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ASSESSING CAPACITY OF URBAN CLIMATE GOVERNANCE: A CASE FROM TURKISH METROPOLITAN MUNICIPALITIES

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Abstract

Emission control and reduction initiatives required to achieve low carbon society necessitate collaboration and capacity building vertically and horizontally between the public and non-public authorities at the international, national and local level. In particular, measures taken at local level are important on the issue of climate change. To this end, this paper examines local climate protection initiatives of the metropolitan municipalities in the framework of modes of governance including self-governance, provision, enabling and regulation in Turkey. In metropolitan cities, content analysis was conducted to the Municipalities' Annual Action Reports and Strategic Plans including different urban policy sectors in order to determine the achievement level of local climate protection actions. The study concludes that the local climate change mitigation activities are frequently implemented by provision modes in the sector of urban infrastructure and transportation in the Turkish metropolitan municipalities.

Keywords: Urban Climate Governance, Local Governments, Metropolitan Municipalities, Mitigation, Adaptation

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Kentsel İklim Yönetişim Kapasitesinin Değerlendirmesi: Türkiye Büyükşehir Belediyeler Örneği

Öz

Düşük karbonlu topluma ulaşmak için gerekli emisyon kontrol ve azaltım girişimleri yerel, ulusal ve uluslararası düzeyde dikey ve yatay olarak kamu ve kamu dışı otoriteler arasında işbirliği ve kapasite oluşturmayı gerektirmektedir. Özellikle, iklim değişikliği konusunda yerel düzeyde alınan önlemler önem arz etmektedir. Bu amaçla makale, Türkiye'deki büyükşehir belediyelerinin kendi kendini yönetme (self-governance), tedarik (provision), etkinleştirme (enabling) ve düzenleme (regulation) dahil olmak üzere yönetişim biçimleri çerçevesinde yerel iklim koruma girişimlerini incelemektedir. Yerel iklim koruma eylemlerinin başarı düzeyini belirlemek amacıyla belediyelerin yıllık faaliyet raporları ve stratejik planları için azaltma (mitigation) ve adaptasyon (uyum) dahil olmak üzere farklı kentsel politika sektörleri ile içerik analizi uygulanmıştır. Çalışma, Türkiye büyükşehir belediyelerindeki yerel iklim değişikliği azaltma faaliyetlerinin sıkılıkla kentsel altyapı ve ulaşım sektörlerinde tedarik biçimi ile gerçekleştirildiği sonucuna varmıştır.

Anahtar Kelimeler: Kentsel İklim Yönetişimi, Yerel Yönetimler, Büyükşehir Belediyeleri, Azaltım, Uyum

1. Introduction

The increasing body of research and scientific evidence demonstrates that the world's climate system is noticeably changing due to mainly rise of GHGs in the atmosphere (IPCC, 2013, 15). Today, scholars and policy practitioners in urban governance are no longer denied reality of anthropogenic climate change. Similarly, comprehensive scientific evidence based on the reports carried out by Intergovernmental Panel on Climate Change (IPCC) and UN-Habitat argues that increasing rate of GHGs concentration in the atmosphere and alteration of the world climate systems has adverse impacts on physical, chemical and biological, and socio-political environment in the urban areas. Hence, the increasing deviation on

world climate systems requires urgent reduction of GHGs emission through instruments of political, social and economic responses at all administrative level. Local governments as policy practitioner are considered as being on the front line of the efforts to address climate change impacts and align their resources and services at the urban areas.

Earlier social science studies argued tacitly or explicitly that issue of climate change necessitates immediate response from international and national institutions with traditional policies and strategies. United Nations Framework Convention on Climate Change by 1992, Kyoto Protocol by 1997, and Paris Agreement by 2015 were just three of international agreements that constitute the general framework of commitments and targets for emission reduction and adaptation. However, scholars have now began to argue classical administrative approaches and instruments on international and national regulations due to recognizing GHGs emission resulted from a bunch of initiatives at the local, regional, national and international level (Bulkeley & Kern, 2006; Betsill & Bulkeley, 2007; Granberg & Elander, 2007; Holgate, 2007; Bulkeley et al., 2009). Furthermore, Paris Agreement that was a significant outcome of the a 21st conference of the parties (COP) by 2015 in France offered important implication for concrete mitigation goals and target, development of the transparent and accounting system to review achievement of states` adaptation and mitigation actions, resilient future, the necessity of the key financial support mechanisms, in particluar in the urban areas (UNFCCC, 2015). With regard to urban climate governance, Advocacy Base of Local Governments and Municipal Authorities (LGMA), Constituency including Climate Summit for Local Leaders, Cities and Regions Pavilion – TAP 2015, Special meetings of LGMA, UNFCCC Blue Zone Activities could be evaluated as significant progress (LGCRS, 2016). Consequently, all of these progresses have demonstrated that structural reorganization, the functions and the deregulation must be assigned to local authorities in climate change

governance.

Today, it has been acknowledged that comprehensive political and regulative response to climate change that has specific characteristics such as complexity, uncertainty, transboundary, temporal and spatial variability seriously necessitates local authorities` engagement including public and non-public organizations. To bring clarity to this argument, it has been asserted by scholars and practitioners that urban areas have included significant player on policy areas including energy, transport, land-use etc. (Collier, 1997; Bulkeley & Betsill, 2003; Bulkeley & Kern, 2006; Betsill & Bulkeley, 2006; Gustavsson, 2009; De Oliveira, 2009; Bulkeley, 2010; Broto & Bulkeley, 2012; Bulkeley & Betsill, 2013; Jiang et al., 2017).

In academic circle, growing number of studies have now spoked of local authorities` role in coordination and cooperation among actors on urban policies in developing countries, in particular since the 2000s. Metropolitan municipalities in developing countries particularly have not achieved their policy commitments for climate change. While municipalities have faced a variety of challenges including financial and technical constrains, some metropolitan municipalities employed successful policy and programs in terms of mitigation and adaptation activities. For instance, local governments in Turkey have significant duties and responsibilities to ensure local goods and services delivery for metropolitan cities due to the establishment of economies of scale and providing more effective, economic and qualified service. In this regard, the engagement of local governments in urban climate governance is expected to ensure international and national climate and energy policies and commitments in Turkey as well (Karabag, 2011; Sahin, 2011; Balaban & Balaban, 2015; Demirci, 2015)

As previous studies implied, there have not been comprehensive discussion and implication in terms of theoretical perspectives of governing capacity of local authorities on urban climate change (Betsill, 2001; Burton & Dredge, 2010; Balaban & Balaban, 2015). However, the study of Alber & Kern (2008) still provide a useful framework to compare, analyze and classify urban climate protection initiatives and measures in their study. It mainly refers to distinct modes of urban governance that vary from soft to the traditional form of governing for climate protection as *self-governance, provision, enabling and regulation* (p.5). Similarly, the works of UN-Habitat (2011), and comprehensive reports published by the Organization for Economic Co-operation and Development (OECD, 2010) also present significant guidelines and implications for urban climate change governance. These comprehensive studies present important contributions and guidelines for academic works on the subject.

