

THE DISTRIBUTION OF THE EU-FUNDED MUNICIPAL PROJECTS AIMED  
AT CONTRIBUTING TO THE SUSTAINABLE DEVELOPMENT GOALS  
ACROSS THE PROVINCES IN TÜRKİYE: A SPATIAL CLUSTERING  
ANALYSIS

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CLUSTERING ANALYSIS**

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## ABSTRACT

### **THE DISTRIBUTION OF THE EU-FUNDED MUNICIPAL PROJECTS AIMED AT CONTRIBUTING TO THE SUSTAINABLE DEVELOPMENT GOALS ACROSS THE PROVINCES IN TÜRKİYE: A SPATIAL CLUSTERING ANALYSIS**

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In the 2030 Agenda for Sustainable Development framework, developed countries assist developing or less developed countries in achieving global goals. The European Union (EU) is one of the most important donors to Türkiye, a developing country in Europe. In order to ensure interregional justice in a way that leaves no one behind, understanding the tendency structure of internationally funded investments of local authorities and their spatial footprints is extremely important. Nonetheless, analyzing the spatial tendencies/choices of these investments is difficult due to a deficiency in customized and integrated geographic data for the Sustainable Development Goals (SDGs). This study aims to fill the gap in the literature by analyzing the budgetary spatial clustering of EU-funded municipal projects in Türkiye in terms of their contribution to the SDGs. In this study, two analysis methods were performed in Geographic Information Systems (GIS) software: Moran's I and Getis-Ord  $G_i^*$ . Results show that the spatial clustering of the budgetary hot spots of the metropolitan and provincial municipal projects financed

by EU grants, in the period 2008-2022, was located in the southern and southeastern parts of Türkiye. Moreover, this is in line with the spatial pattern of projects between 2015-2022, whereas no clustering could be identified in the distribution between 2008-2014. In terms of SDGs, the spatial pattern of SDG6 (clean water and sanitation) and SDG11 (sustainable cities and communities) is similar to the distribution of budget allocations.

Keywords: Sustainable Development Goals (SDGs), EU Financial Assistance to Türkiye, Local Authorities/Municipalities, Geographic Information Systems (GIS), Spatial Clustering

## ÖZ

### **AB FİNANSMANLI BELEDİYE PROJELERİNİN SÜRDÜRÜLEBİLİR KALKINMA AMAÇLARINA KATKILARININ TÜRKİYE'DEKİ İLLERE GÖRE DAĞILIMI: MEKÂNSAL KÜMELEME ANALİZİ**

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Sürdürülebilir Sürdürülebilir Kalkınma için 2030 Gündemi çerçevesinde gelişmiş ülkeler, gelişmekte olan veya az gelişmiş ülkelere küresel hedeflere ulaşmalarında yardımcı olmaktadır. Avrupa Birliğı (AB), Avrupa'nın gelişmekte olan ülkelerinden biri olan Türkiye'nin en önemli donörlerinden biridir. Bölgeler arası adaleti kimseyi geride bırakmayacak şekilde sağlamak için yerel yönetimlerin uluslararası finansmanlı yatırımlarının eğilim yapısını ve mekânsal ayak izlerini anlamak son derece önemlidir. Bununla birlikte, Sürdürülebilir Kalkınma Amaçları (SKA) için özelleştirilmiş ve entegre coğrafi veri eksikliği nedeniyle bu yatırımların mekânsal eğilimlerini/seçimlerini analiz etmek zordur. Bu çalışma, Türkiye'deki AB finansmanlı belediye projelerinin bütçesel olarak mekânsal kümelenmesini SKA'lara katkıları açısından analiz ederek literatürdeki boşluğu doldurmayı amaçlamaktadır. Bu çalışmada, Coğrafi Bilgi Sistemleri (CBS) yazılımlarında iki analiz yöntemi uygulanmıştır: Moran's I ve Getis-Ord Gi\*. Sonuçlar, 2008-2022 döneminde AB hibeleriyle finanse edilen büyükşehir ve il belediyesi projelerinin bütçesel bazda sıcak noktalarının mekânsal kümelenmesinin Türkiye'nin güney ve güneydoğı

bölgelerinde yer aldığını göstermektedir. Üstelik bu durum, 2008-2014 yılları arasındaki dağılımda herhangi bir kümelenme tespit edilemezken, 2015-2022 yılları arasındaki projelerin mekânsal örüntüsüyle de uyumludur. SKA'lar açısından, SKA6 (temiz su ve sanitasyon) ve SKA11'in (sürdürülebilir şehirler ve topluluklar) mekânsal örüntüsü bütçe tahsisatlarının dağılımıyla benzerlik göstermektedir.

Anahtar Kelimeler: Sürdürülebilir Kalkınma Amaçları (SKA), AB-Türkiye Mali Yardımları, Yerel Yönetimler/Belediyeler, Coğrafi Bilgi Sistemleri (CBS), Mekânsal Kümelenme



To my beloved family

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## LIST OF ABBREVIATIONS

AFD	:	French Development Agency
CFCU	:	Central Finance and Contracts Unit
CoA	:	Court of Accounts
COP	:	UN Climate Change Conference
Co-PPGIS	:	Collaborative Public Participatory Geographical Information System
DAP	:	Eastern Anatolia Project
DEU	:	Directorate of European Union
DGMM	:	Directorate General of Migration Management
DP	:	Development Plan
EC	:	European Commission
EIB	:	European Investment Bank
EU	:	European Union
EUD	:	Delegation of European Union to Türkiye
EUR	:	Euro (Currency of European Union)
EUTF	:	European Union Trust Fund
FFPA	:	Financial Framework Partnership Agreement
FRIT	:	EU Facility for Refugees in Türkiye
GAP	:	Southeastern Anatolia Project
GDP	:	Gross Domestic Product
GHG	:	Greenhouse Gas
GIS	:	Geographic Information Systems
GWR	:	Geographically Weighted Regression
IAEG-SDGs	:	Inter-agency Expert Group on Sustainable Development Goal Indicators
IEAG	:	Independent Expert Advisory Group on a Data Revolution for Sustainable Development

