Knowledge-Making

in the Turkish Anti-Nuclear Movement

An Alternative Reading of Social Movements

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Abstract

The Turkish anti-nuclear protest which already mobilized in the 1970s has become more active against the attempts of contemporary governments after the 2002 elections which have purposed to initiate the construction of nuclear power plants by re-considering Turkey's nuclear energy programme which was suspended in 2000. In this regard, the thesis uses "cognitive approach" from social movement studies and the concept of "research in the wild" from STS in order to analyze how this activism against nuclear energy has been occurred and how Turkish activists have developed and legitimated their claims that nuclear energy is too risky.

On the basis of discourse analysis and interviews, the thesis identified four practices used by the Turkish anti-nuclear movement to produce the anti-nuclear knowledge which consists of a set of knowledge claims and related narratives that frame nuclear energy as highly risky. It is observed that the Turkish anti-nuclear movement uses scientific knowledge which is based on the studies of nuclear scientists and international organizations in the field of nuclear energy in order to deconstruct the dominant risks assessments. Moreover, the movement recruits local knowledge from other anti-nuclear movements around the world through global transfers and combines it with its own experiences in legal and social issues in order to construct alternative risk assessments. While the first two mechanisms, calling for scientists and referring to the international organizations, mobilize the scientific knowledge, recruiting local knowledge and combining it with movement's own experiences mobilize the local knowledge. Finally, alternative framings regarding alternative technologies for the electricity generation are developed separately by the political components of the movement by carrying the discussions about the renewable energy and energy efficiency into the political and social domains.

To sum up, the thesis concludes that the anti-nuclear knowledge is a combination of all these four practices which is crucial to identify Turkish anti-nuclear protest as a social movement which has the ability of transforming a technical issue into a socio-technical controversy by recruiting new people, new contexts and new area of application.

Keywords: Turkish anti-nuclear platform, social movements, cognitive approach, research in the wild, knowledge-making in social movements

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to the memory of my beloved brother

İsmet Alparslan

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List of Abbreviations

AECL	Atomic Energy of Canada Limited
AEK	Atomic Energy Commission
ANAEM	Ankara Nuclear Research and Training Centre
BOT	Built-Operate-Transfer Model
BUND	Friends of the Earth Germany
BWR	Boiling Water Reactor
CANDU	Canadian Deuterium Uranium Reactor
ÇNAEM	Çekmece Nuclear Research and Training Centre
EİEİ	Department of the Electricity Surveys Administration
EMO	Chamber of Electrical Engineers
ETKB	Ministry of Energy and Natural Resources
EUAŞ	Electricity Generation Company
GE	General Electric
KAERI	Korean Atomic Energy Research Institute
KWU	Siemens-Kraft Werk Union
MMO	Chamber of Mechanical Engineers
NKP	Turkish Anti-Nuclear Platform
NPI	Siemens and Framatome Consortium
NPPs	Nuclear Power Plants
PWR	Pressurized Water Reactor
STS	Science, Technology and Society Studies
TAEK	Turkish Atomic Energy Authority
TEK	Turkish Electricity Authority
TETAŞ	Turkish Electricity Transmission Company
TETAŞ	Turkish Electricity Trading and Contracting Company
TMMOB	Union of Chambers of Turkish Engineers and Architects
VVER	Water-Water Energetic Reactor

1. Introduction

If there is one prominent symbol that has represented the anti-nuclear movement over the last forty years is the" smiling sun" with the slogan of "Nuclear Power? No Thanks!". This symbol was firstly introduced by one of the Danish activist in 1975 (Spiegel Online International, 2011). Then, it became very popular all around the world, and since then it has been used by many anti-nuclear movements as a symbol to resist to nuclear energy programmes. In this regard, due to its pervasive use, this symbol can be accepted as the representative of the anti-nuclear discourse, and thereby is important to start searching for the knowledge-making in anti-nuclear movements. Protests against the nuclear energy in Europe in the 1970s were also reflected in Turkey, but the anti-nuclear protest in Turkey became more visible in the 1990s. Eventually, the issue of nuclear power has emerged again as the most salient issue after the parliamentary elections in 2002. Although the contemporary government in 2000 declared that the nuclear programme was delayed indefinitely, the new prime minister who formed the government after the elections of 2002 started to give speeches that his government was reconsidering to construct two nuclear power plants (NPPs) in Akkuyu (Mersin) and Sinop where are located in the Mediterranean coast and Black Sea coast respectively. The related Ministry announced that they launched a new nuclear programme of which its first priority was to initiate the construction of NPPs. In these circumstances, first demonstrations took place in April 2006 in Sinop. This opposition has accelerated in the last ten years and mobilized people against the nuclear programme of the government. The first attempt of the government was realized in 2008 by holding a tender. In spite of some legal and political concerns which constrained the tender process, the government was able to sign two international agreements with Russia for Akkuyu NPP and with Japan for Sinop NPP, which resulted in the uprising of the

Turkish anti-nuclear movement. Moreover, Fukishima nuclear accident in 2011 also contributed to the mobilization and helps to keep the momentum for the Turkish anti-nuclear movement.

By following this particular case in Turkey, the thesis aims to analyze how this activism has been occurred and how Turkish activists have developed and legitimated their claims that nuclear energy is too risky. Accordingly, the thesis argues that if the emergence of these activist groups in a socio-technical culture is to be understood, there is need to enrich the theory of social movements. In this context, the thesis tries to introduce Science, Technology and Society Studies (STS) perspective to social movement studies as an alternative way of reading social movements. The mechanisms which are used by the Turkish anti-nuclear movement are examined to follow the practices and processes of knowledge-making within the movement. Hence, social movements are primarily considered as knowledge producers, as well as a collection of different anti-nuclear organizations. In this regard, the unit of analysis is determined as the movement itself. To sum up, the thesis tries to answer how the anti-nuclear movement in Turkey produces, appropriates, circulates, legitimates and contests knowledge. In order to answer this question, the thesis brings social movement studies and STS together. Firstly, cognitive approach developed by Eyerman and Jamison (1991) will be adopted. This approach is introduced as an integrative perspective into the social movement studies. Thus, to some extent, this approach represents the cultural perspective within social movement studies, which leads to the emergence of the understanding that social movements are not only shaped by the social and political context, but also shape it by producing its own knowledge. Secondly, this perspective will be complemented by the concept of "research in the wild" which was developed by Callon, Lascourmes and Barthe (2001) to explain how social movements involve in the knowledge-making about a technical problem.

In this regard, inclusion of social movements as the unit of analysis into STS can contribute to the studies about public participation and lay knowledge. As Hess (2014, p.70) claims, studies drawing attention to the repression of opposition groups and public participation processes can explicitly connect STS and social movement studies. As putting the Turkish anti-nuclear movement at the centre, the thesis purposes to build a link between these two fields. Social movements are crucial to grasp the societal changes in many respects. They can emerge in both democratic and authoritarian regimes. Indeed, they are influential in the formation of more democratic instruments in their respective societies regarding their concerns. Therefore, STS are handy to follow the interaction of social movements with science by opening a room to develop a broader perspective about knowledge-making practices.

As Melucci (1996, p.1) argues that social movements are not only the consequence of social or political actions or changes, but also the signs of a changing society. This is still the case in the today's societies which are more interacted with scientific and technological developments. Protests against genetically modified organisms, stem cell research, nuclear waste disposal and nuclear power plants or environmentally hazardous activities are becoming more visible in the public domain. Accordingly, democratic participation and public involvement in the policy-making process in technical issues have been becoming the focus of social movement studies. Hess et. al. (2008, p.473) describe this importance of social movements in this regard as below:

> "Social movements enhance public participation in scientific and technical decision-making, encourage inclusion of popular perspectives even in specialized fields, and contribute to the changes in the policy-making process that favor greater participation from non-governmental organizations and citizens generally (2008, p.473)."

Regarding to this, my aim in this thesis is to move forward along this line, by elaborating what Callon et. al. (2001) refer to as 'research in the wild'. Thus, the thesis offers a synthesis of cognitive approach from social movement studies and the concept of "research in the wild" from STS. In social movement studies, relatively new approaches have already examined different aspects of the mobilization process. These approaches will be questioned through how they conceive of knowledge-making practices of social movements. This questioning will be a critical analysis of literature. The focus of framing theories on mobilization of ideas and meanings, and the definition of identity studies emphasizing the symbolic, informational and cultural aspects of new social movements will be examined to departure from the social movement studies to STS. Consequently, the cognitive approach (Eyerman & Jamison, 1991) is adopted by the thesis and elaborated together with the main concepts of STS regarding how social movements have been becoming more active in contributing to the knowledge-making about technical problems.

In this regard, the anti-nuclear movement, among all, provides a fruitful ground to investigate the relation between technology and politics. National or global politics or crises are reflected in the society when they are combined with the use of technology to fix the problem or to support the decision. For example, when a nuclear accident happens, this can stimulate the resurgence of the anti-nuclear movements in the world-wide or foster mobilization against nuclear programmes (Koopmans & Duyvendak, 1995; Ho, 2014). This response can be explained by the public's willingness of involving in the policy-making process regarding technical problems on which have highly deteriorating impacts in the society. This claim leads to the transformation of a technical problem into a socio-technical controversy. In terms of public policy, this reaction is mostly against state, and demands for more open and inclusive democracy in which the public finds a place for their claims.

Anti-nuclear movements since the second half of the 20th century have been on the agenda of many disciplines. Thus, in the literature, there are many diverse studies regarding anti-nuclear movements in different countries or in global perspective. Anti-nuclear movements have been studied both in national level as comparative studies (Koopmans & Duyvendak, 1995; Jasanoff & Kim, 2009) and in transnational level within global studies (Kirchhof & Meyer, 2014). The first types of studies mostly try to describe the main characteristics of movements and its participants to examine the mobilization process and their existence in a political system which produces the 'atom for peace' or 'atom for development' imaginaries. In the second category, scholars focus on the global diffusion of knowledge and transnational exchange in a broader perspective within not only anti-nuclear movement, but also environmental movement in general.

To sum up, the thesis introduces STS as an alternative perspective for social movement studies by translating them into knowledge producers. Moreover, by analyzing the anti-nuclear movement in Turkey, I try to bring new dimensions to STS around mobilization of knowledge and the emergence of social movements as knowledge producers. Concerning the research question of the thesis, I will elaborate the Turkish Anti-Nuclear Platform (NKP with Turkish acronym) within the framework of social movement theories and STS. Who are those people? Why and how are they mobilized? What forms of knowledge do they use? How do they frame this knowledge? How do citizens and experts interact within the movement? These questions will be central to search for the knowledge-making in the movement. Therefore, the emphasis of the thesis will be the organization of knowledge. In this analysis, knowledge refers the anti-nuclear knowledge which is merely neither scientific nor ideological. In a broader sense, it is the

anti-nuclear knowledge shaped by the collaboration of activists and scientists, which leads to the creation of claims about the risks of nuclear technology.

This thesis is structured in six chapters. Following the introduction chapter (chapter 1), I will introduce the conceptual framework of the thesis by explaining the main perspectives and studies in both social movement studies and STS in the theoretical chapter (chapter 2). The theoretical chapter will be followed by the methodology chapter (chapter 3). In the methodology chapter, I will discuss the convenience of the discourse analysis for the thesis research topic. Moreover, I will question the limitations of the collection and the selection of the empirical material and ethical concerns about methodological bottlenecks. Later, chapter 4 will outline the Turkish nuclear energy programme and the emergence of the Turkish anti-nuclear movement. In the following chapter (chapter 5), I will present the empirical material within the conceptual framework of the thesis. Finally, in the conclusion chapter (chapter 6), I will critically examine all my findings and discuss some further research opportunities about studying social movements within STS discipline.

2. Theoretical Chapter

The theoretical chapter is divided into three sections. The first introduces the historical development of social movement studies and the cognitive approach. Secondly, relevant literature in STS is explained in order to introduce the conceptual framework of the empirical analysis. Finally, the third section sets out the integrative perspective of the thesis. Research objectives are also identified.