In this regard, the aim of this study is to comprehend governance capacity of local administrations through modes of the climate change governance in Turkey. To this end, it explores initiatives of both mitigation and adaptation operated by municipalities, and assesses collaborative capacity through modes of urban climate governance. The main research question of the study *is how local administrations in metropolitan cities in Turkey engage in climate change protection actions comprising of both mitigation and adaptation measures*. In general, the study is structured with five distinct sections. Besides introduction, the framework of the conceptual, theoretical background that forms the basis for the research question is discussed in the section of the urban climate change governance. Then, the research design section presents the analytical framework and methodological approaches used in the study. It mainly provides a significant explanation concerning data sources, data collection, and data analyzing techniques. The next section evaluates local climate protection initiatives by metropolitan

municipalities and collaborative capacity with the other actors through governance modes. The conclusion section harmonizes theoretical explanation with empirical findings and provides recommendations for future research on the subject.

2. Urban Climate Change Governance

While projections, impacts and necessary political and executive breakthroughs on climate change were initially evaluated at the global and national level, it is often emphasized that local actors should take an active role in the policy-making and implementation in comprehensive and science-based reports. For instance, the importance of the local authorities' involvement and social-economic and political responses to achieve goals and target was firstly underlined in the Brundtland report in 1987. It addressed the significance of local authorities, city-level actions, initiatives, and their problems to reach sustainable development principles, rather than directly to climate change issue (the Brundtland Commission, 1987; Collier & Lofstedt, 1997). Afterward, further emphases and recognition of the necessity and role of local actions in achieving sustainable development targets were taken at the Rio conference of the United Nations Environment and Development in 1992 (UNCED, 1992). Then, a significant contribution and assessment regarding urban-level climate initiatives were highlighted in the reports and projects led by several intergovernmental organizations such as UN-Habitat and the World Bank (Czako, 2011, 36). The establishment of the International Institute for Environment and Development (IIED) in 1971, Local Governments for Sustainability found as International Council for Environmental Initiatives (ICLEI) in 1990, The Global Report on United Nation Human Settlements Program (UN-Habitat) in 2011 titled as the Fifth Urban Research Symposium, and several reports by OECD also sıgnıficantly contributed to the climate governance literature in terms of institutionalization and regulation of the climate change at the local context. (Rosenzweig, *et* al., 2011,

xvi, Czako, 2011, 36). The importance of local-level initiatives regarding climate change has once again referred in 2015 with sustainable development targets announced by the United Nations. Similarly, in a report published in 2018, the Second Assessment Report on Climate Change and Cities (ARC3.2) provides advice to public and non-governmental actors responsible for city management on the subject of the climate change (Rosenzweig et al., 2015).

The necessity of local authorities` engagement for GHGs reduction is always bound up with several premises. First, it is associated with arguments that urban are places in which over half of the world`s population lives, and social, economic and technologic development activities have been mainly held, which is accounted for the majority part of global GHGs emissions (United Nations, 2014; OECD, 2010, 30; Czako, 2011, 4; Loftus et. al., 2011; OECD, 2015; Koop & Leeuwen, 2017). The second ground is closely linked with premises that local authorities have partially independent power, duty and responsibility compared to central administrations in several sectors such as energy, transportation, building, infrastructure, water and waste management, land use planning (Collier & Lofstedt, 1997, 27; Rayner & Malone, 1997, 333; Dodman 2009, 198; Sippel & Jenssen, 2009, 3; Koop & Leuwen, 2017; Hoekstra et al., 2018). Another premise is that local government is the most appropriate political jurisdiction to ensure cooperation between civil society and private sector, citizen participation for reducing GHGs emissions in the cities, and providing support for mobilization and engagement of all actors in climate change policies and locally tailored response, which varies based on the nature of each community such as demography, geographic position, culture, socio-economic condition, etc. (Coenen & Menkveld, 2002, 111; Betsill & Bulkeley, 2006, 141; Sippel & Jenssen, 2009, 3; UN-Habitat 2011, 58). Furthermore, the threshold level of the vulnerability in the metropolitan cities is so low that their infrastructure, water, and

building systems would be affected by the devastating impacts of climate change (Corfee-Morlot et al. 2009, 17, and as cited in Sippel & Jenssen, 2009, 3-4). Finally, climate change protection actions at the local level would be appropriate based on subsidiarity, democratization, participation, efficient and effective public services delivery, principle proposed in the international negotiation of the European Union such as Maastricht Treaty in 1992, which necessitates political action at the lowest authority level and much more close to the individual as completely as possible (Czako, 2011, 4).

In addition to the importance of local actors, it was often emphasized that there should be a serious change in the administration approaches to deal with such global environmental problems. Against previous theoretical background, a proper strategic and political response to climate change that necessitates interrelationship and social coordination among all actors at each level of government could be embodied in the concept of "governance" (Fröhlich & Knielingen, 2013, 9). Approaches to "governance" rather than "government" and good public policy are regarded as a necessity for metropolitan cities to ensure proper infrastructure, land-use planning, energy and transportation systems, and all social and economic sectors to be much more competitive and sustainable (Anand & Kallidaikurich, 2011, 33). Consequently, it is acknowledged that the governance is also relevant to global climate change regime that requires multiple modes of governance, process, and institutionalization across a variety of administrative scale (Betsill & Bulkeley, 2006, 144).

Holistically and theoretically, "climate change governance" has been referred to as a management process involving cooperation at a certain level between stakeholders with some participatory principles concerning causes and results of climate change (Pohlmann, 2011, 5). A bunch of features stand out in

conceptualizing and analyzing the concept of the "climate change governance" such as being normative and practical problems/solutions, social bases, scientific uncertainty, justice and equity concerns, multi-level/actor/sectorial, extended time period, global implications, while some of those are similar to other public policy areas (Meadowcroft, 2009, 5). Meadowcroft (2009) clearly indicates that the most famous controversy concerning "climate change governance" is an association with the notion which distinct administrative level would be the most appropriate for climate change protection initiatives, as called "politics of scale". Scholars, in particular international scientists and economists, argue that it should be accepted as global problems and scale-up approaches are required, and the most suitable unit is international level. According to them, these are rational arguments due to the fact that it requires global orchestrated and competitive movement process in a global era. However, Gupta (2007, 132) argues that it needs to be addressed at the local level with scale-down approaches because international level actions are weak and ill-suited level for mobilizing the entire society.

In addition to all these clarifications, another theoretical background of local actions and strategies for GHGs emission reduction is associated with "modes of climate governance". Modes of climate governance are a useful framework for a better analysis of urban climate protection initiatives, and collaborative capacity of municipalities with other actors on the subject. In practice, there are a number of different mitigation and adaptation strategies, mechanisms and policy tools that can be divided into different management modes for each of the policy sectors, such as energy, transport, land use planning, urban infrastructure, and waste. The forms of climate change mitigation or adaptation of local actors, especially municipalities, depend mainly on the degree of each actor's cooperative attitude and tendency (UN-Habitat 2011, 107).

In the studies carried out to date, different classifications methods have been established in terms of the status and action mode of each actor in the local climate change activities. For example, in addition to the extensive work of the UN and Habitat and the OECD, Alber & Kern (2008, 5) and Bulkeley & Kern (2006) have suggested four different governance styles including *self-governing, enabling, provision and regulation* for local climate protection initiatives. Likewise, the report carried out by Un-Habitat in 2011 (p.107) argued that different modes of governance emerged as a result of the transition in the perception of the states` intervention on policy domain such as transformation from formal government, hierarchical relation to the involvement of non- governmental and private actors, flexible form of partnership, cooperation, networking, sharing responsibility, service provision and decentralization. In terms of municipalities as actors, main modes of climate governance can be summarized as follows;

- **Self-governing** demonstrates the capacity and competence level that local government applies climate change principle in their organizations, institution, strategic and innovative operations, mainly driven by both environmental and economic concerns. Concentration on energy efficiency, and renewable energy and behavior change and demand reduction mechanism in their actions are just some of the initiatives adopted by municipal authorities with respect to self-governance modes (UN-Habitat, 2011, 108).

