems in Istanbul, and to reduce their environmental pollution (ISTKA, 2013, p. 59).

The above activities do not cover ISTKA's all activities on climate change. However, a general review reveals that ISTKA's perspective and practices on climate change are more passive than IZKA as its activities are mostly non-transformative activities such as attending seminars, workshops, and meetings. ISTKA does not seem to have any initiatives to develop projects or policies directly for climate change, to direct institutions in the region, and to integrate climate change into its other activities. The next part will present the results of the interviews with the Agency experts to reach background information on the Agency's approaches to science-policy interfaces, especially in the context of climate change.

### **3.3.2 Interview findings**

This section includes the responses given by two ISTKA experts (Respondent VI and Respondent VII) to the questions about

- (i) the Agency's perspective on scientific knowledge
- (ii) the Agency's perspective on science-policy interfaces, and collaborations with other stakeholders
- (iii) the barriers the Agency face in establishing science-policy interfaces and possible solutions to overcome these barriers

#### **The Agency's perspective on scientific knowledge**

Both Respondent VI and Respondent VII state that the Agency adopts a knowledge-based approach in all its activities. Respondent VII asserts that the knowledge that shapes the policies of ISTKA is created by using two types of data: statistical data and qualitative data. After determining the statistical data that Respondent VII describes as the main condition, the Agency also obtains qualitative data by interacting with the

actors of the region in order to be more inclusive. Respondent VI shows the preparation process for the 2010-2013 Regional Plan as an example of the Agency's working principle based on interacting with actors in the region. First, the Agency officials collected all the data they can obtain on their own. Then, they visited every member of the Agency's development council, which consists of one hundred representatives from different institutions in the region. Thus, ISTKA, according to Respondent VI, accessed a lot of unpublished data and demonstrated a robust knowledge-based approach.

### **The Agency's perspective on science-policy interfaces and collaborations with other stakeholders**

The Respondent VI puts forward that the Agency carries out a stakeholder analysis to determine whom they can collaborate with before starting any activity. ISTKA tries to reach every actor of the region for the stakeholder analysis, such as municipalities (metropolitan municipality and thirty-nine district municipalities), district governorships, universities, academicians, associations, arts organizations, companies, and independent individuals. Nevertheless, Respondent VI states that the scope of their stakeholder analysis varies depending on the subject. That is, ISTKA interacts and collaborates with different stakeholders in different ways for different issues. Respondent VII elaborates on the point that the Agency attaches particular importance to establishing relationships with all relevant actors. For example, if the Agency develops a project or policy about innovations, it wants to cooperate with the actors such as corporate officers, start-up employees, and R&D researchers. In addition, ISTKA has been operating in the region for about ten years, and, according to Respondent VI, compared to the past, it is now more successful in identifying actors to collaborate with.

This study examines the interaction and collaboration between knowledge producers and policymakers in the context of climate change policies. Although ISTKA exhibits a positive attitude towards cooperation with different actors, including knowledge producers, both respondents admit that the Agency has not had a climate change-oriented activity in the past few years. Respondent VII reveals that the Agency focuses on four main areas, innovation, entrepreneurship, creativity, and children/teenagers and that it addresses environmental and climate change policies only when they coincide with one of these four topics. In other words, for ISTKA, climate change is



not a separate issue, but it can be discussed within the scope of other topics. For this reason, the information given below regarding the cooperation and collaboration of the Agency with other actors, especially knowledge producers, is about ISTKA's general activities rather than climate change-related activities.

Respondent VII puts forward that the academy and academic knowledge, although they are not considered absolute and tested by the other actors' opinions and feedbacks, are very effective in ISTKA's policymaking process. At least half of the people in the actor analysis are academics in every activity, including establishing boards, designing process of projects, receiving consultancy, and even the preparation of financial support programs. Respondent VII argues that since academics follow the scientific developments more closely, the Agency has the opportunity to get scientific knowledge directly from the specialist by interacting with academics. Therefore, according to Respondent VII, when ISTKA requires knowledge on any subject, it first wants to contact the relevant academics immediately: "Especially if there is a well-specialized university on the issue, this becomes an advantage for us. I can easily say that we are very eager to work with universities."

Respondent VI agrees with Respondent VII's point that the Agency prioritizes working with universities. Moreover, Respondent VII mentions a project, 'Feasibility Analysis for Integration of Intelligent Transportation Systems for Metrobuses', that ISTKA cooperated with Okan University, a private university in Istanbul. The project aims to make the use of metrobuses more efficient; thus, even if it is not directly related to climate change, it has an environmental dimension. Respondent VI states that, within the scope of the project, the University prepared a report that ISTKA shared as a suggestion with the Istanbul Metropolitan Municipality. In other words, the Agency pioneered the establishment of a science-policy interface by providing cooperation between different actors in the region.

Respondent VII reveals that, in addition to partnerships with local actors, the Agency has established international scientific partnerships. For instance, ISTKA is currently working with the 'Arts and Humanities Research Council' of the UK to explore how academics, private sector, and NGOs can improve cooperation in creative industries between Istanbul and the UK. According to Respondent VII, this project is an evidence of the Agency's willingness to interact with international academic studies, and, within the context of this project, the parties have established a very close interaction: "We

have technical partnerships. We examine each other's systems of project acceptance and project evaluation. We go there (Arts and Humanities Research Council), and they come to ISTKA. We have a system of mutual exchange of information, which is currently evolving towards a cooperation model.”