2.1. Social Movement Studies

Studies regarding the idea of groups of individuals can date back to the theories of labor unions and Marxist theories. However, I will not go further, but start with discussing the collective behavior perspective and continued with resource mobilization, political process, framing theory and theories of 'new social movements'. Although Marxist theories are seen as the founder of social movement studies, they will be excluded due to their avoidance of meaning-making in social movements. As Kurzman (2008, pp.6-7) indicates that social movement studies generally ignore knowledge-making in the analysis of social movements. Such like, collective perspective also merely neglects this aspect of social movements (Ibid.). But, it is firstly introduced to show how it led to the emergence of the following theories in order to indicate the relation between different theories in their historical development. Apart from this, my aim is to sketch general aspects of these theories before introducing cognitive approach as the main theoretical perspective from the social movement studies which will establish the theoretical base of the thesis together with "research in the wild" concept from STS.

The earliest approach to the social movement studies is collective behavior approach. This approach is recognized as the orthodox approach in the literature, which was popular until

the 1960s. The supporters of this approach consider social movements as semi-rational responses to the main social and political structure of the society and hierarchical relations between major societal institutions (Blumer, 1949 [1951]; Turner & Killian, 1957 [1972]; Smelser, 1962). For example, Turner and Killian (1972, p.246) define social movements as a collectivity which emerges to promote or resist a change in the society. Blumer (1949, p.200) gives the examples of free education, liberation of women, children's rights as to indicate some changing beliefs and tendencies in the society which led to the emergence of contemporary social movements. In this approach, social movements were evaluated as non-institutionalized collectivities with neither authorized leadership nor recognized membership (Ibid.). Studies in this perspective mostly focused on the origins of movements, and analyzed how social movements lead to the social change (Morris & Herring, 1984, p.6). Thus, they rarely examined the values, perceptions, and knowledge-making practices of social movements.

The second category includes in resource mobilization theory (McCarthy & Zald, 1977) and political process theory (Tilly, 1978). Such studies in this category focus on the question of why some movements are more successful than the others, different from the collective behavior perspective which questions of why individuals join social movements. The well or poor establishment of social movement organizations, lack of available resources or changing social and political conditions are given as the reasons for the success or failure of social movements. Resource mobilization theory claims that grievances don't result in social movements unless social movement actors are able to create viable organizations and mobilize resources (McCarthy & Zald, 1977, p.1216). Therefore, organizations seem crucial to further common interests of individuals. Political process theory argues that collective action is also influenced by changing political conditions (Tilly, 1978, p.232). Thus, a historical perspective on changing political

opportunities is essential to analyze the repertoire of the collective action and examine how this change affects the pattern of pursuit of interests. Moreover, as Leach and Scoones (2007, p.11) argue in their study about mobilization in social movement studies that political process theory sees the historical shifts in the social and political opportunities important as to understand when solidarities emerge and mobilization occurs.

To sum up, these second set of approaches advocate that social movements are rational responses to the changing situations and opportunities in the society. In other words, they are not evaluated as emotional reactions to the societal changes which are only derived from the grievances, but rational actors whom are capable of producing new arguments while using current social and political opportunities. Different from the collective behavior perspective, external resources and political conditions are also seen as the main factors which are influential on the success of mobilization. According to their inclusion to benefit from these social resources and political opportunities, movements develop their own mechanisms to participate in the social and political spheres. However, these studies are still less concern about the knowledge-making process in social movements. As Kurzman (2008, p.8) claims that they primarily focus on the structures in which individuals are mobilized, rather than how these actors make sense by interpreting their surroundings.

Benford (1997, p.409) claims that these structuralist approaches in the second category had an enormous popularity within social movements studies until the 1980s. But, after the 1980s, these structural studies have started to be questioned. In these circumstances, framing theory which is introduced in the third category was developed as a response to the current approaches. In their study, Snow, Rochford, Worden and Benford (1986) describe the shortcomings of the traditional approaches which are described in the second category, and their

study led to the establishment of social movement framing perspective. These shortcomings are: (1) the negligence of the process of grievance interpretation; (2) the tendency to threat participation as merely rational decision; (3) over-generalization of participation-related processes (Snow et.al., 1986, pp.465-467). They claim that grievances are subject to differential interpretations. Accordingly, these variations across individuals, social movement organizations and time affect how the movement mobilizes. Moreover, while people decide to become a part of a social movement, they devote time, energy, and sometimes money. This devotion is affected by the current circumstances. Thus, the decision for participation is subject to reconsideration of current conditions. Furthermore, objectives, the structure of the organization and the strength of the opposition cannot be generalized. Therefore, participation varies across different social movements.

They advocate framing theory as an alternative to resource mobilization and political process theories in parallel with the arguments of Jenkins (1983, p.527) that social movement theories should be extended by considering both psychological and structural factors rather than focusing only one of them. Their central concept, the frame, is defined as a way of interpretation in which people give meaning to their experiences and organize the world through them (Benford & Snow, 2000, p.614). Put differently, framing helps people to understand the occurrences and guide their actions by interpreting their experiences. Accordingly, collective action frames as another concept introduced by the framing theory refers to the sets of beliefs and meanings which are used to justify the actions of social movements (Ibid.). Thereby, social movements engage in realigning collective social frames to establish the link between individuals' and social movements' interpretative frames. So that movements' interests, ideas, values and goals become consistent with it prospective members, and this leads to the

mobilization of individuals. In this regard, the first step is the problem definition, or as Benford and Snow (2000) identify, "diagnostic framing". This definition of the problem enables social movements to start searching for solutions for the problem, which is identified as "prognostic framing". The last framing task is "motivational framing" which refers to the creation of the rationale for action, and thus include in the construction of the movement's vocabulary of motive (Ibid., p.617). Accordingly, ideas and meanings constructed during the formation of a problem shape and motivate the mobilization of individuals. Moreover, these sets of frames are also shaped by the mobilization itself. Consequently, this cycle continues creating alternative framings within the movement.

Although framing theory is presented as an alternative approach, some studies have combined the framing and political opportunity perspectives. For example, Koopmans and Duyvendek (1995, p.249) in their study about anti-nuclear movements in Western Europe claim that the reason which prompts the emergence of social movement mobilization is rooted in political power relations. They examine the specific political conditions in Germany, France, the Netherlands and Switzerland in order to compare the strength of the anti-nuclear movements in these countries. They conclude that social movements can only be successful when the political context offers them the opportunities to do so. For example, the German anti-nuclear movement had already been well prepared and enabled the public to mobilize against the construction of a nuclear reprocessing plant in Wackersdorf, Bavaria, when the Chernobyl nuclear accident happened (Ibid., p.239). Moreover, some political parties, such as the Social Democratic Party, had already declared that they supported to the German anti-nuclear movement against this nuclear plant in Wackersdorf. Thereby, Koopmans and Duyvendek (Ibid.) agree that the social and political conditions were already ready for the German anti-nuclear movement by the time of

the Chernobyl nuclear accident to mobilize the public. Moreover, the current opportunities for the German anti-nuclear movement were also influential on its capacity to construct more convincing frames than their counterparts in France or the Netherlands. To sum up, this comparative study reveals that both different political opportunities and interpretation of similar events differently varies from one country to another. Therefore, this difference can affect the level of mobilization and the capability of the movement to raise public awareness.

Finally, the fourth category is represented by the cognitive approach. This perspective has been introduced by Eyerman and Jamison (1991) as a combination of critical Marxism and academic sociology aiming to link social theory with the theory of science. They mainly criticize the previous approaches for neglecting knowledge as a relevant dimension of social movements. Knowledge refers both worldview assumptions shared by participants of social movements and particular issues that movement is created around (Ibid., p.3). Social movements, in this approach, emerge as knowledge producers. This approach argues that the problem which the social movement is mobilized around is conceptualized in a political and cultural context by the interaction of historically situated actors and their opponents. This interaction produces the movement identity or cognitive praxis.

Cognitive praxis is defined as the core identity or particular structural organization through which the social movement is identified by outsiders (Jamison et.al., 1990, p.2). Moreover, cognitive praxis constitutes the collective identity of the social. Apart from this definition, they distinguish tree dimension or what they call “knowledge interests”. These are cosmological, technological and organizational dimensions (Jamison et.al., 1990; Eyerman & Jamison, 1991; Jamison, 1996). Eyerman and Jamison (1991, p.67) explain the reason of dividing cognitive praxis into three dimensions as to comprehend both general and particular

aspects in the cognitive identity of a social movement. According to them, this is also useful in practice as a methodological tool to identify the set of variables which forms the knowledge of the social movement.

Cosmological dimension refers to the common worldview assumptions which lead to the formation of the social movement's world-changing aims (Ibid., pp.70-75). For example, Jamison et.al (1990, p.5) indicate that questioning the dominant worldview based on modernization and establishing its "ecological" worldview constitute the cosmological dimension of the environmental knowledge. If we accept that the cosmological dimension is the general aspect of the cognitive praxis, technological dimension, then, can be assessed as the particular aspect of it. Eyerman and Jamison (1991, pp.75-76) define technological dimension as technological interests of the movement. Put differently, concerns about a specific technology and issues around which the movement establishes form the basis of the technological dimension. This dimension covers both negative assumptions about specific technology such as hydroelectric dams or nuclear energy and positive assumptions about alternative technology such as recycling and the use of renewable energy. Finally, organizational dimension is about rejection of elitism, and thereby the anti-elitism which is at the core of this dimension highlights the importance of dissemination of scientific information (Ibid. p.76). Participation and decentralization appear as the key aspects, and thus the organizational dimension eventually refers to the re-definition of expertise (Jamison et.al., 1990, p.6).

As well as the cognitive praxis of the movement, this approach also includes in the social and the political conditions in order to analyze the emergence and the survival of social movements. Accordingly, they establish a link between the cognitive praxis of social movements and the social context which create the problem of which leads to the formation of the movement

itself. Indeed, social and political conditions are seen crucial on the formation of the cognitive praxis of social movements. For example, environmentalism in Sweden is evaluated scarcely as a social movement, since the movement had to incorporate into the established institutions due to the strength of the well-established political culture in comparison with the Netherlands and Denmark (Eyerman & Jamison, 1991, p.68).

Moreover, the elaboration of the approach to analyze the role of social movements and the development of scientific knowledge by Jamison (2006) brings some additional analytical perspective which will help to base the empirical analysis of the thesis. Jamison, in his analysis, argues that social movements have been cultural responses to long waves of industrialization. Accordingly, cognitive approach introduces cultural features of the social shaping of knowledge through analyzing the cognitive praxis, and thus goes beyond the ideological understanding of social movements.

2.2. Science, Technology and Society Studies

STS have investigated governance and expertise to examine the boundaries between science and politics by elaborating the ways for more open democracies and lay participation in political decision-making (Bijker, 2001; Epstein, 1996, 2005). Boundaries between science and politics and eventually public inclusion in technical decision-making have been examined in order to determine the new paths for more democratic inclusion (Durant & Joss, 1995; Callon et. al., 2001; Nowotny, H., 2003). These studies have brought new aspects into studies about the social movements, and emphasized social movements' contribution to the knowledge production. As Hess (2014, p.75) indicates that STS has helped to develop more comprehensive perspective about social movements by identifying them as reform movements rather than disruptive or

protest-based movements. Accordingly, the epistemic dimension of social movements has become a research object as an alternative to resource mobilization, political process and framing theories. Accordingly, the first studies in STS focused on the image of the public regarding scientific and technological developments and policy-making process in technical issues. Apart from this, as Bucchi and Neresini (2008, p.450) discuss, STS studies regarding public participation have been developed against the so-called "deficit model" of public understanding of science. By this term, they refer to the tendency of traditional researchers to threat the public as incapable of understanding the scientific and technological developments, and thus they are becoming hostile to the new developments. Consequently, scientific knowledge is seen as a process which is leaded by competent scientists of having scientific curiosity through the uses of purely scientific methods. Thus, this understanding bounds the knowledge to the scientific expertise.