IPA	: Instrument for Pre-Accession Assistance
ISPA	: Instrument for Structural Policies for Pre-Accession
IUCN	: International Union for the Conservation of Nature
İLBANK	: İller Bankası A.Ş.
MDGs	: Millennium Development Goals
MEDA	: Mediterranean Economic Development Area
MIPD	: Multi-Annual Indicative Planning Document
MoD	: Ministry of Development
MoEUCC	: Ministry of Environment, Urbanization and Climate Change
MoFA	: Ministry of Foreign Affairs
MoI	: Ministry of Interior
MoIT	: Ministry of Industry and Technology
MoND	: Ministry of National Defense
NAC	: National Aid Coordinator
NAO	: National Authorizing Officer
NDICI	: Neighborhood, Development and International Cooperation Instrument
OECD	: Organization for Economic Co-operation and Development
P <sub>0</sub>	: Period Between 2008-2022
P <sub>1</sub>	: Period Between 2008-2014
P <sub>2</sub>	: Period Between 2015-2022
PGIS	: Participatory Geographical Information System
PPGIS	: Public Participatory Geographical Information System
PHARE	: Poland and Hungary: Assistance for Restructuring Their Economies
RS	: Remote Sensing
SAPARD	: Special Accession Programme for Agriculture and Rural Development

SBO	:	Strategy Budget Office
SD	:	Sustainable Development
SDGs	:	Sustainable Development Goals
SDS	:	Sustainable Development Strategy
SECAP	:	Sustainable Energy and Climate Plan
SMEs	:	Small and Medium-sized Enterprises
SPO	:	State Planning Organization
SUMP	:	Sustainable Urban Mobility Plans
SuTP	:	Syrians Under Temporary Protection
TBD	:	To Be Defined
TBMM	:	Turkish Grand National Assembly
TURKSTAT	:	Turkish Statistical Institute
UN	:	United Nations
UN-Habitat	:	United Nations Human Settlements Programme
UNCSD	:	United Nations Conference on Sustainable Development
UNDP	:	United Nations Development Programme
UNFCCC	:	United Nations Framework Convention on Climate Change
UN-GGIM	:	United Nations Committee of Experts on Global Geospatial Information Management
UNSDG	:	United Nations Sustainable Development Group
UNStats	:	United Nations Statistical Office
UNSDSN	:	United Nations Sustainable Solutions Network
VNR	:	Voluntary National Review
WB	:	World Bank
WBCSD	:	World Business Council for Sustainable Development
WCED	:	World Commission on Environment and Development
WSA	:	Water and Sewerage Administrations
WSSD	:	World Summit on Sustainable Development
WW	:	World War



# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

The world is confronted with the harmful repercussions of development strategies based on growth in population, economy, production and consumption. Poverty, grain shortages, epidemics, climate crises, and catastrophes are some of the outcomes of such development strategies. These tendencies cause an exponential increase in pecuniary loss and intangible damages day by day. To avoid such adverse consequences, world leaders have sought to seek fair, inclusive, clean, green, climate-sensitive, circular and sustainable models of development. As a result of this search, the Sustainable Development (SD) concept has emerged as a possible and comprehensive alternative to a growth-oriented linear strategy. The classical definition of SD, “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987; para. 27), emphasizes the importance of restructuring today’s policies, urbanization strategies, production and consumption habits with an understanding of intergenerational justice.

The 17 Sustainable Development Goals (SDGs) of the “2030 Agenda” for SD, adopted by the United Nations (UN) Member States in 2015, reflect an urgent call to action by all countries in a global partnership (UN, 2015b). As clearly stated in SDG 17, which is related to partnership for the goals, each country has responsibilities. In this framework, developed countries assist developing or less developed countries in pursuing of achieving global goals.

The approach of “the whole is greater than the sum of its parts”, proposed by Aristotle in ancient times, was one of the fundamental principles of the Gestalt school

in the 20<sup>th</sup> century (Halimi et al., 2020). This approach emphasizes the importance of analyzing local implementations by considering geographical relations in addition to national cumulative data. The glocalization approach, which was depicted as “think global, act local” by Herbig (1998), underlines the importance of the steps to be taken locally regarding local features and tendencies.

The “2030 Agenda” requires transforming human interventions in social, economic and environmental dimensions globally. As an inevitable result of this, urbanization processes are being restructured in accordance with the principles of being people-oriented, environmentally conscious and climate-sensitive. Thus, it is possible to state that urbanization has been evolving toward the construction of sustainable cities. The primary reason for this is that over fifty percent of the world’s population lives in urban areas. These areas, the cities, appear as the concentration point for production-consumption and management activities. In other words, cities are the engines of growth and prosperity, especially in developing countries (Duranton, 2008).

In the shaping of urban functions, primarily policy-makers and urban planners prepare strategies and plans that can reveal their national, regional and urban contributions by considering the SDGs. In line with these strategies, targets and responsibilities for the SDGs have been established in different scales, and action plans are being developed and revised if necessary to achieve the 2030 targets most effectively and efficiently based on the monitoring and evaluation results of periodic reports.

It is crucial to monitor, evaluate and manage the SDG contributions of public investments through international funding at the scale of local authorities for four primary reasons. First, public investments are, by their nature, the product of strategies that consider the public interest. In this direction, it is very important to carry out the processes in a transparent manner and to monitor their effects in detail. Secondly, global targets are mostly followed on a country basis. However, on the road that started with the slogan “leaving no one behind”, ensuring interregional



justice is as important as cumulative progress. Therefore, the overall evaluation of the local scale investments is necessary. Thirdly, local practices (unlike the national and regional ones) have the advantage of being created in line with local needs and potential. Thus, examining the investments of local authorities provides an important basis for understanding how their spatial diversity will be in the near future. Finally, internationally financed projects have the flexibility to be shaped according to local needs and demands. Still, they basically prioritize global objectives such as the SDGs, which provide the possibility to evaluate spatial concentrations or divergences of investments in a holistic framework.