Finally, Respondent VI states that the Agency, in search of knowledge, interacts not only with universities or academics but also with NGOs. Respondent VI mentions that ISTKA cooperated with the Sustainable Cities Association to prepare a guide for cycling routes in Istanbul. Then, the Ministry of Environment and Urbanization used this guide in developing a standard for cycling routes in Turkey.

### **The barriers the Agency face in establishing science-policy interfaces and possible solutions to overcome these barriers**

A common problem that both Respondent VI and Respondent VII define is perspective differences. In particular, Respondent VI, by pointing out that the Agency and potential partner institution have their own working conditions, legislation, and management approach, claim that conflicts between missions and visions of two organizations might prevent cooperation. For instance, while collaborating with a university, the bureaucratic process can create problems, since the payment of the academic comes from revolving funds. Another specific example Respondent VI gives is the attitude of the academicians and businessmen towards each other when ISTKA wants to establish a partnership between them: “The businessman says: Why should I visit an academician personally? Even if I go, how can I find him or her in that huge campus? The academician's point of view is also like this: “I am an academic, am I be obliged to visit an industrialist?”” Respondent VI adds the perception of time to this problem: “This is one of the most basic things. The understanding of time in universities, the private sector, and public institutions are very different.” According to Respondent VI, basically, while the private sector wants to act fast, the university and the public are generally relatively slower.

Respondent VII argues that perspective differences, more precisely, differences in visions, ideals, ideologies, moral criteria and philosophy of lives, between organizations or individuals, is the biggest problem since, even if they identify the same problem, public or private sector and academic institutions differ from each other in solving these problems. Respondent VII contends that some academic institutions or academics avoid working with other organizations due to the differences in their

approaches and supports this argument with an example: “I think it would not be easy for an academician, who thinks socialism is the solution, to work for solving private sector problems.” According to Respondent VII, this general problem also has some consequences for ISTKA. For instance, even if the Agency is not aware of the situation, some academics may stay away from ISTKA and avoid cooperating because of its stance posture or perspective.

Another type of barrier is the issues specific to Istanbul and ISTKA. Respondent VI thinks that Istanbul has some unique characteristics that may not be considered ‘problems’, but can definitely be called ‘challenges’. The challenge is the enormous human capital of Istanbul as a city of fifteen million. Respondent VI believes that the positive aspect of this challenge is that when ISTKA carries out a specific activity, it, unlike many other development agencies in Turkey, can find a relevant expert in the region. Nonetheless, in order to find the relevant expert, the Agency may have to investigate the academics of all universities in Istanbul, whose number is more than fifty. Respondent VI thinks, for instance, if the Agency wanted to develop a strategy for entrepreneurship or creative industries, it would be complicated to find the best person on the issue: “There is definitely such an academician or expert in Istanbul. But how can we find him or her? The difficulties arise here. Everyone knows these people in smaller places. But if you work on a specific subject in Istanbul, the chances of finding that person are low.” Respondent VI, however, reminds us that the Agency already knows the prominent names if the topic is not specific but general. Respondent VII points out to another difficulty of having too many experts in Istanbul: “....the Agency has to make a choice. This may cause other actors to feel excluded, even if the Agency has no such intention.” Respondent VIII argues that it is not easy to make a decision between different actors; nevertheless, it is not efficient or meaningful to work on an issue that the Agency can address with a few academics from one university with a hundred academics from thirty universities. According to Respondent VI, there is a similar problem also for NGOs since a large part of civil society organizations in Turkey are in Istanbul. In particular, Respondent VI reveals that they have identified eighteen thousand associations in Istanbul, most of which are the hometown associations.

Respondent VII refers to some legislative limitations as another specific barrier for ISTKA to establish science-policy interfaces. While the Agency is able to cooperate

with public universities directly through protocols, this is, in accordance with the legislation, not possible with foundation universities. In order to cooperate with a foundation university, the Agency must go out to tender and receive an offer from three institutions, including that university. Finally, the university the Agency wants to cooperate must have made the best offer. Respondent VII believes there is a rationale for making the legislation in this way, but also thinks that some convenience can be provided: “I am not saying that the legislation should change, but maybe it can be stretched... Working directly (with foundation universities) can be allowed.”

Respondents, naturally, do not develop clear solutions for Istanbul and ISTKA specific barriers. However, they share some ideas about how knowledge producers and policymakers can interact and collaborate more easily. First, both Respondent VI and Respondent VII think that knowledge producers should be more enthusiastic, sociable, and organized to cooperate with policymakers. According to Respondent VII, although accessing the knowledge is the responsibility of policymakers, it may be beneficial if knowledge producers can forward relevant articles and research results directly to the Agency. Thus, ISTKA officials can find out about academic studies they overlooked. Suggesting that ISTKA, universities, associations, or foundations can take the initiative in order to transfer the knowledge producers’ studies to the policymakers in a more effective way, Respondent VII argues that interactions and collaborations would increase if the Agency were aware of these studies. Respondent VI agrees on this point and states that entrepreneur academics make it easier to establish collaborations: “...entrepreneur academics, who show or want to show themselves or want to do a project, find us before we find them... Then, we try to do something together...”