- **Governing through enabling** is used to explain the capacity of local authorities' endorsement for the community and non-public actors to pursue climate change principles in their actions and organizations using convincing, encouragement and volunteer methods. This mode of governance has different dimensions including education, awareness campaign and supporting activities, local government policies and strategies with respect to climate change protection (Alber & Kern, 2008, 8).

- **Governing by provision** indicates capacity of local authorities to provide the necessary infrastructure and services by using financial and resource mechanisms to enable other actors to follow the principle of climate change in their actions. Low carbon infrastructure, changing carbon intensity for household and business actors in the reduction of GHG in the municipal border are just some of the advantages of this governance mode, while the lack of financial constraints and dependency on capital condition are among the limitations (UN-Habitat, 2011, 108).

- **Governing authority (regulation)** demonstrates necessary perception or setting out capacity for the emergence of urban climate governance principle by using direct authority, compulsory and legal measures, in particular on urban transportation and development policy. That is, local governments have a broad legal authority and executive power on implementation, limitation and obligation of common principle in all actors` strategies and actions in sectors such as energy, transport, building and land-using (UN-Habitat, 2011, 108).

Governance modes vary from cities to cities depending on the economic, political and socio-cultural structures of the countries. In practice local authorities have deployed one of four modes of governance in their policies and strategies separately or simultaneously at given time for their mitigation and adaptation initiatives (UN-Habitat, 2011, 108). Furthermore, self-governing is the most common and dominant approach adopted by local authorities, as regulation is the least for urban climate governance initiatives. Self-governing and enabling are dominant approaches, particularly in developed countries to demonstrate visible and short-term scale climate change commitment, while provision mode is more common in developing countries as the infrastructure and services are provided to protect the city against potential impacts against climate change. In addition, regulation mode is one

commonly deployed in municipal climate initiatives compared to others. It is also possible to notice different versions or combinations of each mode of governance, quasi-modes, on local climate actions such as *voluntary: public-private provision and mobilizations* (UN-Habitat, 2011, 107-108).

3. Research Design and Methods

Strategic Plans (SPs) and Annual Action Reports (AARs) of corresponding metropolitan municipalities concerning reference years were investigated with document analysis. The official web pages of the metropolitan municipality were scanned to obtain essential documents, and officers in municipalities also were directly contacted by phone or email not to miss good sources of information. There are a variety of reasons behind the use of the AAR and SP as a data source in the research. For instance, AAPs provide significant information concerning metropolitan municipality's annual actions based on public finance management and control law (No: 5018). Each metropolitan municipality is required to submit accurate and reliable AAR within the framework of the principle of fiscal transparency and accountability. In addition, a significant explanation for the data collection process in the study is associated with `inferences` from LCC actions. As Krause (2011) argues, LCC actions could be evaluated in two different ways; explicitly or implicitly. `Implicit LCC initiatives` were taken into account once conducting content analysis to figure out the cumulative impact of local climate either with actual or potential initiatives in metropolitan municipalities in Turkey.

In first stage of the research, several categories of themes and phenomena based on the science-based and comprehensive reports and studies (mainly from UN-Habitat) concerning local climate change initiatives for each urban sector such as urban development and design, built environment, urban infrastructure, transportation

and carbon sequestration, and adaptation were formed on the subject (see Table 1). For instance, in the study as a coding process, many different codes that consist of words or short phrases such as transport/ation, tree/planting, energy and water efficiency, CO_2, renewable/energy, public transport and so on, have been created based. The combination, frequency and classification of these codes under the specific thematic categories presented in Table 1 is formed on the excel program. Consequently, forty-one distinct local climate change actions (consists of different codes) associated with six different urban policy sectors (includes thematic categories) and two main climate protection approaches, mitigation and adaptation, were recorded on the excel sheet by taking into account of UN-Habitat (2011), OECD report (2010) and Krause (2011) studies.

For data analysis in the study, selective coding method consisted of coded categories and subcategories have been employed for annual action reports-AAR (regarding reference years range from 2011 to 2014) of metropolitan municipalities and their strategic plans-SP (2015 - 2019). During data analysis, each local climate protection initiatives was also evaluated and recorded in terms of modes of climate change governance framework as *self-governing, provision, enabling and regulation*. For instance, it was recorded in the self-governing category in the event that metropolitan municipality performed action for energy or water efficiency in their infrastructure or institutional buildings, or in the enabling categories if carried out an educational campaign for other actors to be further energy or water saving, or in the regulation categories if tax, standardization was applied, or in the provision categories if public transportation service expanded in the city.

All metropolitan municipalities in Turkey (except for Mardin because of unavailable data) were selected as a sample in the research (n=29, *İstanbul, Ankara, İzmir, Kocaeli, Tekirdağ, Eskişehir, Antalya, Bursa, Samsun, Sakarya, Mersin (İçel), Denizli, Muğla, Kayseri,*

Adana, Hatay, Aydın, Balıkesir, K. Maraş, Konya, Manisa, Trabzon, Ordu, G.Antep, Erzurum, Malatya, Diyarbakır, Şanlıurfa, Van). The main reason for selection of the metropolitan municipalities as research units can be associated with the notion that climate change issue requires actions, the solidarity of sufficient social and economic capacity, large geographic and administrative areas. For instance, metropolitan municipalities in Turkey have more potential regarding populations, social networks and economic competence, environmental integration, and cooperation in their provincial borders. Furthermore, the main focus was given to metropolitan municipalities in Turkey due to providing major local service for around 93.3 % of total population in Turkey based on Turkish Statistical Institution (TSI). In addition to these points, the municipal boundaries in metropolitan cities hereafter cover provincial and administrative borders with new Metropolitan Municipality law "The Establishment of Fourteen Metropolitan Municipalities And Twenty-Seven Districts and Amendments at Certain Law and Decree Laws" enacted in 2012 (No 6360). Law of 6360 aims at economies of scale and ensure the optimization of efficient and effective resources usage. For instance, it has frequently been argued that overlapping the metropolitan municipality and administrative boundaries in Istanbul and Kocaeli selected as pilot study improved the integrity and effectiveness of the local services delivery. Hence, metropolitan municipalities have become the most prominent local public actors in the province with the new legislation in Turkey compared to others.

As a research method, document analysis was used in the study. AAR and SP of corresponding metropolitan municipalities concerning reference years including the second period of the Kyoto Protocol (since 2012) were investigated with document analysis due to several grounds. It is considered important to identify the current trends and capacity level of local administrations before established a new climate regime and its applications such as Paris Agreement in the international arena though there has not been any obligation for

Turkey in the second period of the Kyoto protocol. Also, the strategic planning is a process which helps for improvement of organizational learning, determining suitable long-term strategies, goals, and target, determining their priority in an appropriate manner, establishing a link between the organization and its environment, goals and existing resource capacity, ensuring effective resource usage (Gürer, 2006, 103). Moreover, strategic plans provide harmonization between organizations` environmental conditions, objectives, and resources, which ensure to have a strong vision and contributing positive competitiveness for sustainable development (Demir & Yılmaz, 2010, 84). In a similar vein, AAR provides significant data concerning metropolitan municipality's annual performance and initiatives in the reference year. Furthermore, each local government in metropolitan municipalities is required to submit their annual accurate and reliable action information within the framework of the principle of fiscal transparency and accountability in the reference year since 2005.