Although world leaders explained how SD will be addressed over time with the implementation of the SDGs, the associated targets and indicators, they have not fully understood the need for geospatial information to monitor, evaluate, and manage the SDGs (Scott and Rajabifard, 2017). There is a voluminous literature discussing the benefits of applications conducted via Geographic Information Systems (GIS) using evidence-based spatial data in the monitoring and evaluation of SDGs (see, e.g., Acharya and Lee, 2019; Avtar et al., 2020; Erdoğan and Aslan, 2021; Tekin et al., 2022). These studies have provided insights into how collectively agreed-upon development priorities are closely related to space. In addition, they emphasize that the precise and integrated geographic data produced by GIS can integrate and connect local and national contributions to the global development agenda more holistically and sustainably.

## **1.2 Motivation and Description of the Problem**

In creating regional development decisions, it is essential to address the localities' features, requirements, and potentials within the framework of spatial relationality. Remote Sensing (RS) and GIS have been used in spatial planning for a long time. These two technologies enable the work to be done more economically, precisely, quickly and efficiently (Avcı and Kuşak, 2010). In addition, geospatial data produced with GIS-based applications make very important contributions to decision-making

processes with the power of visualization explaining much more than thousands of written pages.

In the SD path, it is vital that the strategies and regional plans, developed in compliance with the national and regional SDG, are based on geographic information. Furthermore, the strategies and plans at the city scale should be prepared in accordance with the upper-scale regional decisions as a requirement of the hierarchy of scales in planning processes. Accordingly, it can be stated that there is a mutual relationship between the city scale and the regional scale and that the appropriateness of decisions made at both stages depends on the availability of accurate and up-to-date geographical data. Thus, managing locally acquired geographic and attribute data in an integrated GIS environment is an uncompromising priority for efficient and effective development.

International funders, including institutions such as the EU, the UN and World Bank (WB), support Türkiye on the path it advances for a sustainable future (Durukal, 2013). EU financial assistance to Türkiye can be provided as direct and indirect funding through grants, loans and blending financial instruments. Grant aid is mainly allocated to various public institutions and organizations within the central and local administrations (Bilici, 2004). Moreover, the motto “act local to go global” refers that local actions and local leadership are crucial to addressing the current global crises and to fostering sustainable recovery and development (UN-Habitat, 2022). Local authorities appear as the most important mechanisms, especially in the shaping of cities and the fulfillment of urban functions. In addition, the constructive influence of local authorities on cities is not limited to their jurisdiction but to their regions as well. Therefore, it is necessary to understand local authorities in Türkiye within the current administrative structure, while searching for the impacts of municipal implementations. Special provincial administrations and villages under local authorities in Türkiye have come to the point of losing these characteristics as a result of the regulations made in the laws, and only municipalities remain as the local authority in real terms (Durukal, 2013).

The fact that the executive and decision-making bodies of the municipalities in Türkiye are directly elected by the people (who are outside the hierarchy of the central government) and that these institutions have their own budgets, make the municipalities in the country a democratic and autonomous institution (Çelik, 2013). Nevertheless, this autonomy also brings with it the possibility that not all municipalities have standard or similar financial and technical capacities. At this point, the opportunity to make investments beyond the financial and technical capacity constraints of municipalities has emerged, especially with EU grants.

In addition to realizing investments in different sectors with EU funding, technical assistance projects are also carried out as a component of investments or a separate project within the scope of the SD approach with EU grants. These technical assistance components have multiplier effects, such as capacity-building activities, and current situation analyses, roadmaps, action plans and capital investment plans for future implementations by municipalities. This multiplier effect offers the opportunity to increase the volume, sustainability and efficiency of urban and regional investments.

Spatial analysis of the EU-funded municipal projects has the potential to provide a unique basis for understanding the trends in urbanization processes in Türkiye. Yet, it is challenging to reach contextualized geographical data sets regarding an integrated database in Türkiye. There are various barriers to creating an integrated database in the country, including the confusion of authority, preference for traditional methods, lack of technical capacity and political concerns of local administrations. For such reasons, in Türkiye, the existing data are produced, stored, presented and assessed on an administrative basis. Due to the lack of specialized and integrated geographic data for SDGs, it is impossible to examine the effectiveness of investments in Türkiye. Thus, for comprehensive analysis, an integrated geographic database is required to be created on a national scale with respect to global targets and indicators.

Even though there is a great deal of literature on the EU's financial assistance to Türkiye and the impact of these investments, little is known about the spatial distribution of these investments and their contributions to the SDGs. Therefore, it is believed that creating an integrated geographical data set of EU-funded municipal projects' SDG contributions at the country level and analyzing it with geospatial/geostatistical methods may help shape the basis for future strategies and plans.

It is crucial to analyze how EU-funded municipal projects are spatially distributed across Türkiye. Due to a lack of spatialized data, it is very difficult to understand where the investments are channeled. In this case, both policy-makers and planners have problems grounding their decision-making mechanisms when designing/directing future investments. Finally, the fact that municipalities, both as final beneficiaries and as project preparers, do not comprehend in which contexts and what kind of spatial choices EU grants have, leads to a lack of important information that can direct to the right choices for future project preparations. Therefore, it is necessary to understand the budgetary spatial pattern of EU funding for municipal projects. Understanding this current trend both in terms of the total budget and the SDGs to which it contributes, taking into account the temporal dimension, will play an important role in mitigating the problems mentioned above. This study is motivated by the desire to contribute to the construction of a knowledge-based path toward solving these problems.