Studies in this tradition have focused on the lack of scientific literacy and offered well-structured science education to overcome the negative consequences of the supposed cognitive deficit. Hence, this traditional view has supported the technocratic view of policy making. The public is seen as disqualified in technical issues. While being against the deficit model and the quantitative studies about public awareness regarding technical issues, STS have used qualitative techniques to examine non-scientific expertise (Wynne, 1989; Jasanoff & Martello, 2004; Iles, 2004). Eventually, theories of different types of expertise and new terms to refer the lay knowledge have been developed by STS scholars. Apart from the deficit model of public understanding of science, survey analyses have showed that better informed citizens don't have more positive attitudes. On the contrary, these survey studies, as Bauer (2008, p.121) agrees, reveal that citizens can equally hold their views whether or not they are informed well. Studies

revealing the different aspects of the relationship between public and science have changed the view of the deficit of the public into the deficit of scientific experts. In parallel, STS has also impaired the idea that science and technology have been continuously in progress for the sake of society. Re-interpretation of the position of science and technology in society has led to the emergence of constructivist framework.

Constructivist frameworks within STS have influenced the discussion on the concept of 'trust' in public toward scientists and, to some extent, weakened the traditional understanding of that science and technology is value-free and autonomous. Bijker argues (2001, p.20) this change has also been indispensable in today's societies. Technological culture as a term which is used to refer to the modern societies by Bijker (2001) is an arena in which the interrelation of science, technology and society is observed. As Hackett (2008, p.429) argues, STS research have also changed the terms of scientific and technological governance which is one of the other units to follow interaction between science, technology and policy within the terms of constructivist frameworks.

In this regard, apart from the debate about modernization, studies have revealed different risk perceptions and develop the understanding of 'risk society' to analyze the relation between science and society. The thesis of Beck (1992 [1986]) focusing on expert knowledge and the reflexive characteristics of modernity and Giddens's (1991 [1990]) analysis exploring the transformation of modernity which claims that scientific knowledge and expert systems are central to this change are the main studies in this field. Moreover, there are some other studies which focus on the reflexive processes amongst the grass-root movements. In his study, Wynne (1996, pp.44-45) criticizes Beck's and Giddens's analysis of risk society as being merely focused

on expert knowledge, and thus neglecting the influence of lay knowledge and cultural differences.

In contrast to Beck's and Giddens's studies, Wynne (Ibid., p.48) claims that there has never been a merely public trust for the scientific authority. He claims that public skepticism and dissent expertise are co-shaped instead of one way shaping of dissent expertise to the public skepticism. Moreover, he argues that lack of observation of dissent does not mean that once trust exists (Ibid. pp.48-49). Hence, social movements cannot be seen just passive protestors to the assurances of the government about the nuclear energy, but active makers of their own knowledge. By acknowledging that mistrust doesn't emerge in one night during the transformation from simple modernity to reflexive modernity, as Wynne (Ibid, p.50) argues that social acceptance of the credibility of expert systems should be equated as 'virtual trust'. Accordingly, the relationship between public and science has been always reflexive. Consequently, the debate over the transformation of modernity into a reflexive modernity reveals another debate about public trust in science and expertise.

In this debate, globalization also appears as the main cause of the transformations, since the modern science and technology has produced global risks from which no one can escape. Beck (1992, pp.19-50) argues that the modern institutions responsible for the emergence of the new risks have failed to control the risks. This incapability leads to the growth of the sense of risk and deteriorates the legitimacy of modern institutions. This deterioration leads to the disengagement and attempts to reconstruct modern institutions and political culture. However, is this one way effect? Or is there more complex process behind this response? Wynne (1996, p.57) claims that public perception of risks is based on the interpretation of attitudes of expert institutions, and thus risks are relational. This relation is explained by the term of 'dependency'

rather than 'trust'. To sum up, studies in this regard mostly deal with understanding the effect of science and technology in the transformation of modernity and contemporary societies to answer how this transformation can lead to the democratization.

Further developing these ideas, Halfmann (1999) has introduced the term 'risk movements' which focuses specifically on technological and environmental risks. Halfmann (1999, p.181) distinguishes social movements from citizen initiatives and formal associations like political parties. He sees the emergence of risk movements as an effect of the emergence of modern risks and changing risk perceptions. In this regard, technological and environmental hazards are considered as threats to life-chances. Thus, protection of life-chances appears as the main motivation. This risk perception leads to the different interpretation while assessing the risks. Halfmann (Ibid., p.186) describes this as actor-risk assessment. Social movements depart from modern institutions while defining the risks derived from the risky technologies, especially technologies which have high catastrophic potential, such as nuclear energy. Analysis on the movements' knowledge which is enhanced by the scientific knowledge contributes to the studies about democratization of policy-making and provides a base to explain the public involvement in producing knowledge through following the knowledge-making process. However, the arguments about risk society and reflexivity of the public are still key to comprehend the emergence of social movements in a socio-technical culture.

2.3. Integrative Perspective of the Thesis

Apart from the sociological studies of social movements, the STS showing that scientific, social, political and economic actors are much more interacted has conceptualized the collaboration of "confined research" and "research in the wild" (Callon et.al., 2001). They claim

that scientific and technological developments have not brought certainty to the scientific research, but contradict its certainty (Ibid. p.18). Callon et. al. describe this paradox of science through the tension between the confined research and the research in the wild. In their study, they introduce the term of "delegative democracy" in which the confined research is shaped. Delegative democracy is defined as a form of representative democracy based on a double delegation which facilitates the formation of traditional institutions (Ibid., pp.121-123). It is grounded on the distinction between ordinary citizens and their elected representatives and experts and lay people. In this system, a part of the population who is eligible to vote elects its representatives from a predetermined list of candidates and delegates its decision power to those representatives for a certain period of time, which eventually leads to the overall control of all political topics. Moreover, the absolute certainty of scientific facts which are produced and reproduced by well-organized experiments by pure scientific expertise in protected laboratories limits the state of knowledge to experts. This system enforces and is enforced by containing uncertainties of the state of knowledge in confined labs and the state of collective in parliaments (Callon, 2003, p.38).

According to Callon et. al. (2001, p.123), this confinement is broken by lay participation. Put differently, new spaces where lay people find an opportunity to participate in discussion about the solution of technical problems is one of the ways to challenge this double delegation. This challenge is organized by researching in the wild. What Callon et. al. (Ibid.) describe as "research in the wild" is explained as a new form of research invented by people or groups who are concerned about some specific issues, and intend to cooperate with scientists. In other words, research in the wild is introduced as a tool used by these people or groups to be involved in the confined research by challenging its certainty, and thereby it is influential in transforming a

technical problem into a socio-technical controversy. Callon et.al. (Ibid., p.89) gives the example of AIDS patient as the direct, and nuclear case as the indirect example for lay participation. In indirect case, these groups can push researchers to be more aware of alternative discussions. This phase can be explained by the term of co-evolution of the research in the wild and the confined research, or science and public for more cooperative research. For example, the establishment of the Commission de Recherche et d'Information Indépendantes sur la Radioactivite (Commission for Independent Research and Information on Radioactivity) as a non-governmental organization in France after the Chernobyl accident is given as an example of this indirect involvement. People outside the confined laboratories were mobilized to discuss alternatives and perform their own research. Thus, this commission was formed as a laboratory to make independent measurement about radioactive contamination. Besides, in the AIDS case, people concerned about this issue including AIDS patients involved in the research collectives directly. They involved in the medical trials, and eventually developed new arguments which fostered further researches. The debate was not only about medicines of biological markers which enable doctors to estimate if the treatment is effective or not, but also the tendency of laboratory research to work on specific patients by excluding the majority of AIDS patients (Callon et.al., 2001, pp.83-89). Eventually, mobilization of people around the AIDS issue thorough involving directly in the research collectives led to the development of new regulations and new investigations.

Apart from the attempts of people outside the confined laboratories to be involved in the confined research, the exchange of information between scientific and non-scientific knowledge eventually leads to the development of “hybrid collectives” (Callon & Rabeharisoa, 2003, p.198). “Hybrid collectives” or “hybrid forums” are described as open spaces where different groups can come together to discuss technical problems (Callon et.al, 2001, p.18). They mention

the example of the nuclear energy case in France in order to indicate how the nuclear energy issue turned into a social issue through local groups, resident's associations and chicken farmers (Ibid., p.25). While nuclear energy was merely a technical issue in the 1960s in France, they argue that the waste disposal problem started to be seen as not only a technical problem, but also social and political problem due to the entrance of new actors into the field of the nuclear energy issue. These new actors came together outside the traditional platforms such as hybrid forums and developed new arguments which are not only scientific or technical, but also social.

The study of Anshelm and Galis (2009) about the politics of nuclear waste management in Sweden is one of the examples of how this conceptualization can be used to examine this indirect involvement of social movements into the solution of a controversial environmental problem. The analysis of the relation between anti-nuclear energy movement and the nuclear energy industry in Sweden reveals that researchers in the wild contributed to the development of a new solution regarding nuclear waste disposal in Sweden by criticizing the methods of the nuclear industry (Ibid. p.27). According to them, the anti-nuclear energy movement in Sweden made politics by recruiting scientific knowledge. In other words, they were able to translate a technical problem into a socio-technical controversy which was resolved by the collaboration of scientific and non-scientific knowledge.

In this regard, the thesis brings some aspects of cognitive approach and the concept of "research in the wild" together to analyze the knowledge production in the Turkish anti-nuclear movement. Thus, it is an attempt to introduce STS into the social movement studies. Social movement studies can be traced back to mid-1900s. As mentioned above, studies in this field have a very long and comprehensive history including many other social sciences such as sociology, political science, psychology and economics. Cognitive perspective, in this thesis, is

used to answer the question of how the social movements produce knowledge. However, some aspects of the perspective should be critically elaborated in order to develop a synthesis with STS. According to Eyerman and Jamison (1991, p.55), social movements are new conceptual spaces in which different groups and organization are involved. Accordingly, cognitive praxis of the social movements doesn't come ready made, but it is created continuously by ideas of which is developed in this collective action (Ibid.). This understanding of social movements in their cultural contexts in the formation of the cognitive praxis which produces knowledge establishes the theoretical base of the thesis. Thus, social movements, in this thesis, are evaluated as knowledge producers.

However, it is not enough to grasp the process of knowledge production in social movements in a socio-technical culture by merely using the cognitive approach. The nuclear energy is an issue which is heavily dominated by scientific expertise. Thus, understanding the internal practices of social movements by using the cognitive approach requires more analysis on the social movement's participation in the knowledge-making process. In other words, analyzing merely internal practices of the social movements by producing knowledge doesn't provide a comprehensive picture. In order to analyze how they produce knowledge, we should also take into account that they are active participants in the knowledge production. The Turkish anti-nuclear movement, in this sense, provides an alternative of which we can put within the framework of Callon's et al. (2001). Social movement's involvement in knowledge production by recruiting both scientific and local knowledge helps to examine how they appropriate, circulate and legitimate the knowledge.

Finally, the concept of the 'risk perception' emerges as a complimentary concept. The importance of reflexivity on the interpretation of risks will be considered to determine the

practices of the Turkish anti-nuclear movement in the thesis. Different risk perceptions between the Turkish anti-nuclear movement and the Turkish government which establish the basis of the anti-nuclear knowledge in Turkish case are determining in the knowledge-making practices.

In this regard, the thesis discusses the internal practices of the Turkish anti-nuclear movement in terms of the mobilization of knowledge, different risk perceptions, and use Callon's et al. perspective to the dynamics of knowledge-making by analyzing their relation with public and nuclear scientists. While analyzing cognitive practices of the movement, the thesis doesn't only focus on how they frame their arguments, but also examine how scientific and local knowledge are co-produced through these practices.