As Krause (2011) points out in her study, a significant explanation for the data collection process in the study is also associated with `inference` from local climate change actions. A blend of initiatives could be evaluated in two different ways explicitly and implicitly. First one is especially associated with actions or implementations which aim for explicitly carbon emission reduction and adaptation. Another one is linked with local climate actions (which do not aim to deal with carbon reduction) could be evaluated tacitly as local climates are related to policies such as energy and water savings, and air pollution (p.200). In this regard, "implicit local climate change initiatives" were taken into account in coding and thematic systems to determine cumulative impact of local climate on either actual or potential initiatives for the majority of municipalities in Turkey which have not joined any climate change networks. In doing so, it was possible to overcome undercounting of total GHGs emissions at the local level in the study.

Table 1. Municipal GHGs emission reduction initiatives

No	*Approaches*	*Sectors*	*Actions or strategies adopted by municipal authorities in Turkey*
Z1	Mitigation	Urban Development and Design	Municipality has GHG reduction plans, inventory, target or strategies
Z2			Land-use and zoning planning for urban sprawl,
Z3			Urban expansion and new residential areas for Energy efficiency activities
Z4			Informal settlement and suburban development,
Z5			Mixed-use zoning to shorten trip distance
Z6			Zoning to promote multi-family and connected housing
Z7			Reuse of Brownfield land
Z8		Built Environment	Energy-efficient material and energy star purchase usage for equipment, appliance, and building design,
Z9			Efficient lighting installed in city buildings
Z10			Efficient lighting installed in city streetlights
Z11			Alternative clean energy and water technologies and supply in its operations, building and for commercial and industrial building and operations,
Z12			Energy demand reduction program and obligatory requirements for public and private building
Z13		Urban Infrastructure	Alternative and renewable energy sources,
Z14			Landfill sites for energy recovery,
Z15			Provision of alternative water resources,
Z16			Incentives for less water and energy usage
Z17			Waste management and recycling for communities
Z18			More energy efficient systems usage in urban infrastructure
Z19			Energy and water demand reduction campaign
Z20		Transportation	Adequate public transportation and intensives (expand mass transit)
Z21			Low carbon transport infrastructure such as community-wide hike and bike trails, bicycle lanes
Z22			Fleet replacement and fuel switching(efficient, alternative and hybrid fuel vehicles)

Z23			Non-motorized transportation (bike lines)
Z24			Public awareness campaign
Z25			Clean technology implementation
Z26			Limitation of mobilization (employee transport plan, Traffic calming, driving and parking restriction)
Z27			Carbon capture and storage technologies
Z28		Carbon Capture and Storage	Tree-planting program
Z29			Restoration for preservation of carbon sink,
Z30			Carbon-offset scheme
Z31			Education awareness campaign
Z32	Adaptation		Heating and cooling services and designs in building
Z33			Energy and water saving and efficiency
Z34			Storm and flood protection management
Z35			Freshwater and groundwater treatment and design
Z36			Reducing Urban Heat Island effect and vulnerability to extreme heat (mass transit systems, building codes, tree planting, etc.)
Z37			Land using planning(open space as buffer zone for flooding)
Z38			Blue and green infrastructure
Z39			Early warning systems
Z40			Healthcare systems
Z41			Education awareness campaign and behavior-based changing

After content analysis at the first stage of the study, the local climate change actions of each metropolitan municipality have been saved and classified in excel on a sectoral basis. After weighting score (frequency of each metropolitan municipalities on each urban climate initiatives divided by all actions, *Municipal Climate Change Action Score* (MCCAS) was summed up with 41 distinct climate protection activities as presented in Table 1. The weighted score of local climate change activities could also provide a comparison among metropolitan municipalities on a sectoral base in Turkey. The reason for the fact that the actions implemented by the municipalities in the climate change governance is assumed as weighted score in their own category is that the capacity of municipalities should be evaluated in terms of each action and the distribution and extensiveness of 41 different efforts rather than density or sole frequency. Otherwise, score value for the municipal which often performed a particular group of

activities with high frequency, especially with respect to waste treatment, building greenery areas etc., will be high, but the MCCAS score for municipal that which conducted a good deal of the actions covering a whole range of actions, but with less frequency, will be low, which may lead to misestimation of prediction accuracy of the capacity of municipalities on the subject of the climate change governance.

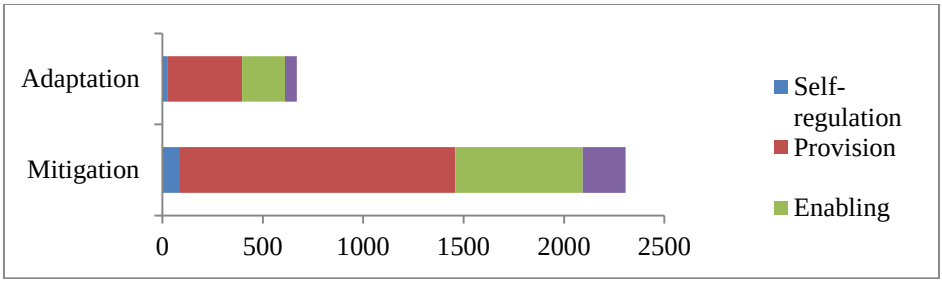
4. Local Climate Change Initiatives and Modes of Climate Governance in Turkey

As a developing country, Turkey does not have any commitment to carbon reduction based on UN international climate negotiations (no historical and financial responsibility) so far. However, the increasing rate of total GHGs emission necessitate engagement of local administrations for dealing with the climate change issue due to nation`s demand for energy consumption and having growing economy leading more GHGs emission (Orhan, 2014, 131). Furthermore, this condition causes serious problems in the field of international diplomacy for Turkey. For instance, scholars argue that the lack of science –based and comprehensive commitments on international climate change negotiation is one of barriers to European negation process for Turkey. However, despite absence of the commitment to GHGs reduction based on the international negotiations, Turkey has still prepared a variety of national and local mitigation-adaptation regulations in terms of institutionalization and capacity buildings projects, particularly since the 2000s (Gedikli & Balaban, 2017). for instance, *National Climate Change Strategy Paper 2010-2023, National Climate Change Action Plan 2011-2023, Climate Change Adaptation Strategy and Action Plan-2011* are some of the regulatıon on the subject.

Considering all discussion in the literature above, metropolitan municipalities in Turkey mainly perform local climate change actions through different governance mechanisms and instruments such as particular subvention, codes, tax etc. to endorse coordination and cooperation among public and private actors including community itself for emission reduction (Gedikli & Balaban, 2017). In the study, when taken into account of all local climate change actions observed with content analysis of AAR of the Turkish metropolitan

municipalities as seen in Figure 1, it is found that municipalities have mainly carried out their initiatives for mitigation aiming at the tacitly or explicitly GHGs emission reductions in their administrative border, while adaptation actions are few.