### **1.3 Research Questions of the Thesis**

This study seeks to contribute to future research and practice by providing a geostatistical assessment of EU-funded municipal projects in Türkiye in terms of their contributions to the SDGs. Referring to the aforementioned gaps in the literature, this study aims to address the following main research question:

- How are the EU-funded grants allocated to the municipal projects with SDGs spatially distributed across the provinces in Türkiye?

The following sub-research questions are posed:

- (1) Are the provinces of Türkiye spatially clustered regarding the total EU budget allocated to support the (metropolitan and provincial) municipalities' projects?
- (2) Where are the clusters observed across the provinces in different time periods?
- (3) Are there spatial clusters among the Turkish provinces regarding the prioritized SDGs in the EU-funded (metropolitan and provincial) municipal projects?
- (4) Where are the clusters observed in Türkiye regarding the prioritized SDGs?

To address these questions, this thesis aimed to create a spatial database that shows the year of funding, implementation area (province) and prioritized SDGs of all EU funded municipal projects in Türkiye between the years 2008 and 2022. Here, it is important to note that the creation of such a database was a challenging and time-intensive process. There were various limitations in accessing data on the EU-funded municipal projects in Türkiye, which are detailed in Chapter 3. These limitations shaped both the questions posed in this study and its methodology. Spatial clustering analyses are conducted using GIS tools. As a result of the geostatistical analysis, the budgetary clusters are mapped to reveal their spatial traces and geographical trends.

#### **1.4 The Contributions of the Study to Research and Practice**

This study aims to contribute to the practice and literature with a unique perspective on SDG contribution assessments of EU-funded municipal investments through grants using GIS tools and statistical methods. The expected contributions can be described as the following: the practice phase of planning investments and managing

their SDG contributions, the studies on EU financial assistance to Türkiye, and the studies on SDGs and their relations to GIS applications.

First, in the practice phase of managing investments, spatial plans, investment programs and development strategies form the fundamental framework of the SD path. In addition to the implementation stages, there is a monitoring and evaluation process in the practice phase. These phases may be held more economically, precisely, quickly and efficiently in realizing SDGs with the benefit of GIS applications. However, there is a gap in practice due to the deficiency of available and accurate integrated geographic data and also limitations in the understanding of geographical perspectives in the field. In this framework, this study aims to create a geostatistical basis for assessing SDG contributions in the case of EU-funded municipal projects. Moreover, the study's outcomes display the current spatial distributions of the investments on a national scale, which provides valuable input to the decision-making process for regional development strategies and plans.

Secondly, there are voluminous studies about EU financial assistance to Türkiye (see, e.g., Ada, 2015; Çınk1, 2020; Durukal, 2013; Erdođan and Aslan, 2021; Girgin, 2018; Kösecik and Akbař, 2009; Tekin et al., 2022). However, these studies are limited in their understanding of the spatial dimension and reflections of these investments. Therefore, this study aims to contribute to the existing research by adding a spatial dimension to the topic with the use of GIS tools.

Finally, studies on the benefits of GIS applications reflect a current search regarding the geographical dimension of SDG contributions (see, e.g., Acharya and Lee, 2019; Avtar et al., 2020; Erdođan and Aslan, 2021; Tekin et al., 2022). In this context, studies include different approaches for geospatial analyses that can be applied specifically to SDGs. These approaches include various analyses based on the subject at different scales in different concepts such as target basis, indicators based on presented baselines, project-specific, sector-specific, and so on. This thesis aims to contribute to this research area, which can still be considered a development laboratory, based on internationally funded projects carried out locally. In the study,

the spatial clustering of the investments made by the municipalities with the financing of the EU on a national scale was obtained with GIS tools. Hence, this study aims to open a new window for further research studies by proposing a method to explore the spatial clustering of the prioritized SDGs and EU funded budgets allocated across the provinces to support municipal projects with SDGs.

## **1.5 The Configuration of the Thesis**

This study is constructed on five interrelated chapters. In this chapter, Chapter 1, after providing a brief introduction about the problem, the author briefly explains the motivation behind the questions posed in this thesis. Next, it listed the questions posed in the thesis, and discussed the contributions of this thesis to the gaps in knowledge.

Chapter 2 provides a review of the literature to inform the readers about the concepts/variables that are examined in this thesis and the relationships between these variables. This chapter is organized into six sub-chapters. First, the meaning and evolution of the development, sustainability and glocalization paradigms, which form the basis of the thesis, are examined. Afterward, the historical development of the concept of SD, which is the premise of the study, and the SDGs are explained in detail. SD in the EU and EU-Türkiye Financial Cooperation are discussed to understand the financing provided to Türkiye by the EU, which has been determined as the field of study. In order to understand the situation of municipal projects, which is the sample of the study, in the country, the administrative structure in Türkiye is explained and the access of local authorities to international financing is mentioned. A review of the role of GIS applications utilized in the study in the monitoring and evaluation processes of SDGs is presented. Finally, the author discusses the information obtained as a result of the literature review in the context of the foci of the study.

Chapter 3 focuses on the conducted methodology of this study while answering the research questions. This chapter is divided into two sections. The first sub-chapter explains the research design. In this section, the principal components of the research and the limitations of the employed methodology are discussed. The overall overview and flowchart of the to-be-applied approach are then presented, and the route to be followed is clarified. In the initial phase of this methodology, the datasets and data gathering techniques are described. The pre-analysis is then explicated. The chapter ends with an explanation of the data analysis processes.

In Chapter 4, the results of the analysis applied in line with the methodology determined for the study are presented in detail with visuals and numerical values under sub-headings parallel to the research questions. The chapter concludes with a final section titled "Concluding Remarks" summarizing the results of the analysis.