Secondly, according to Respondent VII, the policymakers and knowledge producers can hold regular meetings at least once a year. Respondent VII states that they made very beneficial meetings before with some public universities, with the participation of the head and co-head of the department, deans, and relevant academics. At these meetings, the Agency learned which department and academicians work on which topics, and they had the opportunity to express what the Agency does. Respondent VII thinks that what the people, who are seeking solutions for common problems, need is only this network, which can be established through regular meetings.

As a result, Chapter 3 has revealed both the analysis of agency documents and the results of the interviews with agency experts. These findings have shown both IZKA and ISTKA's perspective on scientific knowledge, their interactions with knowledge producers, their approaches to the science-policy interfaces, especially in climate change policymaking, and their relevant activities. The next chapter involves the evaluation of the results of Chapter 3. More precisely, Chapter 4 will discuss what the case study findings mean within the scope of this study and how they relate to the literature review.



#### 4. DISCUSSION

By analyzing agencies' documents, the results of the interviews with agency experts, and literature review findings together, this chapter discusses the perspective and experiences of IZKA and ISTKA on science-policy interfaces, especially in climate change-related activities. In order to make the discussion within a particular structure, some criteria that institutions that establish science-policy interfaces should meet have been determined. As mentioned earlier, this study defines the ideal science-policy interface as an interface in which knowledge producers and policymakers co-produce knowledge, policy, and action based on interaction, partnership, and cooperation. By drawing from this definition, the determined criteria are as follows:

1. Being aware of the necessity of scientific knowledge in the policymaking process.
2. Being aware of the necessity of science-policy interfaces in the policymaking process.
3. Designing science-policy interfaces based on co-production.
4. Being aware of barriers that negatively affect science-policy interfaces and possible solutions to overcome these barriers.

In the continuation of the chapter, the findings of the case study on IZKA and ISTKA will be evaluated within the framework of the above criteria.

##### **Being aware of the necessity of scientific knowledge in the policymaking process**

The primary condition for establishing a science-policy interface is, naturally, that policymakers want and decide to incorporate scientific knowledge into the policymaking process. Scientific knowledge becomes even more critical for climate change policies since it is impossible to analyze the issue and make the right decisions without scientific knowledge. Development agencies' documents and interviews with experts have shown that both IZKA and ISTKA are aware of the importance of scientific knowledge. All the respondents state that their agencies design, develop, and perform all their activities based on knowledge. In order to reach scientific knowledge,

both agencies interact with knowledge-producing institutions such as universities, foundations, associations, technoparks, research centers, and NGOs. Nevertheless, agency experts also revealed that they do not accept scientific knowledge as an absolute authority and only input for the policymaking. As emphasized by Respondent IV from IZKA and Respondent VII from ISTKA, the agencies evaluate scientific knowledge together with the opinions and feedback of other stakeholders in the region, and thus, show a more holistic understanding of scientific knowledge. As a result, although it is out of the scope of this study to measure and determine the impact of scientific knowledge in each activity carried out by the agencies, it can be argued that both IZKA and ISTKA are aware of the importance and necessity of scientific knowledge for project development, policymaking, and, in general, perform an activity.

### **Being aware of the necessity of science-policy interfaces in the policymaking process**

The first criterion investigates the approaches of the agencies to scientific knowledge in their activities, especially those related to climate change. This second criterion explores the interaction and cooperation of agency experts with knowledge producers, that is, the science-policy interfaces they establish. Respondents from both agencies state that when designing an activity, they conduct a stakeholder analysis to investigate which actors can contribute to their activity. During this stakeholder analysis, the agencies pay attention to reveal all actors they can partner with. This research covers a broad set of actors from public institutions to universities and academics, from the private sector to foundations and NGOs, and from local people to international organizations. Respondent I from IZKA considers the process of including all possible relevant actors as part of their agency's mission to be inclusive rather than an optional choice. Similarly, Respondent VI from ISTKA states that the basic working principle of their agency is to determine the relevant actors in order to receive their knowledge and experience. That is to say; both agencies attach importance to establishing science-policy interfaces by directly interacting with knowledge producers and even reveal this approach as their basic working method.

Science-policy interface perspectives of development agencies can be examined in two different frameworks. The first is the science-policy interfaces that they establish as policymakers. Indeed, since they are institutions that develop policies, projects, plans,



and strategies, the agencies often work with knowledge producers, especially universities and academicians, while designing and implementing these activities. Nonetheless, another duty of them is to enable the actors of the region to interact and cooperate with each other. In other words, development agencies, besides being a policymaking institution, have the mission of linking regional actors such as local administrations, universities, private sector, and NGOs. Therefore, as a mediator, they form science-policy interfaces by bringing together different knowledge producers and policymakers. These two different missions of the agencies can be associated with two approaches to the establishment of science-policy interfaces described in the third section ‘How to Establish a Science-Policy Interface?’ of the Literature Review Chapter. One of the approaches in that section was that the knowledge producers and policymakers directly interact and cooperate, and the second was that the mediators bring these two groups together. Apparently, the agencies use both approaches. When they develop a policy or project, they tend to form direct relationships with knowledge producers. However, sometimes they aim to provide cooperation between different actors, and they work as a mediator to create a connection between knowledge producers and policymakers.