Figure 1. Local climate change actions with major modes of climate governance based on AAR (f = 2977) of metropolitan municipalities in Turkey.

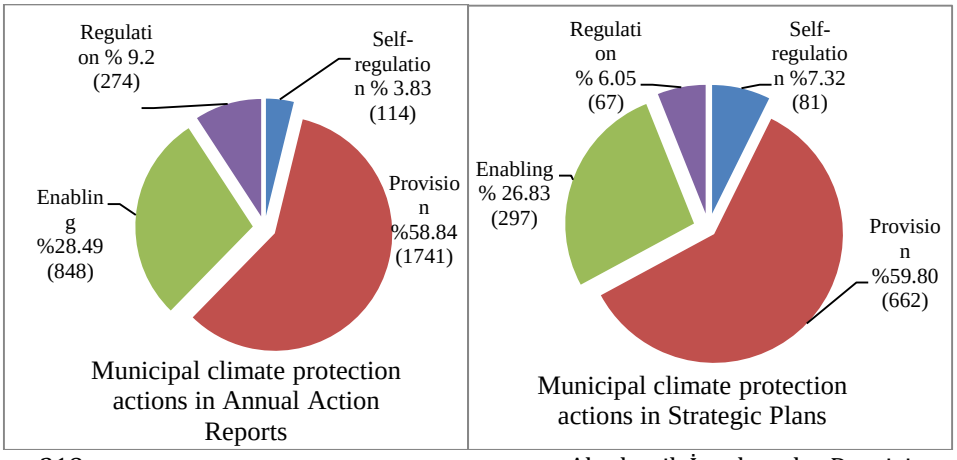


Comprehensive reports such as UN-Habitat (2011) frankly indicate that self-governance (mainly focusing on municipalities' own local climate activities and operation within the framework of climate protection principles) provides a short-term and visible commitment for municipalities. In addition, when developed and developing countries are compared, it is argued that self-governing and enabling forms are widespread in developed countries, while provision is a more commonly used approach in developing countries. That is, it is expected to be that regulation is the most common form for Turkish metropolitan municipalities in the sector of transportation that is highly complex by virtue of large number of origin, destination, amount and variety of traffic systems. Similarly, provision in the sector of urban infrastructure and urban development and design, enabling in the built environment and carbon sequestration among mitigating initiatives are common form adopted in Turkey (UN-Habitat, 2011).

Against this background, the study demonstrates that provision mode (mainly focusing on goods and services delivery by municipalities such as waste treatment, wastewater management,

greenary areas, public transportation etc.) is the most prevalent approach respectively based on AAR and SP, while enabling mode (focusing on encouragement and subsidy for other stakeholders on GHGs emission reduction) is the second one adopted by metropolitan municipalities in Turkey (see Figure 2). Particularly, corresponding metropolitan municipalities in Turkey continues their initiatives to ensure the reduction of GHGs emission with provision mode in the urban infrastructure. Metropolitan municipalities in Turkey provide goods and service delivered in the sectors of the waste and transportation through provision modes. To this end, it is possible to assert that despite the fact that local goods and services are delivered by private authorities besides public institutions because of neoliberal market regulation in the country, Turkish metropolitan municipalities still have a crucial role in providing local needs of the society. Likewise, it is found that the second most prevalent governance mode adopted by corresponding municipalities in metropolitan areas is enabling, that means significant collaborative capacity to endorse other actors. Finaly, self-governance is the least adopted governance form based on analysis of the annual action reports, while regulation is the least one based on strategic plans.

Figure 2. Local climate change actions with major modes of governance based on AAR (f=2977) and SP, (f=1107) in 29 Metropolitan Municipalities in Turkey.



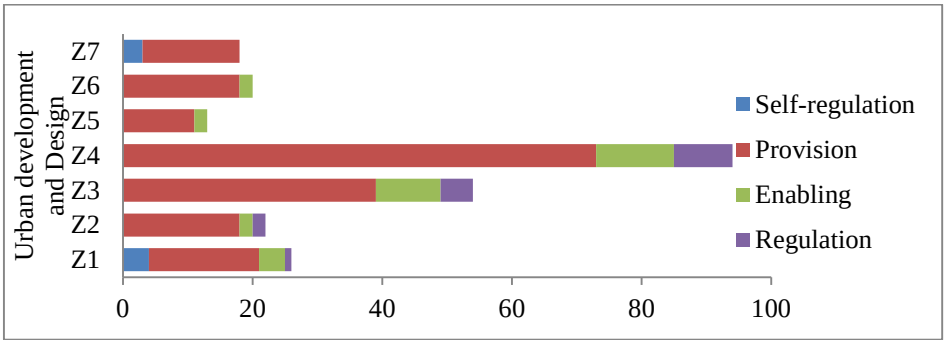
If we take into account of all activities carried out by the metropolitan municipality based on AAR, SP in Turkey (including mitigation and adaptation), it is found that the waste management and recycling for communities (coded as Z17), adequate public transportation and intensives for mass-transportation (Z20), restoration or preservation of carbon sink areas (Z29), storm and flood protection management (Z34), tree-planting programs (Z28), and low carbon transport infrastructure such as a community-wide hike, bike trails and bicycle lanes (Z21) are frequent initiatives adopted by municipalities regarding local climate change governance in Turkey.

A number of metropolitan municipalities mainly do activities because of environmental protection concerns such as waste management and recycling, rather than climate protections. Similarly, support for a low-carbon motorized vehicle, technological progress in the transport sector, encouragement of public transport usage, further service delivery with new vehicle fleets could be evaluated as similar aims such as energy saving and environmental concerns. Moreover, the preservation of urban greenary provides significant political and social output because of not only mitigating GHGs emissions but also public health and aesthetic concerns. However, despite the fact that all these actions are not aimed to climate change concerns, it still provides significant contribution to emission reduction and evaluation of the local climate governance initiatives in Turkey.

Energy consumptions and GHGs emissions are closely associated with the sector of *urban development and design*. In particular, the rate of urban sprawl, unplanned urbanization, and population density leads to raising energy consumption per capita and GHGs emissions. Similarly, households have trouble to access reliable and sustainable sources of energy and water in urban areas which have an unplanned urbanization and informal settlement. In this regard, finding of the study demonstrates that the corresponding municipalities in the metropolitan cities in Turkey have implemented a variety of measures, standards, and instruments in land-use zoning, master planning, and a mixed-use urban development, which can be attributed to GHGs emission reduction.

The finding of the stuyd illusrtae that initiatives for energy and water efficiency in informal settlement and suburban development (Z4 and Z3 in the figure 3) respectively are leading actions adopted by municipalities in the sector of *urban development and design*. That is, any initiatives for energy and water efficiency implemented by the corresponding municipalities for dealing with unplanned urbanization, informal settlement and urban transformation are some of the local climate change initiatives in Turkey. When the modes of governance are considered, provision and enabling forms are widespread governance modes in the sector of urban development and design. Indeed, it is expected that metropolitan municipalities have performed their local actions associated with urban development and design through regulation modes due to high power and responsibility on urban policies, but it is not possible due to fact that such emission reduction initiatives are implemented in a voluntary manner, not compulsory in the metropolitan cities in Turkey.

Figure 3. Local climate change actions in the sector of urban development and design with major modes of governance based on AAR (f = 247) in 29 metropolitan municipalities in Turkey.