3. Methodology Chapter

In this chapter, the methodology of the thesis is introduced and discussed regarding its relevance to answer the research question of the thesis. Indeed, the strengths and the weaknesses of discourse analysis are examined. The research question as mentioned in the introduction chapter is determined as how the anti-nuclear movement in Turkey produces, appropriates, circulates, legitimates, and contests knowledge. This question requires dual strategy to be answered. Discourse analysis is used to determine the main themes in the documents in order to follow the processes of how the anti-nuclear knowledge is produced. These main themes are later deconstructed into the categories in which the cognitive practices of the Turkish anti-nuclear movement are framed. The cognitive practices determined during the discourse analysis are elaborated during interviews and participatory observations. Consequently, while discourse analysis reveals the categories, interviews and participatory observations contribute to the exploration of cognitive practices which are used to produce, appropriate and legitimate the main claims about the nuclear energy.

3.1. Discourse Analysis

In general, there is not a specific way to use the discourse analysis. Although it is basically originated from linguistics and social psychology, it is also accepted as an analytical tool for sociology, media and communication, political and management and organization studies (Tonkiss, 2012, p.406). Within the terms of STS regarding analyzing science and technology through social practices, discourse analysis as an analytical tool can be assessed as relevant. Tonkiss (Ibid.) defines discourse as “systematic ordering of language involving certain rules, terminology and conventions”. Hajer (1995, p.44) describes discourse as collection of

ideas, concepts, and categorizations which are framed and re-framed in the social context through particular practices. Accordingly, discourse refers to the representation of a specific knowledge generated about a certain issue which gains the meaning from the social context, while also giving meaning to the social realities. In the case of the thesis, discourse analysis is used to determine the categories in which the anti-nuclear knowledge is produced. Regarding to this, different risk perceptions, reinterpretation of risks and formulation of new risk assessments are defined as main discourses. In this thesis, discourse analysis enables to investigate the social context of the main claims of the Turkish anti-nuclear movement and eventually helps to identify the process of knowledge-making by deconstructing the language used in the documents.

The thesis agrees that knowledge-making process within the movement can be understood by examining the discursive basis of their claims about the risks of the nuclear energy. The rhetoric used by the movement in brochures, articles, press releases and reports which establishes the basis of the anti-nuclear knowledge can be tracked through discourse analysis. Rhetoric, in this thesis, refers to the argumentation style of the Turkish anti-nuclear movement which is one of the aspects of the discursive basis of the anti-nuclear knowledge rather than another analytical tool to analyze it.

Moreover, the thesis evaluates social movements as processes in formation instead of reading them as a collection of different organizations. As Eyerman and Jamison (1992, p.59) claims that one of the barriers to define social movements as knowledge producers is to embody them as a collection of organizations. While accepting that social movements can be seen as a network of organizations which are concerned with the nuclear energy, the whole cognitive process of knowledge-making cannot be followed through separate campaigns and protests of affiliated organizations, but through their practices used to create their claims. Thereby, the

thesis considers the NKP as the main body of the Turkish anti-nuclear movement, which leads the processes in which the anti-nuclear knowledge has been framed since the 1990s.

3.2. The Collection and Selection of Empirical Material

After I determined the unit of the analysis as the Turkish anti-nuclear movement, I started to search for articles, brochures and reports in the web-site of the NKP. During my research, I also came up with press releases and declarations prepared by the NKP. Moreover, there were newspaper articles and news regarding Turkey's nuclear energy programme and anti-nuclear campaigns of which are also shared through the web-site of the NKP. I chose the NKP as the main body representing the Turkish anti-nuclear movement. Since, it systematically presents the anti-nuclear reports, protests and campaigns via its internet site. Moreover, my research about the development of the Turkish anti-nuclear movement also confirmed my decision. Since I don't take the Turkish anti-nuclear movement into account as a collection of organizations, I prefer to focus on claims rather than their authors. However, determining the pioneers of the movement helped me to select the core documents for my empirical analysis.

Soon after, I also discovered that there is a particular project called as "Nükleersiz (No-Nuclear)" which aims to collect all current sources concerning with the nuclear energy to share on an internet-site. Regarding my further research about this project, I also learnt that some of the members of the project team were involved in the establishment of the NKP. Thus, I continued to stick with the NKP web-site for collecting data. However, I got in contact with the project coordinator of "Nükleersiz" project to arrange an interview with her and provide in depth information about the project. Depending on my preliminary research, I decided to include some

of the documents which I reached from the web-site of the "Nükleersiz" project into my preliminary data set.

The internet archive of the NKP and "Nükleersiz" project provided lots of information. Soon after, I realized that I needed to change my research strategy, since I was overwhelmed by these pages of documents. Among this preliminary data set, there were many documents which touched upon the same issues from the same perspective. Hence, I decided to choose one or two of them for my final data set. But, this continuity in the documents inspired me about the categories which I considered for the discourse analysis. By keeping in my mind about these categories, I continued to select the relevant documents for my final data set. During the selection process, my main focus is to define the argumentation process. By doing this, I mainly searched for the documents in which the movement's main claims are included such as brochures, declarations, congress's proceedings and press releases. Finally, I determined fifteen documents which I reached from the web-sites of the NKP and the "Nükleersiz" project. Indeed, I considered the publishing date while selecting the relevant documents. Since my research focus was not a historical comparison of the movement's development, I tried to follow the argumentation line and concluded that documents published after 2002 were convenient for my research question. But, while keeping the recent documents as primary sources, the articles and books I reached through the web-site of the "Nükleersiz" project were also used as secondary sources, which reflect the historical development of the Turkish anti-nuclear movement.

As well as determining how they develop their claims, since I aimed to answer how the movement produces the knowledge, I thought that I should reach the members of the movements personally and conduct interviews face-to-face. I thought that it would help me to monitor the cognitive practices of the movement. The first person that I identified and found her email was

the project coordinator of the "Nükleersiz" project. The determining criterion was if their emails could be attained via the internet or not. Thus, I started with the people whom I reached their emails. She replied me kindly and offered me some other people whom I could contact. By her kind help, I reached two key members of the NKP in İstanbul and had the chance to join some activities organized by the movement. The time period when I would be in Turkey was determined together with one of the activists. The last three weeks of April was chosen, since it was closed to the anniversary of the Chernobyl nuclear accident. Moreover, this time period we defined, was coincided with the groundbreaking ceremony of the Akkuyu NPP. Therefore, it was productive for my research to involve in the activities in such kind of a busy period. I conducted three interviews in Turkey, but I also attended a panel and a press conference. During these activities, I also had the chance to meet many activists. All the activists I met and requested to talk about the anti-nuclear campaigns were very willing to answer my questions and provide me additional documents. Eventually, I was accepted to join their internal emailing list, and therefore I obtained some documents which I couldn't reach via the internet. However, since my time was limited, my observations were, to some extent, remained limited.

I used the semi-structured interview technique. The questions were prepared in three categories. I started interviews with personal questions to obtain information about their main motivation and activities in which they were involved so far. Secondly, I continued with open questions about the main arguments of the Turkish anti-nuclear movement. This set of questions gave me the chance to ask more-focused questions about argumentation and decision-making processes. I asked interviewees to tell how the movements develop its claims about the risks of nuclear energy. They were also asked to describe their relation with scientists and citizens. To

sum up, these interviews provided me many details which I could not consider through the only discourse analysis.

I conducted the first interview with one of the founders of the local platform in Sinop where the second NPP is planned to be constructed (Interview with Respondent 1 dated 17 April 2015). She is an economist. She has been involved in the Turkish anti-nuclear movement since 2005. She started to organize campaigns via the internet by organizing a web-site concerned with the environmental and cultural problems of Sinop in 2001. Her involvement in the anti-nuclear movement provided details about the emergence of local platforms. Moreover, her personal experience in the nuclear energy issue also helped me to conclude some of the practices for my empirical analysis which I could not have acquired through only the analysis of documents. The second interview was done by the former chair of the platform in Istanbul (Interview with Respondent 2 dated 18 April 2015). She is an electrical engineer. Although she decided to study electrical engineering to become a nuclear engineer, her personal experience later in her life led her to become a part of the anti-nuclear movement. She has been involved in this movement since the 1990s. Since she had been in the executive bodies of the movement previously, I had the opportunity to ask specific questions about decision-making processes within the movement. The final face-to-face interview was conducted with one of the founders of the local platform in İstanbul, which was firstly established as a group, namely "Working Group against NPPs" (Interview with Respondent 3 dated 29 April 2015). He is also the member of the Turkish Green Party and one of the founders of the Second Green Party[1] in 2008. His position in the movement is very important to examine the conflicting issues about different arguments and organizations involved in the Turkish anti-nuclear movement.

[1] The Green Party in Turkey can be split into two periods. One is between 1988 and 1994. The second is the period after 2008. It was re-established fourteen years after it was closed down, in 2008.

3.3. The Data Analysis Procedure

Since I evaluated the Turkish anti-nuclear movement as the collection of meanings rather than the collection of organizations, I also assume that language of which it uses reflects this meaning. Thus, the thesis claims that there is no brute data independent from meaning by following the claims of interpretative, critical and 'post' approaches regarding the qualitative research (Popkewitz, 2004, p.72.)

In this regard, through reading the documents, I firstly defined themes. During interviews, it was observed that one of the themes was more dominant among others. This was the "counter risk assessment". Hence, the findings of coding were re-organized around this dominant theme. Apart from the interpretation of data set including the findings of interviews and observations, four practices of the Turkish anti-nuclear movement, which is used for developing the anti-nuclear knowledge were identified which are elaborated in the following chapters.

3.4. Quality of Empirical Material and Ethical Concerns

Regarding the selection of the empirical material and data analysis procedure, I should note some ethical concerns. Discourse analysis as an analytical tool, as mentioned in the previous section, cannot be formalized. Therefore, we can talk about different discourses and discourse analysis. However, in order to be consistent during my research, I considered that language is not only formed by the social and the political context, but also forms it. Thus, the language which is used to represent claims in texts can be read through their discursive meaning, which I think that this reading facilitates the identification of the cognitive practice of the movement. But, the wholly appreciation of the language can drive the researcher misinterpretations. This is

sometimes a bottleneck for the researcher which leads her to start believing in that she will eventually find a theme. In order to avoid this, the themes should be continuous in documents and corrected by interviews and observations. Hence, during coding, I checked the continuity of themes and reviewed them according to the findings of interviews. However, I should remark that since the time was limited for the research, some themes might have been neglected due to their lack of continuity in the data set.

Finally, I would like to mention some difficulties about interviews. Only one interview (Interview with Respondent 3 dated 29 April 2015) was scheduled before, but the others were developed spontaneously. Since the movement doesn't have a specific organizational body which has a centre, I had only the opportunity to meet them face to face during the panel and the press release. Therefore, I scheduled interviews after these events. Thus, I couldn't do in depth research about the interviewees. Moreover, my observations were relatively limited since I didn't have time to join all the events with them due to geographical limitations.

4. Turkish Anti-Nuclear Movement Against Turkey's Nuclear "Honeymoon"

This chapter will provide a general overview about Turkey's energy policy regarding the development of nuclear energy and campaigns of anti-nuclear groups in this period. It starts with a historical overview of legal and political decisions of Turkish governments since the 1950s. Then, it tells some historical turning points of how this policy led to the emergence of an anti-nuclear movement in Turkey by introducing the efforts of anti-nuclear groups to stop the construction of NPPs in Turkey.

4.1. Turkey's Nuclear Energy Policy

Following the years of the foundation of the Republic of Turkey in 1923, the electricity industry was based on foreign investment. According to the tendency of the 1930s which emphasized the importance of public ownership in the electricity production, Turkey also started to nationalize electricity industry. By the 1940s, the whole electricity industry was publicly invested (Erdoğdu, 2007, p.3068). Then, the Ministry of Energy and Natural Resources (ETKB with Turkish acronym) was established in 1963. Accordingly, Turkish Electricity Authority[2] (TEK with Turkish acronym) was formed in 1970.