In addition to providing cooperation between different actors in the region, the agencies also aim to constitute collaboration across different scales. Although they are regional institutions, the agencies interact and work with the actors from all scales, international, national, regional, and local. Moreover, besides their own partnerships, they enable different actors of these different scales to work together. For example, IZKA brings together international organizations such as the World Bank and the World Wildlife Fund with local companies. Likewise, ISTKA collaborates with the Arts and Humanities Research Council from the UK to establish partnerships between local and regional actors of two countries. In this sense, development agencies seem to have the capacity and potential to establish science-policy interfaces between actors from international-national-regional and local scales.

Both documents and interview findings indicate that development agencies are highly aware of the importance of establishing science-policy interfaces, as required by their knowledge-based work approaches and their missions to strengthen interaction among the actors in the region. Nevertheless, this study examines science-policy interfaces in the context of climate change policies. When it comes to climate change, there is a

clear distinction between the two agencies. While IZKA puts climate change at the center of its activities, for ISTKA, climate change is not of primary importance. IZKA has recently changed its organizational structure to be more focused on climate change, and now it has ‘Green Growth’ and ‘Blue Growth’ Result Oriented Programs, which were designed to work on sustainable development by considering the effects of climate change for Izmir region. Within the framework of its activities on climate change, IZKA establishes science-policy interfaces in collaboration with universities, academics, NGOs, foundations, local and national public institutions, and international partners. In contrast, ISTKA’s Results Oriented Programs are identified as ‘Innovation’, ‘Entrepreneurship’, ‘Creativity’, and ‘Children and Youth’. Climate change is not among the core study areas, and it is only addressed if it intersects with the scope of one of these Result Oriented Programs. That is, according to ISTKA, an activity that is related to climate change is not defined as a benefit but as a co-benefit. Therefore, it has had, at least in recent years, no, or very few, activities to establish science-policy interfaces directly related to climate change. Thus, even though IZKA’s and ISTKA’s general understanding of science-policy interfaces is similar, they are at different points about climate change-related science-policy interfaces since they approach climate change from divergent perspectives. IZKA has a progressive, willing, and organized stance about climate change, while ISTKA attributes a secondary value to the issue.

To summarize the evaluations regarding this criterion, which discusses the science-policy interface understandings of the agencies, it can be contended that both IZKA and ISTKA are aware of the necessity of science-policy interfaces. They intend to establish science-policy interfaces, both by interacting and collaborating with knowledge producers as a policymaker and project developer institution and by bringing together different knowledge producers and policymakers as a mediator institution. However, IZKA uses climate change-related science-policy interfaces more frequently and effectively compared to ISTKA. It is not because ISTKA has a poor understanding of science-policy interfaces, but because its organizational structure and perspective are not focused on the issue of climate change.

### **Designing science-policy interfaces based on co-production**

The previous criterion discussed the approaches of the agencies to the science-policy interfaces between knowledge producers and policymakers. Nevertheless, these

interfaces do not have a single definition or formula and may have different characteristics. This study advocates the co-production-based science-policy interfaces in which knowledge producers and policymakers collaborate to co-produce knowledge and action, rather than technocratic approaches in which the science dominates politics or the populist/anti-intellectual approaches in which politics dominates science. For this reason, this criterion, unlike the previous criterion, does not examine the awareness of agencies about the science-policy interfaces, but the methodology and perspective they adopt while designing and maintaining these interfaces.

In order to better understand how development agencies approach knowledge producers, it would be appropriate to explore the organizational structures and working principles of them. As mentioned before, because the agencies are affiliated to the Ministry of Industry and Technology, they are, in contrast to municipalities, not managed by elected administrators. In municipalities, organizational and policy changes may arise from different perspectives of newly elected mayors. On the contrary, although they are not independent of national policies, development agencies are relatively less affected by local political changes, and they work on long-term, theoretical, and sustainable activities. Indeed, regional plans are proof of this sense of work. Both agencies have prepared regional plans covering the years 2014-2023 as an upper-scale guide for regional policies. Another factor that shapes which activities the agencies will focus on is Result Oriented Programs. For instance, IZKA focuses on Green Growth and Blue Growth Result Oriented Programs, while ISTKA concentrates on Innovation and Entrepreneurship Result Oriented Programs. Accordingly, agencies do not place particular emphasis on activities that are entirely beyond the scope of these programs. These working methods reveal that they have actually established a vision and a general structure for their activities, and the relations with other stakeholders continue within the framework of this structure.

Nevertheless, this finding cannot deduce that the agencies are closed to the opinions of different actors and that they decide everything by themselves. The experts of both agencies state that other stakeholders, especially scientists and academics, have made great contributions in shaping the agencies' visions, regional plans, and strategies. As a matter of fact, their Regional Plan documents explain that, in the process of making the plan, extensive meetings were held with different actors both from and outside the

region. In these plans, which include a full list of these actors, it is claimed that the regional plans were shaped by the opinions of the participants. That is, the agencies work with a participatory approach when determining strategy and vision. However, as described in the previous paragraph, after they decided these strategies and long-term plans, they pay attention to operate within this framework and not to stretch the structure. An example of this is that climate change is not part of ISTKA's Result Oriented Programs, and therefore, they address the issue only if it overlaps with one of its programs.