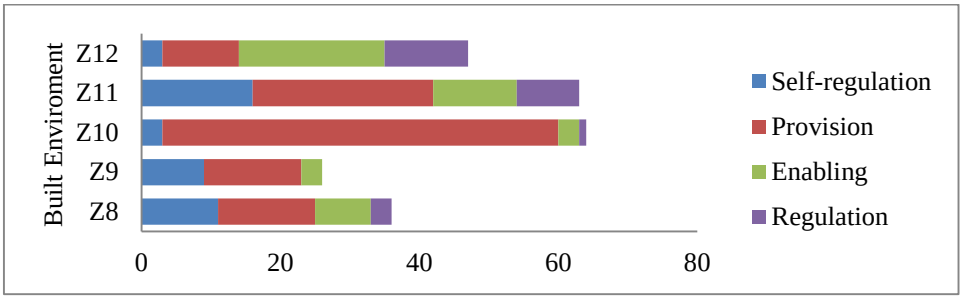


Another sector analyzed in the study is the *built environment*. With regard to built environment, science based reports (such as UN-Habitat, 2011: Loftus & et. al., 2011; OECD, 2010; OECD 2015, OECD 2018) clearly indicate that any policies and strategies conducted by the corresponding municipalities to ensure energy efficient systems and technology to support energy usage from alternative energy sources, energy demand reduction programs have played significant role in local GHGs emission reduction. In this context, findings of this study demonstrate that the metropolitan municipalities in Turkey have maintained a variety of actions such as

energy efficient lighting installed in city streetlights and alternative clean energy and water technologies, and supply in their commercial and industrial building and operations (as coded as Z10 and Z11 in the Figure 4). Furthermore, the energy reduction campaign in public and commercial building (Z12), and energy-efficient material and energy-star purchase for equipment, appliance in building design (Z8) are another important initiatives that can be considered within the scope of the local climate governance on the subject of the built environment for Turkish metropolitian municipalities.

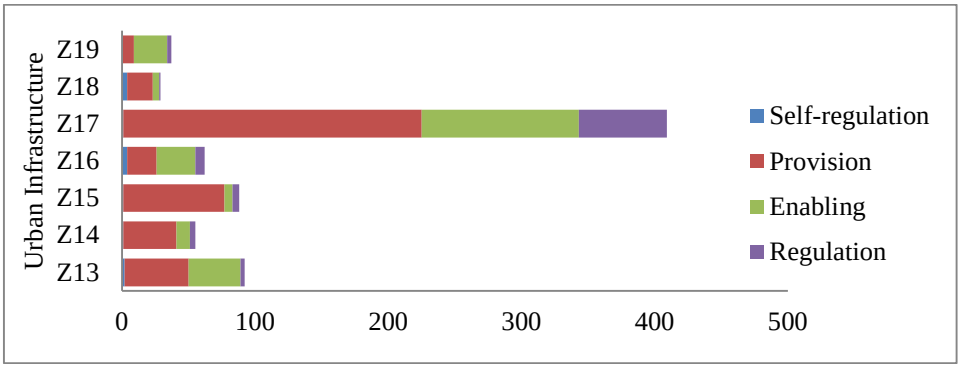
To illustrate capacity of the metropolitan municipalities for emission reduction, it is found that the most frequent governance modes in municipalities' activities in the sector of the built environment are provision, while regulation is the least one. There could be several reasons for these arguments. Firstly, metropolitan municipalities in Turkey have significant executive responsibility and duties on the policies of the energy, water, transport and waste management. They have, therefore, a crucial position to steer several urban policies and strategies. What is more, metropolitan municipalities have provided certain local services that enable other local stakeholders to follow energy and water efficient infrastructure for GHGs emission reduction in their operations. Finally, enabling mode requires cooperative actions with other local actors for climate protection. That could be possible in the industrialized countries that have a further neo-liberal market for energy, transport or other related political sectors. However, all actors including public and private organizations have mutual responsibilities and control power on these sectors for developed countries, while the local mutual services are provided mainly through local public authorities, in particular municipalities, in developing countries such as Turkey.

Figure 4. Local climate change actions in the sector of built environment with major modes of governance based on AAR (f= 236) in 29 metropolitan municipalities in Turkey.



Another significant sector which has played a crucial role in reducing and shaping future trajectories of GHGs emissions is *urban infrastructure*. In Turkey, metropolitan municipalities together with other civil and private actors have tried to maintain a variety of mechanisms for reducing GHGs emission through the development of urban infrastructure systems. In particular, waste management, and recycling are the main initiatives that municipalities perform with high rate of (Z17 as seen in Figure 5). Provision of waste services, recycling, and reuse programs enable Turkish metropolitan municipalities to address climate change in their administrative border as well.

Figure 5. Local climate change actions in sector of urban infrastructure with major modes of governance based on AAR (f= 772) in 29 metropolitan municipalities in Turkey.



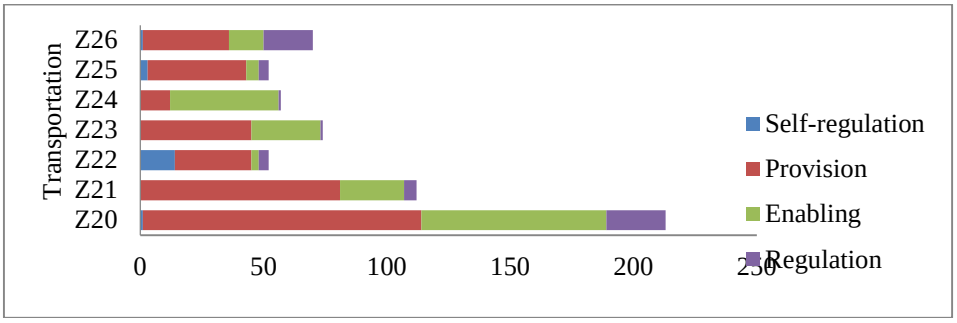
Another important sector that has a significant contribution to GHGs and amount of CO_2 emissions from combustion of fossil fuel is *transportation*. Although the rate of GHGs emissions from transportation is low in developing countries compared to other sectors, it is still important due to increasing trajectory in household income and increasing personal transportation, economic development and growth. In particular, a variety of actions adopted by a municipality such as the provision of adequate public transportation and low carbon transportation infrastructure, vehicle fleet replacement and fuel switching, implementation of the clean technology, limitation of mobilization, public awareness campaign are some of carbon saving initiatives that have a crucial place for the future trajectory of GHGs emission in cities. In this regard, the findings of the study indicate that the most critical urban policy sector focused by metropolitan municipalities in Turkey regarding GHGs emission is *transportation* with high rate. In the transport sector, demand enhancement measures such as incentives for public transportation, alternative transportation methods are the most common initiatives adopted by metropolitan municipalities for reduction of GHGs emission in Turkey (Z20 and Z21 as seen in Figure 6). Promotion of non-motorized transportation, public awareness campaign, and limitation of mobilization are some other actions in the transport sector for Turkish metropolitan municipalities.

The development of new public transportation systems implemented by metropolitan municipalities in Turkey is the most common initiatives compared to other actions such as trams, rail, and trains. For instance, Bus Rapid System (BRT) implemented in a few cities such as Istanbul has played a crucial role in decreasing GHGs emission because of being low cost, speed, high capacity, and easy to implement. Furthermore, another set of initiatives in transport sectors adopted by municipalities in Turkey is associated with the demand reduction program. For instance, bicycle networks led by a wide range of actors and work-related mobility reduction projects in the cities are some of those implemented by municipalities in Turkey.