Apart from the efforts to become an industrialized country and to connect the electricity to the whole country, electricity production and consumption were constantly increased in years. While the electricity production was 2815.1 GWh in 1960, it was increased twenty-five times and realized as 73.665 GWh in 2003. Per capita annual energy consumption was also increased

[2] TEK split into two state-owned enterprises in 1993: One was the Turkish Electricity Generation Transmission Company (TEAŞ) and the other was the Turkish Electricity Distribution Company (TEDAŞ). After the implementation of the Electricity Market Law, TEK was re-organized again and at this time split into three enterprises in 2001, namely the Turkish Electricity Transmission Company (TETAŞ), Electricity Generation Company (EUAŞ) and Turkish Electricity Trading and Contracting Company (TETAŞ). Moreover, an Electricity Market Authority was also established by the Law (Erdoğdu, 2007, p.3068).

from 86 kWh to 1581 kWh in forty years (Yılmaz & Uslu, 2007, p.261.). While the 60s and the 70s was the developments plans era which was publicly dominated, Turkey followed more liberal energy policies in the 80s and the 90s. During the first two development plans, Turkey targeted the efficient use of the current power plants for the electricity generation like coal-fired power plants. Moreover, it purposed to search for hydraulic energy resources. Accordingly, Seyitömer, Hopa and Aliağa thermal power plants and Keban hydroelectric power plant started operation during this period. The third development plan which covered the period between 1973 and 1977 was the first plan in which the nuclear energy was recognized as one of the primary energy resources along with geothermal and natural gas (Palabıyık et.al., 2010, p.71.).

In this regard, the idea of the construction of NPPs for electricity generation was shaped by the efforts of the Atomic Energy Commission (AEK with Turkish acronym), which was later transformed into the Turkish Atomic Energy Authority (TAEK with Turkish acronym) by the contribution of the Department of the Electricity Surveys Administration (EİEİ with Turkish acronym) and affiliated to the Prime Ministry by another Law in 1982. The first international attempt of Turkey to develop nuclear energy was to sign an agreement with the United States (US) for starting collaboration to use the nuclear energy for civilian purposes in 1955. According to some authors, the reason behind Turkey's attempt to generate nuclear energy can be dated back to the US President Eisenhower's 'Atoms for Peace' speech in the United Nations General Assembly in 1953 (Kibaroğlu, 1997, p.34). Indeed, the commitment of Turkey to generate nuclear energy for civilian purposes was followed by the enactment of the Law on the establishment of AEK in 1956. This act not only purposed the construction of NPPs, but also the promotion of nuclear research and the construction of research reactors (Ibid.). Therefore, a land near Küçükçekmece Lake (İstanbul) was expropriated and the first nuclear research centre was

established in 1961 with the name of Çekmece Nuclear Research and Training Centre (ÇNAEM with Turkish acronym) (TAEK History, 2010). Accordingly, for the same purposes, Ankara Nuclear Research and Training Centre (ANAEM) was formed in 1967. Indeed, in the following twenty years, many universities launched academic programmes for nuclear engineering, such as İstanbul Technical University, Ankara University, Ege University (İzmir), Boğaziçi University (İstanbul) and Middle East Technical University (Ankara) (Özemre, 2002, p.77).

Apart from feasibility studies and surveys to select the nuclear site for NPP, Akkuyu Bay (Mersin) which is in the Mediterranean coast of Turkey was chosen for the construction of the first NPP in 1976 (Kibaroğlu, 1997, p.35). TAEK issued the license for Akkuyu in the same year. Following this decision, negotiation with firms started. However, the negotiations with Swedish firms for the construction of a NPP were interrupted by the military coup in 1980. However, research and training reactors, namely Triga Mark II and TR-2 continued to operate.

Regarding the nuclear energy policy of Turkey, the 80s and the 90s witnessed the unsuccessful attempts to construct NPPs. Processes for organizing tenders and collaborating with international firms had been interrupted by many times. The political situation in the country, changing priorities about energy production and unwillingness of international firms diminished Turkey's endeavors in this period. After the selection of İnceburun (Sinop) in the Black Sea coast of Turkey as another site for the second NPP, seven major firms in this field were invited to submit bids. German, Canadian and US firms' bids were approved. It was agreed by Atomic Energy of Canada Limited (AECL) for the construction of a 655 MWe Canadian Deuterium Uranium (CANDU) reactor in Akkuyu; by the Siemens-Kraft Werk Union (KWU) for the construction of 990 MWe Pressurized Water Reactor (PWR) in Akkuyu and by General Electric (GE) for the construction of the Boiling Water Reactor (BWR) in Sinop (Ibid.). Later studies

about the convenience of Sinop for a NPP failed. The research about the geological appropriateness of Sinop revealed that there was needed more research to measure the negative impact of the fault line in the Black Sea region. Negotiations with other two firms also failed due to financial and political reasons (Özemre, 2002, p.79). Turkey offered a new model, namely built-operate-transfer (BOT) model which was basically based on the joint venture utilities formed between firms and TEK. In this model, firms were responsible for the construction and operation of the reactor for 15 years together with TEK by committing that they would sell electricity to TEK and hand in the reactor to TEK at the end of the period. This model led the KWU lose its willingness. Eventually, KWU disagreed and withdraw undertaking the construction of a reactor in Akkuyu. The Canadian government also evaluated BOT model risky and didn't give the guarantee to AECL.

In the 1990s, Turkey continued its efforts to agree with international firms to construct NPPs in Akkuyu and Sinop. Political turmoil in the country and corruption lawsuits prevented efforts to be successfully implemented. At the Meeting of the Supreme Council for Science and Technology of Turkey in 1993, the use of nuclear energy for electricity generation were counted as one of the highest priority projects (Turkish Science and Technology Policy: 1993-2003, 1993). TEAŞ started to consult with Korean Atomic Energy Research Institute (KAERI). (Kibaroğlu, 1997, p.39). In 1997, three consortiums, namely AECL, Nuclear Power International as Siemens and Framatome Consortium (NPI) and Westinghouse and Mitsubishi Consortium offered their proposals (Özemre, 2002, p.80). However, the negotiations had never been concluded and the nuclear programme was indefinitely delayed in 2000. In these three years, the government changed three times. Moreover, two former energy ministers were accused of involving in inappropriate relations with firms during the contracting process to import natural

gas from Russia. Because of the financial instability which led a huge economic crisis in 2001 as long as political instability and corruption cases, Turkey's nuclear programme was failed.

After one year, in 2002 elections, the government changed, and after 50 years for the first time only one party had the majority to establish the government by itself. The government has re-taken the nuclear energy in its agenda and underlined its importance for the future electricity generation. ETKB revaluated the nuclear energy programme and launched initiatives for the construction of NPPs (Erdoğdu, 2007, p.3070). In this process, the Turkish government adopted legislation to hold a tender for the construction of a NPP in Akkuyu by giving financial incentives to private companies in 2008. But, the legislation was terminated in 2009, since only one firm bid. After this unsuccessful attempt, the government decided to solve the problem under the framework of international agreements rather than tenders. Accordingly, in May 2010, Turkey signed an agreement with the Russian government for the construction of 4800 MWe Water-Water Energetic Reactor (VVER) (Turkish Nuclear Power Programme: Report 1, 2013). The official launch ceremony in the construction site took place in April 2015, and it is expected to start operating by 2019. For the second NPP in Sinop, Turkey signed another international agreement with the Japanese government in 2013. Turkey aims to produce % 10 of electricity from nuclear energy by 2023 (Nuclear Power Programme and NPP Projects in Turkey: Report 2, 2013). Thus, this aim is planned to be realized by these two projected NPPs.

4.2. Turkish Anti-Nuclear Movement

First protests against the government's attempts to construct a NPP in Akkuyu (Mersin) were started in 1976, when few activists decided to hold meetings with fishermen in the region to tell them the risks of the nuclear energy. These protests were leaded by a chairman of a local

organization, namely Taşucu Fishery Cooperative along with journalists concerned with the risks of NPPs. As Künar (2002, p.25) argues that these first protests were inspired by the protests against the construction of NPPs in the Mediterranean coast in France at the time. Arslan Eyce[3] wrote a book namely "Akdeniz'de Nükleer Saldırı (Nuclear Attack in Mediterranean)" which was published in 1978. One of the cartoonists, Turhan Selçuk[4], designed the first brochures and posters highlighting the dangerous of NPPs. These brochures and posters were allocated to the people in the region to raise awareness. Journalists in top national newspapers with the high press run like Örsay Öymen (Milliyet[5]) continuously examined the risks regarding Akkuyu in his articles in the newspaper. Thus, they would be able to attract civil society organizations. Indeed, the nation-wide unions like The Union of Chambers of Turkish Engineers and Architects (TMMOB with Turkish acronym) involved in the anti-nuclear protest in this period (Ibid., p.27). At the end of the 1970s, these people actively involved in protests which mainly aimed to inform the public, raise the awareness and discuss the risks of the nuclear energy with related parties. Not only civil society organizations, but also TEK, AEK, representatives from universities and ministries attended these meetings and panels (Künar, 2002, p.28). Indeed, some of politicians and bureaucrats also supported these campaigns at the time. During the negotiations with Swedish firms for the construction of a NPP, Swedish anti-nuclear groups also supported Turkish counterparts and organized protests in Sweden.

The Chernobyl nuclear accident in 1986 paved the way for the formation of an anti-nuclear organization in Turkey. The potential effects of the Chernobyl accident, especially at the Black Sea Region became a very salient issue, and the discussions were spread across the

[3] He was the chairman of the Taşucu Fishery Cooperative. He is also the pioneer of the Turkish anti-nuclear movement.
[4] He was also the founder of the Turkish Cartoonists Association.
[5] Milliyet is one of the major newspapers in Turkey, which has been publishing since 1950s with approximately 150 thousands press run weekly by 2015.

country through the media. However, these discussions remained relatively weak. For example, only three thousands of signatures could be collected during the signature campaign in 1986 (Ibid., p.39). But, the protests against the construction of the Aliağa thermal power plant prompted the protests in Akkuyu in the 1990s. In this regard, the Turkish anti-nuclear movement was supported by environmental organizations and also supported them. The anti-nuclear campaign and ecologist movements came together and published a journal, namely Ağaçkakan with a special case on the nuclear energy, namely Nuclear Honeymoon (Nükleer Balayı) in 1992. The second signature campaign which was more influential was started in 1993 through this journal. Ağaçkakan spread the anti-nuclear campaign to local organizations and 170 thousands of signatures were collected (Kökkılıç & Aksakoğlu, 2007). This call which was spread through the Ağaçkakan journal led to the establishment of a working group, namely "Revolt against Akkuyu Nuclear Power Plant (Akkuyu Nükleer Santraline Karşı Mücadele Grubu)" in 1993. Accordingly, anti-nuclear panels were held in many cities, such as İstanbul, Ankara, İzmir, Antalya, Adana, Zonguldak and Mersin. These panels and protests paved the way for the establishment of local platforms which later formed the NKP. This period was very active for anti-nuclear activists. They hold panels by the participation of officials and proponents of the nuclear energy. The first example of these kinds of panels was held in İzmir by the organization of the Chamber of Mechanical Engineers (MMO with Turkish acronym) in 1993. The name of the panel was NPPs: Worries and Expectations (Nükleer Santraller: Kaygılar ve Beklentiler) (Künar, 2002, p.44).

The first Anti-Nuclear Congress in October 1993 was the turning point for the Turkish anti-nuclear movement. Although it was planned to be organized in September, since the MMO announced that it would hold International Nuclear Technology Congress, the anti-nuclear

congress was re-scheduled and coincided with the same date of the international nuclear technology congress. As some of anti-nuclear activists say that this congress was not only counter-conference, but also 'founding congress' of the NKP. During the organization of the congress, the movement started to establish some operational bodies like the secretariat. The call for the anti-nuclear congress was spread by newspapers, civil society organizations and unions. Various organizations took the responsibility and contribute by supplying some main requirements. For example, municipalities and unions in Ankara facilitated accommodation for participants. Ağaçkakan journal prepared brochures and posters. During the whole week, many activities such as campaigns, concerts and performances were organized. Rock bands, journalist, actors, writers, caricaturists joined these campaigns and supported anti-nuclear activism (Ibid. pp. 46-50). This congress gathered 200 people from different 50 organizations on the basis of being anti to nuclear energy. International activists from Greenpeace Spain, North Cyprus Greenpeace, Friends of the Earth Germany (BUND) and Mediterranean SOS Network, also joined this congress. Moreover, a meeting organized simultaneously by the name of "Volunteer Organizations Assembly". Eventually, the first "Akkuyu Meeting" was held in 1994. This meeting by the participation of civil society organizations, activists, and local people had been organized in every year until 2000. After seven years break, it was started to organize again in 2007 (Kökkılıç & Aksakoğlu, 2007). At the end of the 1990s, the chambers became more active within the movement. Indeed, Greenpeace also involved in many protests and contributed to the Turkish anti-nuclear movement. One of the interesting campaigns was the referendum which was held in Akkuyu in 1999 of which % 87 of votes were against nuclear. In 2000, it was announced that nuclear programme was delayed indefinitely. This was seen as a victory by the Turkish anti-

nuclear movement. Until the government gave importance to the nuclear programme again in 2002, the anti-nuclear movement relatively stayed silent during these two years.