In Chapter 5, the preceding chapter's findings are analyzed and discussed within the context of this investigation. To address the thesis's research questions, derived findings are provided. The chapter concludes with implications and recommendations for future research and practice.



## CHAPTER 2

### LITERATURE REVIEW

This section aims to provide an overview of the intellectual accumulation obtained in the literature that overlaps with the framework of the study. The chapter consists of five sections. It starts with a summary of the paradigms of development, sustainability and glocalization on which the study is based. Then, an overview of the basic principles, the historical flow of the SD approach and components of the “2030 Agenda” and SDGs are presented. After the explanation of the aforementioned general principles of SD, historical breakpoints and the global agenda, the EU’s approach to SD and its financial cooperation processes with Türkiye are addressed. Further, Türkiye’s stance on SD, the position of local administrations in the administrative structure and municipalities’ access to external financing are examined. Finally, in order to understand the relationship of GIS with the SD approach, the general structure and role of GIS are introduced and the progress that has been made in measuring and monitoring SDGs utilizing GIS is outlined. As a result, the chapter concludes with concluding remarks about the conducted literature review by the author.

#### **2.1 Understanding the Concepts of Development, Sustainability and Glocalization**

*“Misnaming the things adds unhappiness to the world’s misery.”*

Albert Camus (1913-1960)

This section examines the key ideas of development, sustainability, and glocalization in the literature one by one, which form the thesis’ essential foundation. It aims to

provide the substance, components, and dimensions of these three notions to grasp their traces in the global agenda and the actions taken for the SDGs. Since it is studied in detail in subsequent sections, this section focuses on the fundamentals of notions, not the progress made after the birth of SD.

### **2.1.1 Development**

The term development focuses on the advancement of the standard and quality of life for individuals as well as the enhancement of the overall welfare of society. More specifically, it refers to improvements in managing an area's natural and human resources to generate wealth and improve people's lives. In other words, it refers to the coexistence of all qualitative and quantitative positive improvements that occur in a country (Sevinç, 2011), which may be also considered as a dynamic concept that proposes to engage in change, starting from the present condition or the prior position (Oakley and Christopher, 1985).

Considering the definition of development, the term appears straightforward to comprehend; yet, it is not, and it may be said that it takes on several forms in practice due to its intricate structure and broad breadth. The concept has been intertwined with concepts such as industrialization, modernization, progress, growth and structural change, which have similar meanings. (Yavilioğlu, 2002). Thus, it has been used instead of them over time and naturally, has undergone a shift in meaning.

Each development theory is implicitly and explicitly based on different dimensions or layers (Pieterse, 2009a), so the meaning of development has changed over time, as Table 2.1 illustrates, under various themes and perspectives in accordance with societal circumstances (Durukal, 2013; Sevinç, 2011; Tolunay and Akyol, 2006). While the notion of development meant "economic growth" formerly, it gained the content of "social welfare" later, and began to be measured by "quality of life" in the last quarter of the 20<sup>th</sup> century (Durukal, 2013). Although development expresses distinct meanings at different times depending on the characteristics of the era, it is

also seen that the concept has different meanings in the same periods (Gitmez, 2013; Yavilioğlu, 2002).

Table 2.1 Meanings of development over time.

<b>Period</b>	<b>Perspectives</b>	<b>Meanings of development</b>
1800s	Classical political economy	Remedy for progress, catching up
1850s	Latecomers	Industrialization, catching up
1870s	Colonial economics	Resource management, trusteeship
1940s	Development economics	Economic growth - industrialization
1950s	Modernization theory	Growth, political and social modernization
1960s	Dependency theory	Accumulation – national, auto-centric
1970s	Alternative development	Human flourishing
1980s	Human development	Capacitation, enlargement of people’s choices
1980s	Neoliberalism	Economic growth – structural reform, deregulation, liberalization, privatization
1990s	Post-development	Authoritarian engineering, disaster
2000s	Millennium Development Goals	Structural reforms

Source: (Pieterse, 2009a)

Decades of debate on this topic have resulted in various theoretical and literature research. The profusion of literature studies notwithstanding, the substance of the notion of development is still not entirely obvious and understood (Akgış and Karakaş, 2019; Yavilioğlu, 2002). It may signify different things in different contexts. These differences are unavoidable because of the development theorists’ political stances, the peculiarities of the milieu in which they create their arguments, and the distinctions in their daily lives, which make it improbable that there is a common understanding of development (Peet and Hartwick, 2015).

While there are several definitions and theories of development, it is reasonable to state that there are essentially two approaches to this subject from a reductionist perspective. The first, known as the conventional approach, suggests that development is a material process dependent on economic growth, whereas the second asserts that it is beyond economic growth (Akgış and Karakaş, 2019).

The first one which is named as conventional approach, emerged in the 1940s and the first half of the 1950s, during which the concepts of economic growth and development were not differentiated much, and the rapid increase of national income was prioritized (Han and Kaya, 2002). In this respect, to be more precise, an important dimension of development refers to growth in per capita (Gross Domestic Product, GDP) (Szirmai, 2005). Thus, it is crucial to base the concept on economic development in order to understand the meaning of development in the conventional approach. Economic development was created based the theories like “*Big Push*” (Rosenstein-Rodan, 1943), “*The Harrod-Domar Equation*” (Domar, 1947; Harrod, 1948), “*Unlimited Supply of Labor and Dual-sector Model*” (Lewis, 1952), “*Balanced Growth*” (Nurkse, 1953), “*Stages of Growth*” (Rostow, 1956) and “*Critical Minimum Effort*” (Leibenstein, 1957). These approaches are based on the idea that people’s welfare and happiness will increase by producing goods and services that people need in an advanced economic structure (Tolunay and Akyol, 2006). It was also assumed that the trickle-down effect of growth would lead to an equitable sharing of benefits, resources and opportunities in society.