Main governance modes for local climate mitigation actions implemented by metropolitan municipalities in the transportation sector are provision, while self-governance are few. Even if mass transportation is

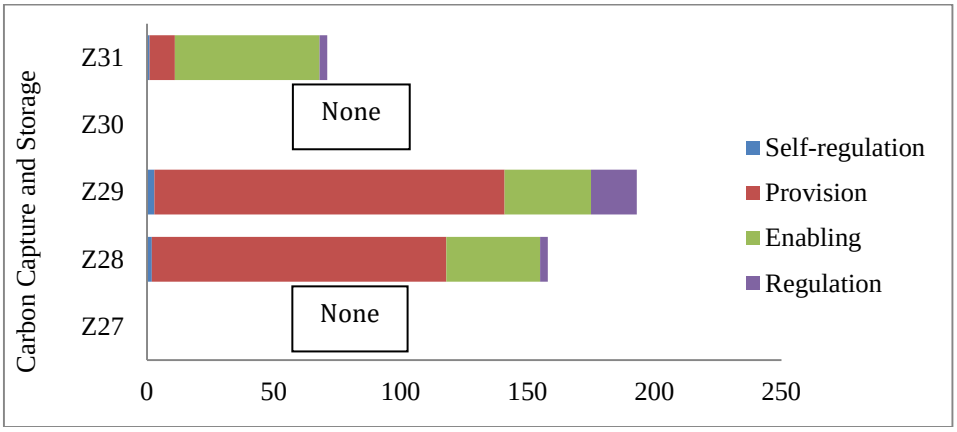
partly privatized in Turkey, it is considered that municipalities as public authorities in metropolitan cities still have an influence on regulation or plans of the urban transportation systems, and allocate their own vehicles for public transportation. To this end, it is expected to be that enabling mode is the second common form of governance in the transportation sector for addressing climate change in metropolitan cities in Turkey. Even though metropolitan municipalities in Turkey have a variety of regulation tools, financial incentives for low-carbon transportation, a regulatory mechanism such as physical and parking restraint, low emission zone, congestion charge, speed control, and construction of cycle path for a reduction in GHGs emission from transportation are still limited.

Figure 6. Local climate change actions in the sector of transportation with major modes of governance based on AAR(f= 630) in 29 metropolitan municipalities in Turkey.



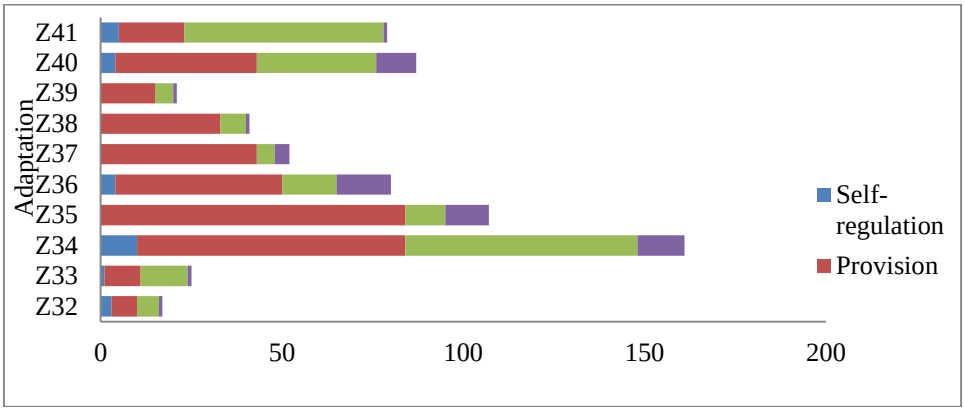
Another urban policy sector that is essential for reducing GHGs emissions is *carbon capture and storage* which is regarded as *carbon sequestration*. The study found that local climate actions adopted by metropolitan municipalities regarding carbon sequestration rank third compared to others. For instance, carbon sequestration action including restoration and preservation of carbon sink and tree-planting program are unsatisfying level (Z29 and Z28 as seen in Figure 7), as in the the promotion of the environmental awareness activities and campaigns adopted by Turkish metroplotian municipalities. Morever, no municipal actions regarding carbon capture and storage technology and carbon-offset scheme were observed on the AAR and SP. It is also found that corresponding municipalities perform their sequestration action mainly through provision modes with high rate of, while self-governance is few as seen Figure 7.

Figure 7. Local climate change actions in the sector of carbon capture and storage with major modes of governance based on AAR (f= 422) in 29 metropolitan municipalities in Turkey.



Another major approach (assumed as distinct urban policy sector in the study) for GHGs reduction is the *adaptation*. It is found that storm and flood protection management, freshwater and groundwater treatment are common actions adopted by municipalities in terms of adaptation (Z34 and Z35 as seen in Figure 8). In particular, metroplotian municipalities in Turkey continues mainly their operations to increase capacity for storm and water collection systems, to ensure landscape requirement for water runoff reduction , and to create buffer zones. In addition, they have implemented early warning systems to reduce property damage from storm and flooding in the cities. At the same time, municipalities have performed a variety of services through fresh and groundwater management in the cities. Similarly, they have persuaded actions through wastewater treatment for water reuse, incresing water consuption price , promotion of the water efficiency measures, and education awareness-rasining programs, that can be attributed as enabling modes in the urban climate governance (Z41 as in Figure 8).

Figure 8. Local climate change actions in adaptation with major modes of governance based on AAR (f = 670) in 29 metropolitan municipalities in Turkey.