The anti-nuclear movement in Turkey can be assessed as a national network of civil society organizations which are against nuclear energy as well. NKP as an umbrella organization with it local platforms can be accepted as the main body of this organization. They define themselves is their web-site[6] as "gathering place" for all anti-nuclear organizations and people. All local platforms continue their efforts in their cities to promote the anti-nuclear campaign by committing that these activities become convenient with the priorities of the NKP. These local platforms are located in ten cities; Adana, Ankara, Antalya, Denizli, İstanbul, İzmir, Kocaeli, Mersin, Samsun and Sinop. It consists of coordinating committee, executive committee, secretariat, ad-hoc commissions, as well as local platforms. The anti-nuclear congress is the highest body which is held annually to determine general principles and the annual programme. The meetings of all local platforms as well as national meetings are open to anyone and any organization which claim that it is against nuclear. There is no voting system in order to take decisions. As activists tell during interviews, all proposals are discussed and the last decision is left to proponent organizations of the proposals. Thus, it is difficult to conclude that there is a decision-making process. However, it can also be said that the decisions are mostly based on consensus.

Being 'anti' to all nuclear is one of the main characteristics of the anti-nuclear movement in Turkey. Especially in the 1990s, this was observed as the main motivation, which is simply to be against to the nuclear at all. This main motivation was developed by taking some actions against the newly attempts of the contemporary government to construct NPPs. Many people

[6] You can reach the official web site of the NKP in Turkish from http://portal.nukleerkarsitiplatform.org/.

from different societal sectarians would join the movement to protest this policy of the government and to oppose to the construction of any nuclear plant within the borders of Turkey. Chambers like the Chamber of Electrical Engineers (EMO with Turkish acronym), bar associations, the Green Party, citizen's organizations, health organizations and environmental groups can be given as examples of civil society organizations affiliated to the NKP.

5. Making the Turkish Anti-Nuclear Knowledge

This chapter will outline the discursive basis of the Turkish anti-nuclear knowledge through the research findings of discourse analysis and interviews. In Turkish case, the anti-nuclear knowledge emerges as a combination of scientific and local knowledge in this analysis. Scientific knowledge refers to the technical knowledge which is produced by nuclear scientists who are also the members of the movement. Moreover, studies of nuclear energy scientists and articles prepared by international organizations in the nuclear energy field are assessed as scientific knowledge. Correspondingly, local knowledge is used in this thesis to refer to the claims of the movement regarding legal, economic and health issues. These claims are usually developed on the basis of past experiences of the movement's intellectuals or learning from other anti-nuclear movements.

In this regard, the research question will be answered as to build up a composition of how the anti-nuclear knowledge is shaped. Different risk perceptions will be presented as the basis of this anti-nuclear knowledge. Consequently, these different risk perceptions are re-interpreted by the movement to deconstruct the dominant risk assessment and later to construct new risk assessments. Moreover, how alternative proposals against the nuclear energy are moved into the political domain by political organizations of the movement will be discussed.

5.1. Calling for Nuclear Scientists

The general idea about risks derived from the nuclear energy is briefly summarized in the brochure (Document 1: Nuclear Fairy Tales and Facts, 2011) prepared by the NKP after the Fukishima nuclear accident. The arguments of the Turkish government about the benefits of nuclear energy are defined as 'fairy tales', while the findings about nuclear accidents show that

the dreadful and continuous effects of these accidents are the 'fact'. Re-assessment of risks by the movement deconstructs the certainty which is offered by the government that its arguments accredited by the scientific authority are the fact. In lieu of remuneration, the movement uses the same mechanism which is the credibility of the scientific authority, to challenge this 'virtual fact' by re-reading these nuclear accidents. Here, the history which shows that these accidents are not only the scientific discussions but reality; is used as a tool to contest the risk perceptions of the government. Moreover, through the scientific re-reading of these nuclear accidents, the movement contributes to the development of the anti-nuclear knowledge.

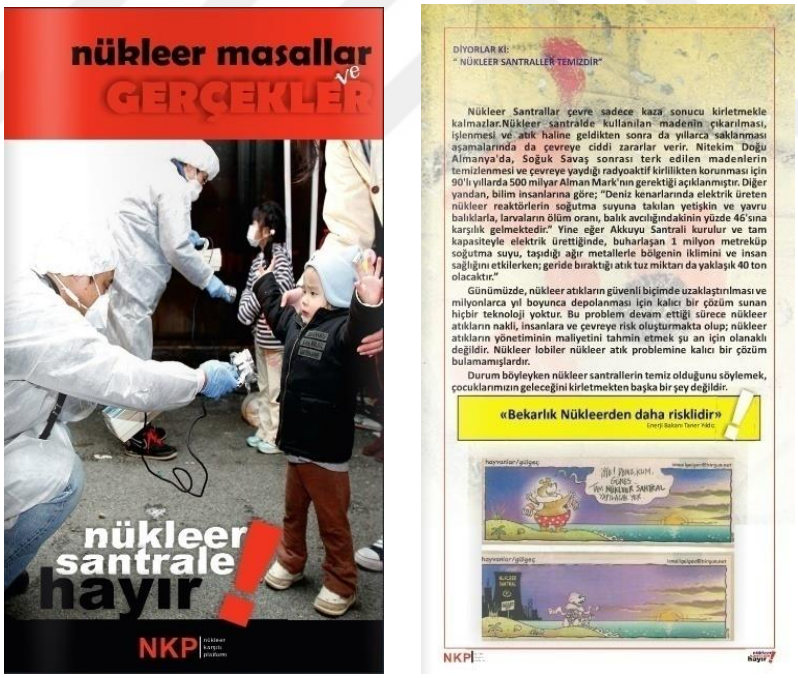

Figure 1: Nuclear Fairy Tales and Facts (NKP Brochure)

In the first page of the brochure (Ibid.) (Figure 1) as an introductory, the dreadful and continuous effect of nuclear accidents is explained by the uncontrollable radioactive release into the environment. In the case of the Turkish anti-nuclear movement, 'low probability' of a nuclear

accident is turned into a discourse of 'catastrophic danger' to the environment independent from the probability. In this regard, the movement uses history to legitimate this kind of risk perception. In the brochure, they give the example of Chernobyl to indicate the residual radioactivity in the environment after the Chernobyl nuclear accident. It reads;

> *"… since the cooling system started operating late because of human error – as if it is not known that NPPs are constructed by human - … there is no birds and no child voices kilometers around Chernobyl now. … "*[7] (Document 1: Nuclear Fairy Tales and Facts, 2011)

In the same brochure (Ibid.) (Figure 1), the movement answers the argument of the government separately. One of the main arguments is that nuclear energy is clean. Apart from many other international discussions whether or not it is clean, the movement again refers to the scientific knowledge to show that not only accidents, but also many other issues related to NPPs such as uranium mining and radioactive waste disposal generate risks which are underestimated by the government. Under the question of whether the nuclear energy is clean, it is stated in the brochure;

> *"NPPs don't only deteriorate the environment because of accidents. They contaminate the environment due to mining and radioactive waste disposal which is needed to be controlled for years…. There is no secure technology to contaminate the radioactive waste for millions of years. … In these circumstances, whoever says that nuclear energy clean, only gives harm to the future of next generations."* (Document 1: Nuclear Fairy Tales and Facts, 2011)

[7] All translations from Turkish to English are the author's own work.

Re-reading the history through the previous nuclear accidents is the first way of appropriating the scientific knowledge. This appropriation follows two paths. One is the re-assessment of risks which emerge as a result of nuclear accidents or uncertainties related to NPPs. The second is the re-interpretation of risks led to the accidents by analyzing the causes of them. At the first one, this re-assessment is done by emphasizing scientific discussions about the issue. At the second path, scientific knowledge is used to point out the inevitability of nuclear accidents. Consequently, the movement sustains credibility for its claims, while developing them by the use of the scientific knowledge.

5.2. Referring to the International Organizations

Referring to the studies of the international organizations in the field of the nuclear energy is the second way of appropriating the scientific knowledge. The internationalized characteristic of scientific knowledge facilitates the process of deconstruction by giving credibility to the process. Studies related to the consequences of nuclear accidents or health problems regarding nuclear leakage are reachable by public easier than past via communication technologies. This can also be explained by the changing feature of knowledge production. STS studies dealing with analyzing the scientific practices has concluded that there is a transition in the scientific knowledge production. This transition is explained by that scientific knowledge production process not only includes in scientific actors, but also social, political and economic actors (Hessels & Lente, 2008, p.740). Apart from this discussion, scientific knowledge is more mobilized and more interacted with the society. Put differently, for the Turkish anti-nuclear movement, the history about nuclear energy is re-interpreted by the help of the mobilization of the scientific knowledge. This mobilization occurs in two phases. One is through scientists who

are in collaboration with their counterparts in all over the world. The second is through international organizations which their studies and analysis are open to public via internet.

This practice of the movement to challenge the dominant risk assessments by referring to the international organizations is visible in the article (Document 2: The Massacre: Nuclear Power Plants, 2010) examining the unreliable policies of the government. In general, it states that any system can lead an accident, even a plane can crash into a power plant. But, if it happens to a NPP which has a huge radioactive storage tank, millions of kilometres field come under threat for millions of years. Again regarding to this 'catastrophic danger' perception, it explains the other dangers not only derived from accidents by referring to scientific studies. It reads:

> *"... According to studies of the International Atomic Energy Agency (IAEA), it has been observed that there is % 400 increase for the people living around NPPs to get cancer, and to give abnormal birth due to genetic mutations. ... The study on the mortality due to leukaemia at the Oak Ridge National Laboratory in 1991 remarks that the ratio is % 63 higher than it is expected. The Southeast Massachusetts Health Report dated 1993 claims that people exposure the radiation from the Pilgrim NPP are under four times more risk than people exposure less them. ... An article published in the British Medical Journal in 1999 argues that children whose playground is around La Hague NPP at the north coast of France or eat sea foods from this area have more risk to get leukaemia in comparison with other."* (Document 2: The Massacre: Nuclear Power Plants, 2010)

5.3. Bringing Local Knowledge

Local knowledge, in Turkish case, has dual meaning. Since the construction of the NPPs has not been completed for over thirty years, the experiences of people in Turkey are limited to

the presumptions. These presumptions are developed according to the legal and political problems which Turkey has faced during this thirty years. But, the Turkish anti-nuclear movement combines the past experiences of the movement in thirty years and local knowledge which has been produced by activists of other anti-nuclear movements of whom have direct experiences about the NPPs. In this regard, the movement obtains this local knowledge through global knowledge transfers. While nuclear scientists supporting the anti-nuclear movement introduce the possibility of unthinkable and uncontrollable risks which happened in the nuclear accidents such as Chernobyl and Fukishima to disapprove the arguments and to illegitimate the methodology of risk assessments of the government through the analysis of the previous nuclear accidents, the Turkish anti-nuclear movement uses a strategy of establishing the new criteria of legitimacy in risk management problems to contest dominant risk assessments by recruiting this local knowledge. Indeed, the local knowledge which is transferred is combined with legal and political experiences of the movement in Turkey by the movement's intellectuals.