The conventional understanding of development, which continued its existence until the 1970s, has undergone significant criticism and changes with the argument that the development of societies should be addressed not only from an economic point of view but from multidimensional aspects (Özçağ and Hotunluoğlu, 2015). In particular, these criticisms focus on the central argument of this mechanism, which is that even if economic growth is accomplished, income disparity persists and most people remain impoverished (Brauch, 2008).

Further, the social and spatial dimensions of the concept have also started to be discussed in the studies. Hence, spatial distribution and geographical features have taken their place in the equation parameters of “social capital” and “natural capital” with the inclusion of justice on the agenda of SD discussion. These advancements have led to alternative approaches based on the idea that development goes beyond economic growth. These alternative approaches focus mainly on three dimensions in

addition to the economic one in the causal relationship: the political, environmental and socio-cultural dimensions.

The first important pillar of the alternative development approaches is the political economy perspective discussed by Manuel Castells, Henri Lefebvre and David Harvey in the late 1970s (Akgiş and Karakaş, 2019). These mainly focus on equal welfare distribution and emphasize the significance of the management style of the capital obtained.

The second pillar was shaped within the framework of the ecological worldview, which emerged after the understanding that environmental problems began to pose serious threats in the 1960s (Hallegatte et al., 2012). In this context, “green growth” emerges as an alternative theory to traditional economic growth. While the science of economics is not concerned with the limit and exhaustion of resources and the problems that may cause in the long run (Başkaya, 2000); without necessarily reducing development rates, green growth focuses on making them more efficient with resources, cleaner, and more adaptable to environmental stresses (Hallegatte et al., 2012). These approaches are based on the idea that economic production and development directly depend on the stock of natural resources and environmental quality and also argue that people’s well-being is inseparable from their environment (Dasgupta and Heal, 1974; Malthus, 1965; Nordhaus, 1974; Smulders, 1994; Solow, 1974).

The third one is the socio-cultural pillar that are human-centric perspectives. In this respect, development emphasizes the humane improvement of the lives of society as well as the improvement of the welfare of the countries (Sen, 1981). The concept covers points such as guaranteeing basic human rights and allowing people to make choices of their own free will (Eyilik, 2019). In addition, these views claim that one of the most important determinants of development depends on the efficient use of existing opportunities by society members to capture the current potential (de Kruijf and van Vuuren, 1998).

Although the focuses and emphasizes of the alternative development approaches are different, all of them intersect in that the concept of development is not just economic growth but goes beyond it (Akgiş and Karakaş, 2019; Tolunay and Akyol, 2006). In addition to these distinct approaches, some integrated, multidimensional development approaches cross-cutting all of these pillars were created, such as SD. The most widely used and accepted definition for SD was expressed in the Brundtland Report prepared by the World Commission on Environment and Development (WCED) in 1987 as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs” (Eryılmaz, 2011; Girgin, 2018). As defined by the Brundtland Commission, “development involves a progressive transformation of economy and society” (Jabareen, 2008) and this progressive transformation must take place on a multidimensional plane.

Moreover, the rights regarding development processes have been documented universally. One of them is the recognition of the right to development by the General Assembly in 1986. This right is included in the UN Charter and the Universal Declaration of Human Rights (Eyilik, 2019). According to Article 1 of the Declaration, the right to development is an inalienable right. Additionally, Article 2 states that every individual and person has the right to participate in, contribute to and benefit from economic, social, cultural and political development (B. Aral, 2001). Therefore, the importance of the concept of development has been clearly recorded, and in this direction, the necessity of meticulous handling of processes such as monitoring, evaluation and management of development has reached an uncompromising status.

In addition to the concept of development being multifaceted and multidimensional, it is also seen that it differs in different scales that are cross-cutting to these dimensions. Examples of this scale differentiation can be given as global development, regional development, national development and local development, etc. Even though the concept concentrates on different components depending on the context in which it is addressed, it is crucial to establish a universally accepted and

applicable framework for development (Akgiş and Karakaş, 2019). Indeed, as a global development strategy, Millennium Development Goals (MDGs) in 2000 (Sachs, 2012) and SDGS in 2015 (Vinuesa et al., 2020) took their place on the global agenda. The important point here is that the management processes of the search for the good should be handled locally in an effective and efficient way within the framework of a holistic universal development understanding.

### **2.1.2 Sustainability**

The root of the notion of sustainability concept lasts long the Latin term “subtenir” which means “to protect” or “to support from below” (Özlem, 2014). In English, “As the primary definition, the sustainability word is defined as ‘ability to be kept, supported or resigned at a location or level’ in the dictionary definitions.” (Oçak, 2018). As it can be understood from the meaning of this dictionary, sustainability can vary from the most specific to the most general, depending on the context in which it is used, and unsurprisingly, it makes the phrase used with its enricher. As a matter of fact, in today’s world, it has found its equivalent in daily life and has turned into an indispensable complementary concept in almost all sectors and all processes.

To link the idea of sustainability with the notion of development, it is advantageous to construct its theoretical framework inside a system based on human activities. Two definitions that meet this framework would be illuminating from this perspective. According to Stoddart et al. (2011), sustainability is the efficient and fair allocation of resources intra-generationally and inter-generationally in conjunction with the functioning of socioeconomic activities within the constraints of a finite ecosystem. Ben-Eli (1980), on the other hand, defines sustainability as a state of dynamic balance between a growing population and its impact on the carrying capacity of its environment, such that everyone may flourish and contribute to society without compromising future generations’ ability to enjoy a high quality of life.