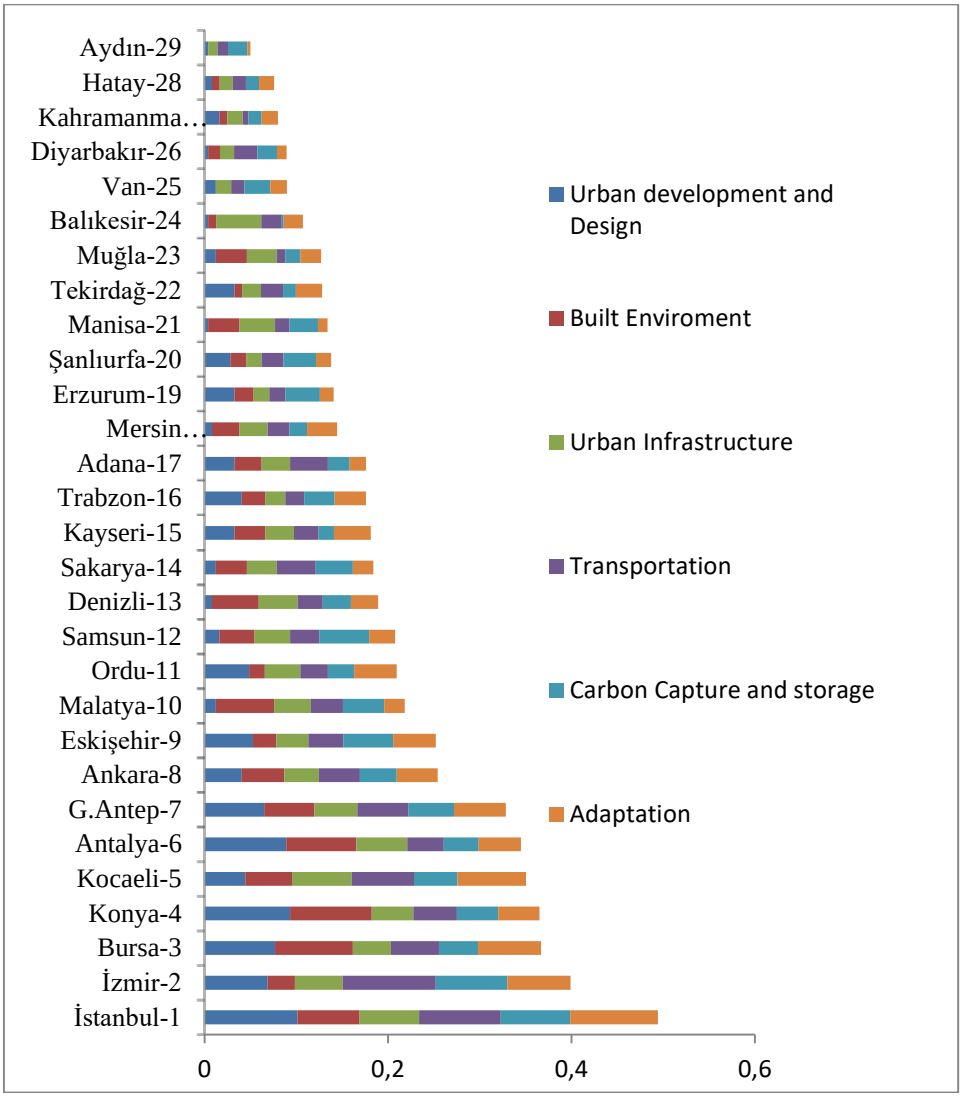


Main finding of the study is that metropolitan municipalities in Turkey have not provided local service for adaptation objectives, but some of these initiatives could be still attributed to urban adaptation governance. For instance, some of those adaptation initiatives have been carried out by municipalities for disaster risk reduction measures, not for climate change adaptation objectives, but it still provides sigificant to eleminate or decrease vulnerability of the cities towards climate change. However, it could be argued that metropolitan municipalities in Turkey have a limited capacity, knowledge, and willingness to address the risk of climate change, disaster, and other adaptation policies. Finally, it is observed that among adaptation actions, municipalities have performed their local policies mainly through provision modes, while self-governance is few.

All in all, among local climate protection activities adopted by metropolitan municipalities in Turkey, waste management and recycling is widespread actions in the urban infrastructure sector. Similarly, in the transport sector, adequate promotion for public transportation, incentives to mass transportation and low carbon transport infrastructure such as community-wide hike and bike trails, bicycle lanes are very frequently encountered actions among other local level climate actions in Turkey. In addition, the restoration and preservation of carbon sink, the tree-planting programs are the most common operations in carbon capture and storage sector. Finally, storm and flood protection management, freshwater and

groundwater treatment and design and healthcare systems are the most prevalent actions adopted by responsible metropolitan municipalities in Turkey. Consequently, when considered all metropolitan cities with MCCAS scores- calculated based on local climate initiatives, it is found that *İstanbul, İzmir, Bursa, Konya, and Kocaeli* are pioneering cities for local climate protection actions in Turkey as presented in the Figure 9.

Figure 9. Local climate change initiatives adopted by metropolitan municipalities in Turkey



5. Conclusion

Today, global climate change governance necessitates the involvement of each authority in various administrative levels. In particular, local initiatives of local governments enhance national and international actions for emission reduction. Science-based reports indicate that political and economic respond at the local level in developing countries is significant based on GHGs emission trajectory or models. In this regard, metropolitan municipalities are regarded as important actors for local climate protection initiatives since they have a crucial influence on urban policies such as land-use and settlement planning, the creation of living spaces and use of energy and water, etc. In particular, planning of urban forms and settlements are urban policy sector which municipalities continues their operations, and closely associated with urban characteristics such as residential buildings, population density, spatial structure, urban forest, and landscape.

Metropolitan municipalities in Turkey have significant responsibility and duties on urban policies with regard to the provision of local shared services and goods. To this end, climate protection initiatives including mitigation and adaptation adopted by metropolitan municipalities are considered as important. In addition, forms of governance are significant to demonstrate collaborative capacity of metropolitan municipalities on the subject. To this end, our study illustrate that mitigation activities are more common than adaptation efforts for dealing with climate change by metropolitan municipalities in Turkey. Considering all strategies and activities, metropolitan municipalities in Turkey mostly perform climate protection activities through provision mode. When a sectoral base is considered, urban infrastructure and transportation were considered as precursor sectors based on AAR and SP that are official documents prepared as a result of many expert opinions and evaluations with comprehensive and reliable data by metropolitan municipalities. Metropolitan municipalities in Turkey adopt provisioning mode due to the lack of institutionalization and knowledge of the other local authorities including non-public and private actors in their administrative borders. Although adaptation is a relatively new approach compared to mitigation, municipalities perform, albeit tacitly, several adaptation actions in

metropolitan municipalities.

The activities performed by metropolitan municipalities for climate change protection mainly include waste management and recycling in the field of urban infrastructure and widespread use of public transport and provision of necessary incentives and support in the field of transportation. In metropolitan cities, low-carbon transportation initiatives such as bicycle paths and ropeways are still limited as well. Moreover, it is possible to suggest that the lack of financial capacity, knowledge and technical know-how, existing geographical conditions, rapid and unplanned urbanization lead challenge for metropolitan municipalities to reach low carbon society. Similarly, tree planting and urban greenery built by municipalities, protection and maintenance activities for existing green areas can be considered among climate change protection activities adopted by municipalities in Turkey.

In addition to mitigation activities, adaptation activities are performed particularly in stream bed rehabilitation measures are taken against flood and other natural disasters in Turkish metropolitan cities. Another remarkable adaptation initiative is wastewater management and treatment for municipalities. Finally, education and awareness-raising campaign aiming at community health and protection of natural environment carried out at the local level are some of the adaptation activities adopted by metropolitan municipalities. In this regard, İstanbul, İzmir, Bursa, Konya, and Kocaeli metropolitan municipalities are pioneer metropolitan municipalities within the scope of climate protection activities in Turkey.

The important inference from the result of the analysis for decision makers, politicians, practitioners, and researchers are financial and technical capacities of municipalities need to be developed for effective and comprehensive urban climate change governance. Furthermore, necessity of municipal climate change mitigation and adaptation guidelines, development of consistent GHGs inventory on city-scale, analyses of climate change impacts on cities could be essential for emission reduction in Turkey. Considering the limited studies on the subject for Turkey, organizing a range of activities such as conferences, workshops and panels

to raise awareness on climate change at local level, establishment of a separate department in municipalities with regard to climate change, raise awareness of energy efficiency and sustainable energy alternatives through media, establishment of the organization that constitutes information on climate change and energy efficiency in the city for each actors and citizens, enhancement of enabling mechanism for non-governmental organizations and business to participate in policy process of sustainability and climate change, increasing technical and knowledge capacity throughout participating in the academic inertia, more participation in international climate and energy networks, and sharing experiences with other city governments could be some of the suggestion for municipalities to reach zero-carbon society.

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