Another point is the agencies' mission to bridge the gap between international and local scales. Agencies may sometimes be insistent on bringing some issues from the international agenda, such as sustainability, digitalization, industry 4.0, innovation, to the local agenda. Nonetheless, the respondents state that they do not direct the region within the scope of a new concept or subject unless they rely on scientific knowledge and international experience. For instance, Respondent IV from IZKA, who defines the main functions of the agencies as guiding the region and spreading important issues, expresses the approach of IZKA as follows: "In some issues, contributions (from other institutions) shape our policies and projects, but in some other issues, we consider the issue very important and insist on it."

To sum up all of this, the way development agencies work is neither a dominant approach in which they decide everything alone nor a populist approach in which their policies and programs are entirely shaped by the views of other stakeholders. The activities that the agencies carry out together with other stakeholders, including knowledge producers, are closer to the co-production model. The respondents state that the Agencies design their activities with a knowledge-based approach and that they collaborate with knowledge producers in this process. The influence of other stakeholders, particularly the knowledge producers, is very influential in shaping their plans, policies, strategies, and projects. All the respondents argue that, when the agencies decide to address an issue, they immediately consult the relevant experts and shape the course of the activity with expert knowledge. On the other hand, the agencies have the capacity and potential to direct and guide the region with a concept or topic they deem necessary, as long as they can justify the importance of the issue. That is, even if the agencies set some general limits within the framework of their visions and long-term plans, they allow knowledge producers and other stakeholders to shape and

contribute to their policies and activities; thus, their working strategy shows significant similarities with the co-production model. Of course, agencies have some shortcomings; and ultimately, how effective agency activities are is controversial. Nevertheless, in general, it can be said that agency experts have awareness and willingness to work and take action together with the knowledge producers. Indeed, the opinion of Respondent IV from IZKA, which was previously quoted in interview findings, is essential and valuable to be shared here again: “You have to work with those people (knowledge producers), not from the perspective of service procurement, but with the feeling that you are stakeholders working together at the same table. If you do not look at the issue as a team, it does not go anywhere... We have to replace ‘the logic of service procurement’ with the logic of ‘working together’.”

### **Being aware of barriers that negatively affect science-policy interfaces and possible solutions to overcome these barriers**

This criterion aims to compare the agencies’ awareness about the barriers that prevent the establishment of science-policy interfaces or affect their activities negatively and about the possible solutions to overcome these barriers with the literature findings. In the interviews, barriers experienced by the agency experts and their solution suggestions were not limited to climate change activities, and general questions were also asked to identify common problems between knowledge producers and policymakers. However, when specific examples were discussed, the science-policy interfaces established for climate change policies and projects were prioritized, especially in interviews with IZKA experts.

In the last section of the Literature Review chapter, four fundamental barriers were defined: cultural differences, scientific uncertainties, scientific myths, and academic incentives. The cultural differences refer to some barriers such as the agenda differences of knowledge producers and policymakers, time constraints, and purpose and method dissimilarities. Interviews with the agency experts have shown that one of the main problems that the agencies face when they try to cooperate with knowledge producers is indeed the differences in working principle, perspective, worldviews, and approaches between the two groups. Respondent VII from ISTKA, for instance, argues that although both knowledge producers and policymakers identified the problem in a similar way, they could not reach a consensus on the solution because of their divergent visions and world views. Likewise, Respondent I, II, and IV from IZKA

believe that, due to these differences, some academics are not willing to cooperate with other stakeholders and even with other academic disciplines. Another dimension of the different working principles of the two groups is bureaucratic obstacles and time problems, as the relevant literature, Respondent II, IV, V from IZKA, and Respondent VI from ISTKA emphasize. Respondent VI from ISTKA also claims that, by pointing out the private sector wants to get results in a relatively shorter time than the public sector and academy, these three groups interpret the concept of time differently.

In the literature research, academic incentives were handled in two basic contexts. One of them was to provide academics with financial incentives for their cooperation with policymakers, and the other was to regard these cooperations as academic success, just like publishing articles or attending conferences. The respondents did not touch on the second issue as it is the academy's internal problem. However, they stressed that academics should receive sufficient financial support for their collaborations. Respondent VI from ISTKA and Respondent IV and Respondent V from IZKA admit that since the agencies have their own payment procedure, they have experienced some problems in financial management, especially in projects where knowledge producers from different institutions came together.

In other words, the experiences of the agency experts match the first and the fourth barriers, which are cultural differences and academic incentives, identified in the literature research. Respondents also share some solutions suggestions that are parallel to each other. For instance, Respondent I and Respondent II from IZKA claim that knowledge producers need to redefine their missions in order to cooperate more often with other stakeholders. Similarly, Respondent VI and Respondent VII from ISTKA underline that knowledge producers should be more inclined to collaborate. Furthermore, Respondent II and IV say that knowledge producers should identify problems of their region and carry out appropriate activities and research. In response to these steps that knowledge producers should take, the experts state that the Agencies, and policymakers in general, also have some responsibilities. For example, Respondent IV from IZKA point out that in the policymaking process, knowledge producers should not be seen as an external consultant but as a co-stakeholder, that is, policymaking activities should be more inclusive. Likewise, Respondent VII from ISTKA thinks that if the agency holds regular meetings with knowledge producers,

interaction opportunities in which both parties can learn about each other's studies and exchange ideas can be created.