The first counter risk assessment is developed on the basis of the legal framework of the construction of NPPs. The time period which is needed for the organization of the tender and the completing the construction of the NPP are evaluated according to the international examples. Apart from this interpretation, the argument of the government that NPPs are required to meet Turkey's future electricity need is disapproved. This knowledge mostly combines with Turkey's experiences about the tenders and corruption suits regarding energy issues since the 1960s. The letter (Document 3: Letters to Proponent of Nuclear Energy, 2010) to the proponents of nuclear energy in Turkey gives examples of American, Argentinean and Brazilian cases to claim that the real reason of the construction of these NPPs in Turkey is not the future electricity need. It reads;

> *"It is not convincing that the construction of NPPs have been included in policy agendas due to the electricity need. … The construction process in the USA took at least 15 years; in Argentina and Brazil at least 25 years. How can you [the government] talk about to complete constructions in 5 years without considering that all previous attempts were interrupted by [political and economic crisis]. …"* (Document 3: Letters to Proponent of Nuclear Energy, 2010)

Apart from these legal problems which are already current in the Turkish case, the movement also analyzes some economic risks. The movement's own analysis on the economic risks of the NPPs is combined with the local knowledge recruited through the collaboration with other anti-nuclear movements in the world. The Japanese anti-nuclear movement appears as the most prominent example recently, in this regard. After the Fukishima accident, the relations have been accelerated through personal efforts. One of the activists explained that they had the opportunity to contact with the Japanese anti-nuclear movement through social media. Accordingly, they invited some Japanese activists into their activities. In return, Turkish activists joined international events hold in Japan hold for discussing the dreadful consequences of the Fukishima accident. In this regard, international meetings also appear as mechanisms to transfer the local knowledge.

Three documents (Documents 8;9;10: Demircan, Notes from Fukishima (1) (3), Fukishima's Fishermen are shocked! TEPCO betrayed us, 2015) which are selected for this analysis reflect this collaboration with anti-nuclear activists around the world. The author of these documents who is also the member of the "Nükleersiz" project shares her experiences in Fukishima. She defines her existence in Fukishima as an effort of groups of people who fight against nuclear energy with similar concerns from all over the world in order to prevent nuclear

disasters (Document 8: Demircan, Notes from Fukishima (1), 2015). The booklet (Document 12: Ten Lessons from Fukishima: Reducing Risks and Protecting Communities from Nuclear Disasters, 2015) prepared and delivered by the Japanese activist during her stay is an example of how these groups collaborate and transfer a local knowledge produced in the one part of the world into another part where the people have similar concerns regarding nuclear energy. These kinds of documents such as booklets are not only used to attract public about the risks of nuclear energy, but also bridges between anti-nuclear activists around the world. Indeed, this collaboration is becoming easier due to the developments in communication technologies such as the use of social media.

The booklet defines the main motivation of activists to prepare this booklet as to tell non-experts how to deal with NPPs and nuclear accidents (Ibid., p.4). Moreover, they explain that this booklet is prepared on the basis of the experiences of the people in Fukishima (Ibid.). Demircan (Document 10: Fukishima's Fishermen are shocked! TEPCO betrayed us, 2015) gives the example of the fishing sector in Fukishima as to indicate that the problems are still continuing, although four years passed over the Fukishima disaster. She claims that nuclear clearance which may provide the people to return their home and cultivate their land requires millions of dollars and full government support.

Accordingly, the remarks about Turkey on the economic risks points out the risks on agriculture and tourism. The press release (Document 7, 2015) advocates that Turkey which has NPPs is only defined as a country whose agriculture and tourism are impeded. Moreover, the NKP congress of 2014 declares the economic risks of the NPPs. The minutes of the congress (Document 5: Minutes of the NKP Congress and the Final Declaration (Manifest), 2014) mentions this issue by stating that fishery is the main source of income with over four thousands

licensed fishers whom will be affected by the NPPs which is planned to be constructed in Sinop. Not only Fukishima accident, but Chernobyl occurred long before Fukishima directly affected Turkish people at the time. Thus, the experiences of Turkey after the Chernobyl accident are also influential on developing arguments regarding economic risks (Document 7: The Press Release, 2015). Hence, not only documents published after the Fukishima accident, but also previous documents emphasize this issue. For example, the Declaration of Scientists opposing NPPs (Document 4, 2007) argues that the nuclear energy is not only a problem related to the nuclear industry, but also to agriculture, forestry, tourism and health. Indeed, this argumentation is pervasive in many documents prepared by Turkish anti-nuclear activists. Under the question of whether the nuclear energy is clean, the brochure of the NKP (Document 1: Nuclear Fairy Tales and Facts, 2011) also pays attention to the economic risks derived from the contamination of seas. It is stated in the brochure;

> *"... Moreover, according to scientists, because of the cooling water of NPPs near the seas, mass animal deaths occur, which is almost equal to the 46 percent of deaths due to fishing. ..."* (Document 1: Nuclear Fairy Tales and Facts, 2011)

Another reflection of the recruitment of the local knowledge is the emergence of new mechanisms which the Turkish anti-nuclear movement uses for its own research. One of the chapters of the booklet of the Japanese anti-nuclear movement (Document 12: Ten Lessons from Fukishima: Reducing Risks and Protecting Communities from Nuclear Disasters, 2015) focuses on the food safety issues and protection of agriculture, forestry and fishery industries. They suggest citizens and farmers in Fukishima to do their own measurement (Ibid., p.34). They gave farmers' experience as an example to show how they were involved in this inquiry to provide information about contamination before developing strategies. The Turkish anti-nuclear

movement also discusses to use this kind of mechanisms to make better judgments when they have to deal with the radioactive leakage. Gaziemir (İzmir) can be given as one the examples of this adaptation. An abandoned factory site in Gaziemir placed in the centre of debate on the illegal burying of the toxic waste. Since the radioactive waste was detected in this site, the anti-nuclear movement took the issue and started to examine the site. This examination was a direct investigation around the factory. According to the journal article (Document 11: Diker, 2013, Recent Situation in Gaziemir), one Turkish radiologist from Germany and members of Greens and the Left Party of the Future (YSGP with Turkish acronym) went to the factory building and neighborhood and talked to the people living around the factory site. Moreover, they had some measurements. They offered some health screening to state the issue comprehensively. Therefore, Gaziemir case shows that the Turkish anti-nuclear movement not only re-tells the history and develops arguments by recruiting knowledge, but also adopts some relevant mechanisms to do its own research. Put differently, activists are becoming the 'scientists' of their own research.

Finally, this transfer has also a unique feature in the Turkish anti-nuclear movement. Since the movement is open any organization or people who declare against nuclear energy, different actors actively involved in the activities of the movement bring in the local knowledge in different arenas. For example, one of the components of the NKP İstanbul, Turkish Health Professionals for Peace and Environment and Against Nuclear Threat is affiliated to the International Physicians for the Prevention of Nuclear War (IPPNW). Moreover, Greenpeace Mediterranean has also been in contact with the NKP and attends their meeting. In this sense, it should be noted that Greenpeace Mediterranean plays an important role for the transformation of this local knowledge through its regional networks.

The report about nuclear energy prepared by the Greenpeace Mediterranean (Document 13: Nuclear Energy: Threat to the Sustainable Development, 2010) is one of the examples of the counter risk assessments. The research compares Çeşme (İzmir) and Bozcaada (Çanakkale) where the renewable energy is pervasively produced and used and Akkuyu (Mersin) and Sinop where the NPPs are planned to be constructed (Ibid., p.4). This comparative study based on population, gender, education, urbanization, employment opportunities and labor force participation concludes that these sites suffer from the "nuclear migration" (Ibid.). It claims that this migration also impairs tourism. Put differently, risks on the regional and economical development are put in the scene even before a NPP starts operating in these cities.

5.4. Talking to the Green Energy

In terms of the scientific authority, boundary work is explained by Gieryn (1983, p.789) as an effective ideological style which is used by the scientist to reinforce their autonomy and maintain their authority. This type of boundary, in this case, reflects the distinction between production of scientific knowledge and the consumption of it by non-scientists. This demarcation gives, to some extent, its strength to the scientific authority. Additionally, within the terms of the regulatory process, as Jasanoff (1990, p.14) claims that this concept can be used to refer the changing roles of actors by separating science and policy to be more influential on some conflicted issues.

The Turkish anti-nuclear movement uses scientific discussions about alternative energy technologies to the nuclear energy by distinguishing these discussions from the anti-nuclear knowledge which they produce within the movement. Thus, in Turkish case, the political organization of the movement's knowledge is represented in a political or social organizations

which also members of the NKP. For example, the Turkish Green Party is one of them. The relation between Turkish Green Party and the NKP is like other components of the platform, is sustained as the base of equal participation in all processes. The boundary in this category is established between the movement's knowledge and its political organization. So, the boundary which is blurred when the issue is to contest dominant risk assessments and produce alternative risks regarding nuclear is becoming more solid when they advocate alternative energy technologies.

As an example of how the anti-nuclear knowledge is shaped by excluding its political organization, one of interviewees provides evidence to this statement of the thesis. Respondent 3 (Interview with Respondent 3 dated 29 April 2015) answered the question of how alternative technologies are discussed within the platform, as stating that these kinds of discussions are not done in the platform, although there are advocators of green energies among members. He claimed that these discussions should be the subject to political processes.

> *"…This is a very old debate since the 1990s. Is this the responsibility of NKP to introduce alternatives? Some claims that we don't need to produce alternative arguments against nuclear energy. … I also think in that way. To be anti to the nuclear, you don't have to have an alternative. … But, you have to say something to [legitimate your claims]. … Naturally, its answer is renewable energy and energy efficiency. … NKP is a negative platform. … However, some of us are also the members of the Turkish Green Party or [other political or social platforms] and stand for our claims about alternative technologies in the political arena. The policies of the Turkish Green Party on alternative energy technologies are complementary to the main claims of NKP."* (Interview with Respondent 3 dated 29 April 2015)

Moreover, some other components of the NKP, such as the Greenpeace Mediterranean also contributes to the development of positive assumption about other technologies or mechanisms which can be replaced or strengthened with the nuclear technology. Although these alternative framings are debatable within the movement whether or not they are supported or not, the components of the Turkish anti-nuclear movement continue to advocate these technologies or mechanisms as the alternative of the nuclear energy as to promote the anti-nuclear knowledge which totally disapprove all the analysis of governments and claim that nuclear energy is highly risky for both current and future generations. The report prepared by the Greenpeace Mediterranean, namely "Energy (R)evolution: A Sustainable Turkey Energy Outlook" (Document 15, 2009) can also be given an example how the alternative technologies and mechanisms are framed. The idea of energy revolution was formalized and firstly reported in Europe in 2005. In this context, the Greenpeace Mediterranean facilitates to the development of arguments and preparation of reports regarding Turkey. The report presents the renewable energy technologies as the primary technologies to generate electricity by criticizing fossil fuels and nuclear energy. Moreover, it highlights the "energy efficiency" as a proper mechanism to reduce the need of electricity, and states that this mechanism is mostly underestimated by authorities in Turkey. This aspect of the technological dimension is also important as to indicate that the cognitive praxis of the Turkish anti-nuclear movement are framed in accordance with the environmental movement, when it is needed to develop positive assumptions. Developing arguments with other technologies are a collaborative activity for social movements, which they can manage it through communicating with not only scientists, but also other social movements and activists.

6. Conclusion

The thesis analyzed one of the main components of the Turkish anti-nuclear movement, namely NKP which was founded by the pioneers of anti-nuclear protest of the 1970s. According to the changing nuclear energy programmes and attempts of governments for the construction of NPPs in Turkey, the movement had mobilized more people in time and eventually twenty years after the first protest, it was officially formed as a platform in 1993 during the first anti-nuclear congress. NKP is accepted by the thesis as the main representative of the Turkish anti-nuclear movement due to its leading role in the anti-nuclear campaigns since the first attempts of the contemporary government for the construction of a NPP in Akkuyu. While anti-nuclear activists in the 1970s and 80s organized field trips to the site where the NPP was planned to be constructed to meet local people and tell them the risks of the nuclear energy or used newspapers to increase public awareness, bigger campaigns started to be organized in the 1990s which led the enlargement of the scope of the anti-nuclear protest in the country. The anti-nuclear campaign which was spread through the Ağaçkakan journal in 1993 was one of them. This campaign resulted in the establishment of local anti-nuclear platforms in many cities, where later came together to form the NKP in the first anti-nuclear congress.