Due to the multidimensional nature of the concept of sustainability, many disciplines that study this subject have created diverse approaches and definitions (Yeni, 2014). However, without conducting a historical review of scientific studies, we may assert that the notion persists across all eras of life due to its inherent character. To illustrate, in ancient times, the definition of sustainability was expressed with a Native American Chief's own thoughts with the phrase "The earth was not inherited from our ancestors, we borrowed it from our offspring" (Karaca, 2007). Also, it is understood from the phrase of Grober, (2012, p.15) that the term sustainability is a natural part of life: "The idea of sustainability is neither an abstract theory dreamt up by modern technocrats nor a wild fantasy hatched by Woodstock-generation eco-freaks...It is our primal world cultural heritage".

It is crucial to touch on the main breakpoints in the historical development of the term since it has not always had such significant connotations. The concept of sustainability was initially formulated by a German forester named Hans Carl von Carlowitz in his 1712 book "*Sylvicultura Oeconomica*" to outline the best practices for forest management over the long run (Girgin, 2018; Scoones, 2007). Nonetheless, it can be stated that the concept had a wider impact with the environmental movements after the 1960s. In this period, Rachel Carson's book named "*Silent Spring*", published in 1962, referred to the fact that the continuation of our lives will be ensured by the continuation of ecosystems (Kelbaş, 2021). The ideas set forth in this book appear as a milestone in raising awareness of the fact that the environment is everyone's responsibility through a sustainable world. According to Beder (1994), the first wave of contemporary environmental movements that emerged in this period turned from traditional concern for the protection of nature to awareness of a possible global environmental crisis.

Although the word transformed to broader meanings over time, the term sustainability did not become widely used until the 1980s. The concept of sustainability was first formally included in the "*World Nature Charter*" document, accepted by the "International Union for the Conservation of Nature (IUCN)" in 1982 (Yazar, 2006). The studies carried out after this period raised awareness about



the concept of sustainability and sprouted another related concept “intergenerational justice”. As a result of these discussions, the search for a sustainable life formed the background of the most important criticisms of the concept of development and led to the emergence of the concept of SD.

The concept has undergone many semantic evolutions in the scope and components of the last quarter of the 20<sup>th</sup> century and the first quarter of the 21<sup>st</sup> century. In this context, studies on understanding the dimensions of the notion have also continued, and as a result, two main conceptual representations of sustainability were created, which are displayed in Figure 2.1. These conceptualizations show the two fundamental approaches of “weak sustainability” (Figure 2.1.a) and “strong sustainability” (Figure 2.1.b).

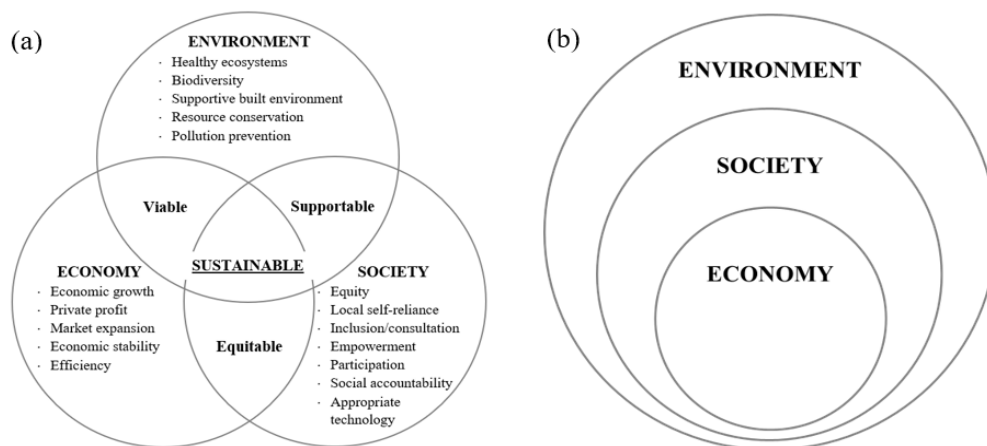


Figure 2.1 Schematics illustrate the two concepts of sustainability: (a) weak sustainability and (b) strong sustainability (Cheng and Hu, 2010).

The weak sustainability model assumes that the three components of sustainability, namely the economic, social, and environmental dimensions, are intertwined. Accordingly, each dimension has its unique driving forces and goals: the economy is primarily geared toward enhancing human welfare, primarily through increases in the supply and consumption of goods and services; environmental protection focuses on the integrity and resilience of ecological systems; and social development emphasizes the enrichment of human relationships and achievement of individual

and group aspirations (Munasinghe, 2001). The most significant objection to this paradigm is that it believes natural capital is interchangeable and can be quantified monetarily. Strong sustainability, on the other hand, is characterized in terms of continual environmental quality and the recognition that human civilization and economic activity within it are completely bound by the natural systems of the planet (Hediger, 1997; Pearce et al., 1994). However, this approach is criticized for failing to address the conflict between social, economic, and environmental sustainability.

The conceptualization of weak sustainability, a typical representation of sustainability as three intersecting circles, has gained widespread traction (Purvis et al., 2019). Accordingly, the most widely accepted idea of sustainability today is based on this approach. Thus, it is believed that sustainability may be realized at the place and time when environmental, economic and social dimensions are developed together. In other words, in order to ensure sustainability; in the decision-making and policy-making activities, it is crucial to pay attention that the goals and objectives are in harmony with all three dimensions (Keskin, 2012). This is reflected in the SD concept, which aligns with ecological modernization and the weak sustainability premise that “economic development and environmental protection can be combined to a fruitful synergy” (Berger et al., 2001, p.55). Therefore, SD, the development approach on which this thesis focuses, and the globally recognized SDGs are shaped from a weak sustainability perspective.

### **2.1.3 Glocalization**

Changes and revolutions that have begun to be experienced, particularly in the realms of transportation and communication technology, have brought a common life beyond borders with the unifying effect of these developments. Globalization, which has made the world a “global village” according to the definition by McLuhan (1962), has rapidly permeated all spheres of life. The fact that consequences of processes occurring somewhere else are experienced concurrently in distant locations, especially in today’s world when global crises are more severe clearly

proves that globalization is neither an economic nor a political fiction. This process, in which the fragmented perception of time-space was abandoned, formed the basis for a re-discussion of all the usual phenomena and perceptions.