Two other barriers identified in the literature review were scientific uncertainties, which refer to ignoring scientific knowledge in the policymaking process due to imprecise statements in scientific findings and scientific myths, which means distinguishing science from the policymaking process by putting science and scientists above all other activities. The literature findings suggested some solutions for these barriers, such as increasing scientific literacy, having knowledge about the characteristics of science and scientific knowledge, and adopting an understanding of science that engages with social life by partnering with other stakeholders rather than a holy and abstract understanding of science. In the interviews, the agency experts did not mention anything specific about these problems, and thus, possible solutions to overcome them. The reason is not that agency experts are not aware of this issue; on the contrary, they are not experiencing these problems because they already have an awareness of science and scientific knowledge. Almost all of the development agency experts are doctoral or master graduates or continue their graduate education. In general terms, the agencies' staff consists of people who can speak at least one foreign language, follow the international agenda and scientific publications, interpret current scientific developments, and have high scientific literacy. The comments and opinions of the agency experts on science and scientific knowledge in the interviews have revealed that they are on the one hand aware of the necessity of scientific knowledge, on the other hand, they consider this knowledge together with other inputs, especially other stakeholders ideas, without accepting it as an absolute authority. In other words, even though agency staff is obliged to develop policies and projects, their relationship with the world of science helps to ensure that they do not experience problems arising from the scientific uncertainties or the exaltation of science.

In addition, the agency experts have mentioned conditions that are specific to their regions and institutions. These conditions have both positive and negative aspects. For example, the fact that the people and institutions in Izmir are 'relax' and that they are content with the existing conditions are considered as an aspect that negatively affects the collaborations. In the meantime, as the political atmosphere is not tense between individuals and institutions in Izmir, the institutions that have a different political stance can more easily interact and work together. However, the most crucial factor in

comparison regarding the establishment and effective operation of science-policy interfaces in Istanbul and Izmir regions may be the regional scale problem. As IZKA respondents have repeatedly emphasized, Izmir has an optimum scale for regional planning and operation because the city is large enough to have sufficient human capital and high-quality universities, but at the same time, unlike Istanbul, it is not an enormous metropolis with its 4,3 million population. Indeed, most development agencies in Turkey cover several provinces. IZKA, on the other hand, has the chance to focus only on the Izmir region, and regional actors are, usually, enough to form partnerships. ISTKA also focuses only on Istanbul; nonetheless, the Istanbul region is quite large and complex compared to Izmir. With a population exceeding 15 million, it is not easy to develop projects, establish partnerships, and conduct activities in Istanbul. In the context of science-policy interfaces, ISTKA seems to have two different problems. If the subject is specific, the agency may have difficulty or spend too much time finding the relevant expert in the region since it has to check all institutions. On the contrary, if the subject is general, then there are a considerable number of individuals and institutions specialized in the issue. Thus, the agency may have difficulty deciding which actor to work with. While involving all actors is an ineffective and costly decision, making choices among actors may damage the relationships of the actors that are not included in the project with the agency. Furthermore, the fact that Istanbul is a region where the national government, large companies, and important NGOs has an impact on ISTKA's inability to carry out activities related to climate change. IZKA, in contrast, can conduct more liberal and independent activities in its region. Apart from these political and economic constraints, as ISTKA can find many relevant actors in the region, this situation can be regarded as an opportunity for science-policy interfaces. Respondent VI from ISTKA, for instance, considers large human capital of the Istanbul region as a challenge rather than a problem because, while many regions, including Izmir, may have to communicate with institutions from different cities, ISTKA is able to find all relevant experts in its own region.

Even when policymakers and knowledge producers are willing to interact and cooperate, there may be some barriers that prevent the formation of science-policy interfaces or negatively affect their operations. Development agencies are not exempt from these barriers. Agency experts mentioned the barriers that they encountered in



establishing science-policy interfaces and possible solutions for overcoming these barriers. Some of the barriers they define are those that are frequently emphasized in the literature, such as perspective differences, time limitations, and financial management, and affect science-policy interfaces regardless of regions and institutions, while some barriers are unique to the Agencies depending on their regions and regulations. When these contributions of Agency experts are evaluated together with the literature, it can be concluded that they have an awareness of these barriers that negatively affect their partnership with knowledge producers, and they work on overcoming these barriers, or at least they are willing to do so.

The discussion conducted within the framework of the above criteria has attempted to analyze the literature research on the science-policy interfaces and the IZKA and ISTKA case studies comparatively. More specifically, it discussed the criteria for the ideal science-policy interfaces, the co-production based science-policy interfaces, which are defined by drawing from theoretical contributions of the relevant literature, with the findings obtained from the analysis of IZKA and ISTKA. Since it is beyond the scope of the study to investigate processes of the agencies' each activity from the beginning to the end and the real-world results of these activities, it would be appropriate to evaluate the results of this discussion within the framework of the perspectives and working principles of the agencies. Moreover, it is not possible to estimate how objective agency experts are to their own institutions, especially regarding the barriers of science-policy interfaces and possible solutions. Undoubtedly, interviews with knowledge producers who have interacted with the agencies would reveal many different dimensions that are not addressed by the agency experts. For instance, experts have addressed issues related to financial management. However, a researcher, regardless of the financial income expectation, may need a capital to start and continue a research or project, and therefore, may not be able to start working unless this capital is provided. Apart from that, although the agency experts attribute many characteristics, such as insights, visions, working principles, to their institutions, these claims may not be found realistic and persuasive by knowledge producers. For these reasons, this discussion should be considered with the limitations arising from the scope of the study.