At this point, it should be noted that the environmentalism and the anti-nuclear protests in Turkey has been shaped simultaneously and supported each other. According to the study of Jamison et. al. (1990) about the cognitive praxis of environmental movements in Sweden, Denmark, and the Netherlands, environmentalism developed into a social movement when the three dimension of the cognitive praxis were bind in the early 1970s. Accordingly, the anti-nuclear movement in the 1970s facilitated combining these dimensions and eventually led to the emergence of more organized Green parties in the 1980s (Eyerman & Jamison, 1991, p.77). In

Turkish case, the anti-nuclear movement in the 1970s which was inspired by the protests in France already started to develop the anti-nuclear knowledge before the environmentalism became significant. However, the environmental movement collaborated with the anti-nuclear movement in the protests of the 1990s and some components of the environmental movement, such as the Turkish Green Party has still been a part of the Turkish anti-nuclear movement. Moreover, if we simply follow the cosmological dimension of the cognitive praxis, as Eyerman and Jamison (Ibid., p.67) states that new social movements of the 1960s and 1970s such as the environmental movement or women movement can be assessed as parts of broader social struggle, and thereby the anti-nuclear movement is also a part of this social struggle. But, each movement, as they claim, has specific issues which it is dealing with. Then, technological dimension of the cognitive praxis becomes determining factor to distinguish contemporary social movements from each other. Although it is still needed some further research on the Turkish anti-nuclear movement which can elaborate external factors in the development of the movement and its collaboration with other social movements in Turkey in both social and political context, it can be concluded that the anti-nuclear protest is not a new field of interest for the environmental movement in Turkey, but a social movement which has the ability to produce its own knowledge what is called as the anti-nuclear knowledge in this thesis.

The thesis revealed that different risk perceptions are on the basis of the cognitive praxis of the Turkish anti-nuclear movement. Eventually, different ‘risk assessments’ are developed by the movement in order to challenge the common understanding about the nuclear energy which has been produced by the Turkish governments since the 1970s . Thus, in the case of the Turkish anti-nuclear movement, the risk perception about nuclear energy was mostly described against the state. In this regard, the anti-nuclear knowledge in the Turkish case is both destructive and

constructive. It is destructive, because it takes the narratives of the proponents of nuclear energy and deconstructs them by using various mechanisms, such as referring to the scientific knowledge which is developed by both nuclear scientists and international organizations in the field of nuclear energy. Moreover, it is constructive, because it also points out different risks and develops alternative risk assessments by combining scientific and local knowledge. Indeed, as part of the technical dimension of the cognitive praxis, the Turkish anti-nuclear movement produces alternative framings about other technical options to generate electricity instead of nuclear energy, and thereby facilitates the development of new arguments.

In this regard, the concept of the 'risk movement' which was introduced in the theory chapter also appears as relevant to understand the Turkish anti-nuclear movement. As Halfmann (1999, p.182) argues that the nuclear energy case is a clear example for different perceptions about risk. The distinction between acceptable risks developed by the governments through scientific advising and fundamental dangers advocated by anti-nuclear groups are co-shaped through the continuous interaction between the center which refers to the government and the periphery which refers to the anti-nuclear movement. Risks for the government are mostly characterized with the term of 'low probability', while the Turkish anti-nuclear movement treats risks as "catastrophic dangers" regarding the nuclear energy. Thus, the movement mostly accuses the government of ignoring this feature of risky technologies, and develops its anti-nuclear knowledge by both criticizing the scientific authority to challenge the dominant views and using scientific and local knowledge to produce and legitimate it.

As Eyerman and Jamison (1991) discus that social movements not only pursue political campaigns, but demand and challenge to authorities. This process leads to the development of the cognitive praxis of the movement and also determines its main characteristics in time by

producing its own knowledge. Accordingly, the thesis argues that the anti-nuclear knowledge in Turkish case is framed by the cognitive praxis of the Turkish anti-nuclear movement, and it also frames it. The dynamic characteristic of the knowledge-making process enables the movement to be active in producing its own narratives and challenging the dominant ones. This challenge is also resulted in the process of researching in the wild. The anti-nuclear knowledge around which is the Turkish anti-nuclear movement produces is a product of the lay expertise of which compose of a collaborative framing between experiments and experiences.

Apart from this assumption, the thesis identified four practices used by the Turkish anti-nuclear movement to produce the anti-nuclear knowledge which consists of a set of knowledge claims and related narratives that frame nuclear energy as highly risky. The first practice is calling for nuclear scientists. Nuclear science regarding the causes and consequences of the nuclear accidents in history was used to redefine the risks of nuclear energy. Put differently, it is one of the ways to deconstruct the dominant understanding about nuclear risks. Accordingly, the movement claims that nuclear energy is dreadfully dangerous for the environment, and thus for humanity, and thereby it should be disregarded altogether as a mechanism for the energy generation. Three Mile Island, Chernobyl, and recently Fukishima cases are re-interpreted and re-calculated from such a perspective and thus transformed into landmark events that should warn the public.

The second practice is referring to the studies of international organizations. Studies which are publicly available in the web-sites of international organizations such as IAEA about related risks derived from the nuclear energy or NPPs are adopted to support the discourse of "catastrophic danger". Movement's intellectuals mobilize available scientific knowledge in order to identify and interpret the risks of nuclear accidents, especially regarding to the people's health.

Scientific knowledge which is adopted from both Turkish nuclear scientists who provide their own narratives about these accidents and international organizations of which their studies about the health problems due to NPPs can be assessed as an alternative reading of nuclear accidents. These alternative readings tend to play down the risks that are identified by the proponent of nuclear energy, and thereby seek to frame nuclear energy as a technology that is highly risky. Accordingly, nuclear accidents are re-interpreted as nuclear "disasters".

These first two practices are based on the mobilization of scientific knowledge. Since the communication systems are changing and connecting more people through the internet, people are able to reach any kind of information easily. Although there is lots of disinformation, people still have an opportunity to check various studies about issues related to the nuclear energy. Accordingly, mobilization of the scientific knowledge constitutes one aspect of the anti-nuclear knowledge. The knowledge which is produced through these practices embraces both the cosmological and the technical dimensions of the cognitive praxis of the Turkish anti-nuclear movement. The cosmology of the anti-nuclear movement is identified due to the nuclear energy's detrimental effect on the environment and the potential health risks which may affect not only the current, but also the future generations. Besides, the technology itself is described as highly risky and thus it is rejected altogether. This claim can be assessed within the technological dimension of the cognitive praxis. This particular aspect of the cognitive praxis, in Turkish case, is mostly destructive. It totally rejects the NPPs for the electricity generation and evaluates nuclear energy harmful for humanity. Development of both technological dimension through adopting scientific knowledge from nuclear scientists' studies and international organizations is not only realized through a passive way of collecting relevant information, but also active

collaboration between activists and nuclear scientists. This collaboration is perfectly fits what Callon et.al. (2001) describe as researching in the wild.

The third practice which the thesis identified is recruiting local knowledge. The global characteristics of these kinds of movements which are resulted in the emergence of a specific technology to solve social and economic problems, is undeniable. Anti-nuclear protest all over the world has developed many frames since the 1970s. In the countries where there have already been NPPs for a very long time, there is a local knowledge which has been evolved from the experiences of nuclear accidents, waste disposal problems and the negative effects of uranium mining. Turkish anti-nuclear movement recruits this local knowledge through global knowledge transfers. Put differently, local knowledge is internationally mobilized. The local knowledge which is transferred is combined with legal and political experiences of the movement in Turkey by the movement's intellectuals, and used to develop counter risk assessments. This counter risk assessments as a crucial part of the anti-nuclear knowledge reveals how activists develop mechanisms to be involved in the knowledge production about technical issues by not only protesting, but also re-conceptualizing them. This re-conceptualization leads to the transformation of a technical problem into a socio-technical controversy, and thus has the ability to prompt changes in both social and political domain. Although, the Turkish anti-nuclear movement has not developed an influential mechanism to direct the political decision-making process, its capability to develop robust arguments enables it to preserve its collective identity and mobilize society against the nuclear energy programme of the government.

The forth and the last practice which the thesis reveals is conceptualized as talking to green energy. This practice appears when the movement wants to develop alternative framing for the energy need of the country. What are the alternatives of nuclear energy? Which mechanisms

can be suggested for Turkey's future electricity generation? These alternatives are framed within the political organization of the Turkish anti-nuclear movement by separating it from the knowledge-making process. This practice can also be assessed within the technological dimension, but as a constructive aspect of it. Instead of nuclear energy, alternative energy technologies are sometimes adopted by the movement as to indicate positive assumptions of the anti-nuclear knowledge. However, these positive assumptions are not as visible as negative assumptions, and therefore they are brought into political domain as a broader part of the green movement.

Consequently, the thesis claims that the anti-nuclear knowledge is an active combination of all these four practices which is crucial to identify Turkish anti-nuclear protest into a social movement which has the ability of transforming a technical issue into a socio-technical controversy by recruiting new people, new contexts and new area of application. Put differently, the Turkish anti-nuclear movement as the producer of the anti-nuclear knowledge was able to transform itself into a social movement by articulating risks of nuclear energy which has been re-read as catastrophic dangers instead of low probabilities. Jamison (1996, p.241) states that environmental movement adopted ideas from system ecology which is produced by scientists and brought them into society. This organizational dimension of the environmental movement is also current in the case of this thesis. The Turkish anti-nuclear movement uses nuclear science to reinterpret the nuclear technology through referring to studies of nuclear scientists and international organizations specialized in this field, and combine this technical knowledge with local knowledge based on experiences and worldview assumptions derived from the different risk perceptions. Apart from this, the Turkish anti-nuclear movement emerges as a hybrid collectivity what Callon et.al (2001) describe as a platform where different people and groups

who are concerned with a specific technology come together to attempt to be involved in the confined research. The movement, itself, provides this open space for all the people from different sectarians to mobilize against a specific technology of which is reinterpreted as a social problem as well as a technical problem.

To sum up, as it is mentioned before, many movements emerge as a reaction to societal change and this societal change is mostly carried with a policy change. These policies directly implemented by authorities. Since this change is prompted by the authorities, activists mostly oppose to the governments and directly target the policy. They are organized to attract the public's attention to gain support. Regarding to this assumption, the Turkish anti-nuclear movement can be assessed as to emerge as a reaction to the nuclear energy programme of the contemporary government in the 1970s. Accordingly, it continued to be mobilized during the years when the programme was in the governments' agendas until 2000. After the government announced that the nuclear energy would be reconsidered, people came together to take actions against to the new policy priorities regarding the nuclear energy. However, the point of interest in the thesis is not that there was a reaction, or strength of the reaction, but the particular claims developed and strategies adopted to develop the anti-nuclear knowledge. The thesis reveals the main aspects of the anti-nuclear knowledge under the framework of "cognitive praxis" and research in the wild" which are adopted from social movement studies and STS. My effort is not making claims that I have identified all aspect of the cognitive praxis of the Turkish anti-nuclear knowledge or drawn a comprehensive picture of how Turkish anti-nuclear activists produce this knowledge. I have tried to pay attention that there is needed for further research on new social movements from the STS perspective in order to understand the interaction between science and society.

In this regard, it was also challenging for a researcher to explain the knowledge-making process. Thus, the cognitive approach which considers social movements as the collection of meanings and ideas, and the "research in the wild" concept which analyzes the strategies of social movements to involve in the production of knowledge are linked up to explain the knowledge-making process. I believe in that this study, if it is furthered with more empirical analysis on the basis of relation between technical problems and politics by bringing social movement studies and STS together, can contribute to the studies on public participation in technical decision-making.

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