The discussion above mainly relates to the criteria based on the literature for the science-policy interfaces. Nonetheless, before concluding the chapter, it would be

useful to highlight some points that come from the analysis of IZKA and ISTKA but are not directly mentioned in the literature. In particular, three characteristics of institutions will be emphasized: (i) the mission, (ii) the vision and perspective, (iii) the staff. In the case study, it was determined that these three points have a direct impact on the science-policy interface activities of both agencies. As these characteristics are present in every political organization that aims to establish science-policy interfaces, they need to become a part of the theoretical discussions on science-policy interfaces. Now, these issues will be discussed for both IZKA and ISTKA.

To begin with, it is among the missions of the agencies to provide interaction and encourage cooperation between different institutions and individuals. This mission makes the agencies more inclined and advantageous to establish and maintain science-policy interfaces. Agencies do not limit these collaborations to only regional stakeholders. At least for IZKA and ISTKA, it can be argued that the agencies can connect an extensive network of actors from the international, national, regional, and local scale. Development agencies, as a regional scale institution, have some unique features. On the one hand, they are able to carry out region-specific activities that the national government cannot perform as it is not acquainted with the region and the regional actors. On the other hand, they are able to engage in relatively higher-scale activities compared to the local scale by directing local actors and connecting them to each other. Furthermore, it seems that the interaction with the international scale is of great importance for IZKA and ISTKA, as they work on bringing international concepts and topics to the regional and local agenda, collaborating with international actors, and promoting the region at the international events. Thus, the agencies, at least within the framework of their organizational structures and missions, can be regarded as institutions that try to ensure regional development with long-term and sustainable plans and policies by strengthening the potential of the region with international and national knowledge and resources. The scope of this mission makes it easier for agencies to establish science-policy interfaces.

Secondly, although the missions of development agencies are conducive to establish science-policy interfaces, this study addresses science-policy interfaces in the context of climate change, and IZKA and ISTKA differ at this point. The main reason for this difference is that agencies' perspectives on climate change are completely contrary. Transforming even its organizational structure, IZKA puts climate change at the center

of its activities while, for ISTKA, climate and environmental policies have secondary importance and are considered as a co-benefit. This vision of ISTKA, which is not focused on climate change, prevents it from conducting effective and transformative activities on the issue. Accordingly, despite looking at science-policy interfaces positively in general, ISTKA does not establish climate change-related science-policy interfaces. One reason for this is that the policies and plans of the actors who have power over the region, especially the central government, are not compatible with the activities that can reduce the effects of climate change. Therefore, ISTKA, an institution that operates under a ministry of the central government, cannot be expected to act completely independently of these policies and plans. On the contrary, IZKA is able to create its perspective relatively more liberally. Ultimately, the vision of an institution affects the scope and content of the science-policy interfaces it will establish.

Finally, the staff of the agencies will be mentioned. Although Development Agencies operate under the Ministry of Industry and Technology, they also have their own Executive Boards. As mentioned earlier, the Board includes mayors and governors of the region, as well as representatives from the chamber of commerce, the chamber of industry, and two or three members from the Development Council. The Development Council, which works as an advisory body, consists of representatives from different institutions of the region, such as universities, NGOs, associations, foundations. However, the main body that carries out the agency's activities is the General Secretariat and its affiliated units. This study reveals that the expert staff working within the General Secretariat differ from those working in an ordinary public institution, especially the local ones which are dominantly responsible for running day-to-day activities and service provision. Both agencies have experts who can carry out academic studies, speak foreign languages, follow scientific developments, turn scientific knowledge into politics. As discussed by Respondent II from IZKA and Respondent VII from ISTKA, the dynamic working environments of the agencies obviously help to enable the agency experts to develop progressive, independent, and entrepreneurial projects. Within the scope of these activities, the experts, who already have a theoretical affinity with the world of science, want to interact and collaborate with knowledge producers by establishing science-policy interfaces. Consequently,

the quality of the personnel of an institution is effective in establishing science-policy interfaces and in the operation of these interfaces.

As a result, this chapter has first discussed the findings of the case study based on the criteria which draw from the literature review. Then, it has revealed three points that are specific to the agencies and argued that the scope of the mission and vision of an institution and the characteristic of the staff affect the establishment of science-policy interfaces. The next chapter is the concluding chapter, which involves an overview of the study and some suggestions for future research.

## 5. CONCLUSION

Climate change is one of the major threats of today and the future. Since it is not possible without the scientific knowledge to correctly analyze this complicated phenomenon and to produce policies that might mitigate its effects or provide adaptation to its inevitable consequences, combating climate change obliges an interaction and cooperation between the world of science and the world of politics. From this point of view, this study has examined the science-policy interfaces, which refer to all kinds of relationships between knowledge producers and policymakers, in the process of producing climate change policies. It has contended that co-production based science-policy interfaces, in which the knowledge producers and policymakers can co-produce knowledge, policy, and action, should be established to turn climate change-related scientific knowledge into effective policies. In this context, by drawing from the literature, especially STS literature, the study first explored the characteristics of science-policy interfaces, the establishment of them, and the barriers that negatively affect these interfaces. Then, in order to investigate the practical dimensions of science-policy interfaces, it has focused on two regional development agencies, IZKA and ISTKA, by analyzing agency documents and pursuing in-depth semi-structured interviews with agency experts. Finally, in the discussion section, the findings of the case study and the literature were discussed comparatively.

In this concluding chapter, three points of the study will be emphasized. The first point is the theoretical framework of the study, which argues that science-policy interfaces should be established and managed in accordance with the co-production model. This model is derived from STS scholar Jasanoff's ideas on the relationship between science and politics. According to Jasanoff (1994), the technocratic approach is inadequate as it prioritizes only science and ignores the political, social, and moral dimensions of the issues. However, the solution is not to exclude science or to deny the importance of scientific knowledge. Scientific knowledge must be included in the policymaking process, especially for climate change, yet this knowledge should be evaluated together with other inputs, including social factors and economic situation. That is,

scientific knowledge is indispensable, but also not an absolute determinant, and thus, not enough alone to produce policies. This inference points to the co-production based science-policy interface approach that encourages the interaction and cooperation of the knowledge producers and policymakers. The model implies that knowledge producers need policymakers to turn their theoretical knowledge into policy and action, and policymakers need knowledge producers to take steps based on scientific findings. Another significant theoretical contribution of Jasanoff is the intellectual boundaries between knowledge producers and policymakers in science-policy interfaces. Jasanoff (1994) asserts that the two groups should be, intellectually, close enough to interact with each other, yet, at the same time, distant enough to work independently, or, as Gieryn (1995) interpreted, “far enough to be objective and authoritative, close enough to be useful” (p. 439).

The second issue is related to the results of the analysis of IZKA and ISTKA. The regional development agencies operate to contribute to the regional development by making use of regional resources and by providing cooperation between regional actors. For this purpose, the agencies act as bridges between the central government and local action, since they, on the one hand, work under the Ministry of Industry and Technology and, on the other, continuously engage with local actors including public organizations, private sector, universities, and NGOs. As Chapter 4 addresses, these characteristics make them advantageous in the context of establishing science-policy interfaces to combat climate change. To put it more precisely, though other actors at the local level are also important, development agencies, due to their structures and activities, seem competent and capable of establishing science-policy interfaces to combat climate change on the local scale. However, as seen in the ISTKA case, development agencies might focus on different agendas and ignore climate change or consider it as a co-benefit, and this approach is evidently not successful in developing efficient and transformative policies, projects, and practices for climate change. In other words, establishing climate change-related science-policy interfaces is not sufficient alone because these interfaces should be used in policymaking processes and practices that focus directly on climate change, rather than those that see the issue as a co-benefit. Therefore, although they are not entirely independent of the central government’s policies and directives, it would be beneficial if development agencies in Turkey, including ISTKA, reinforced their organizational structure to give more

priority to climate change, focused on designing and implementing effective climate change activities, and developed visions that can create substantial changes in the region and raise awareness of other actors on the issue. Climate change is a global phenomenon, but, as it shows its effect on the local scale, the local and regional response is critical. For this reason, climate change visions, perspectives, and activities of development agencies will be determining factors on how their regions will be affected by this disaster in the future.

The third and final issue is the barriers that are frequently mentioned both in the literature and by the agency experts in the interviews. Science-policy interfaces can be established in different ways under different conditions. Nevertheless, even when both knowledge producers and policymakers are willing to work together, some barriers between the two groups might prevent or complicate these collaborations. The barriers can either be global issues, which can be experienced in every region, such as methodological, theoretical, and perspective differences, time constraints, financial management problems, low science literacy, and political conflicts, or, as the case study revealed, be region-specific issues. For instance, in the case study, the scale problem was found to be the most significant regional barrier. In the process of establishing collaborations, if the region is very large and contains a significant number of different actors, it may be challenging to find the right actor or choose one among them. Nonetheless, if the region is very small and does not have enough human capital, then it is not possible to establish collaborations within the region, and the problem of finding actors from different regions occurs. All in all, it would undoubtedly be easier to establish science-policy interfaces in optimal scale regions where activities can be carried out relatively independently and where there are sufficient and qualified actors. However, as neither general nor region-specific barriers are constant and unsolvable, the identification of the barriers should not discourage the establishment of science-policy interfaces. On the contrary, it should be seen as an opportunity to find possible solutions. As Aristotle (1925/n.d.) said, “for those who wish to get clear of difficulties it is advantageous to discuss the difficulties well”. What both knowledge producers and policymakers need to do is to interact, to identify and analyze barriers carefully, and to develop solutions in cooperation to overcome these barriers.

This study, after all, focused on the science-policy interfaces of the two development agencies. Future studies might examine climate change-related science-policy interfaces established by development agencies other than IZKA and ISTKA, municipalities, or relevant national government units. Thus, making comparative analyzes of science-policy interfaces might be possible by revealing the perspectives, methods, and problems of different organizations. Furthermore, comparing the science-policy interface experiences of institutions in Turkey with other countries that have different sociocultural structures might also lead to beneficial results. In addition to this, a more specific research may share experiences and opinions of knowledge producers who have been involved in science-policy interfaces. Such studies will ultimately help gain a broader perspective on the relation between the world of science and the world of politics and hopefully contribute to its improvement.



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