Pieterse (2009b, p.7) claims that “Globalization is like a prism in which major disputes over the collective human condition are now refracted: questions of capitalism, inequality, power, development, ecology, culture, gender, identity and population, all come back in a landscape where ‘globalization did it’ like a flag word globalization sparks conflict”. This sparked conflict is mainly concentrated at two extremes. For the first extreme, globalization appears to be a common development ground in which “colorfulness will emerge” (Mangani, 2020), while for the other, it is a tool for the formation of a new dystopia where differences and identities will vanish. This intellectual chasm has been integrated into platforms where the concepts of “globalization” and “localization” are discussed together, and as a result, both concepts have evolved and gained new appearances. The WB argued in its 1999-2000 report that both globalization and localization are inevitable and that a country’s prosperity in the 21<sup>st</sup> century depends on how successfully it can manage these twin forces (Tunçer, 2012). In light of this approach, it can be stated that glocalization, which puts the balance between these twin forces on a conceptual basis, eliminates the fears brought by globalization and opens a new window to the closure of localization.

Giving a general definition for both terms will help to understand this relationship better. Globalization can be defined as the spread of economic, political, social and cultural values and the accumulations formed within the framework of these values to the whole world by going beyond national borders (Parlak, 2003, p.353). For the generally accepted definition of localization, the statement of WB is “transferring the responsibility and authority for public activities from the central government to provincial and local authorities, or to semi-autonomous public institutions or to the private sector” (Kaya and Atalay, 2020).

Although globalization and localization may seem like two diametrically opposite concepts at first glance, there is actually a dialectical relationship between them (Derin, 2019; Durukal, 2013; Kaya and Atalay, 2020; Khondker, 2004; Tunçer, 2012). This relationship can be expressed as the localization of the universal on one side of the globalization process and the universalization of localities on the other (Tunçer, 2012, p.136). So much so that the more globalization takes place, the more localization will occur (Tunçer, 2012).

One of the most important developments in which the global and the local were handled together took place in 1992 in Rio. With Agenda 21 decided at the “UN Conference on Environment and Development” held here, the concept of localization has become a national target defined at the international level around the principle of conducting local affairs with the participation of the people (Arap, 2004, p.159). It can be said that two basic factors are effective in determining the importance of local authorities on a global scale (Zibel, 2004):

- (1) The idea that local authorities are effective actors and indispensable conditions of democratic structure.
- (2) Local authorities are seen as administrative units that can provide direct and inexpensive services to the public and enable public participation.

Glocalization, which is a fairly new concept, is derived from the combination of the words “global” and “local” (Derin, 2019). The origin of this term, which is short for global localization, is based on the Japanese word “dochakuka” (Durukal, 2013; Khondker, 2004; Okudan, 2019). Then, “glocalization” as a term was first introduced to sociology by American sociologist Roland Robertson. According to Robertson, in today’s world, there is neither global nor local; glocalization is a new argument rising from the ashes of the ideas of globalization and localization and the only reflection of existing reality (Derin, 2019). The concept of glocalization is not only a simple reflection field of the real or a concept that constitutes the passive pole of the global but also a determinant that produces answers and has the ability to synthesize with the global and local.

The concept of glocalization has become widespread by being positioned around the slogan “think globally, act locally”. Although the slogan in question is a popular cultural term, it is a socio-political concept and expresses the simplest definition of glocalization. Accordingly, “transnational institutions and organizations can meet the requirements of adapting to local conditions by following global policies and acting according to local conditions” (Olgun, 2007, p.112).

Localization of commonly and globally used techniques by adapting them to local conditions constitutes the basis of glocalization (Durukal, 2013). Glocalization is similar to the key arguments of a sophisticated form of globalization, and it consists of five fundamental propositions (Khondker, 2004, p.5):

- (1) Diversity is the essence of social life.
- (2) Globalization does not erase all differences.
- (3) Autonomy of history and culture gives a sense of uniqueness to the experiences of groups of people, whether we define them as cultures, societies or nations.
- (4) Glocalization is the notion that removes the fear from many that globalization is like a tidal wave erasing all the differences.
- (5) Glocalization does not promise a world free from conflicts and tensions but a more historically grounded understanding of the complicated yet pragmatic view of the world.

Mangani (2020) claims that glocalization will contribute more to SD in the 21<sup>st</sup> century than globalization. Similarly, UN-Habitat (2022) argued that “more than 65% of the SDG targets are related to the work and mandate of local governments”. Therefore, it could be stated that “local action and local leadership are critical to addressing the current global crises and fostering sustainable recovery and development” (UN-Habitat, 2022). This situation, in line with the glocalization approach, emphasizes the importance of the local in global development scenarios. Hence, it shows that the studies on the SDGs cannot be separated from the glocalization approach.

The main focus of this study is directly related to glocalization at the four key nodes. The first of these is the global SDGs that emerged as a natural result of globalization. The second is the EU, a supranational unit that has emerged as one of the administrative units restructured by globalization. The third is the EU's financial assistance to Türkiye as a form of international cooperation that has sprouted up within the framework of global responsibilities. The last one is the municipal projects that characterize the local actions. In summary, the monitoring and evaluation of the global goals brought about by globalization in the project investments of the local administrations, which are supported by cross-border collaborations, fully coincide with the glocalization approach. Therefore, this study deals with a subject that can be considered one of the best applications of the glocalization approach in life.

## **2.2 Toward Sustainable Development: Signals of Change**

This section seeks answers to the fundamental questions that formed the thesis' main argument: what SD is and how it has evolved historically, how international cooperation and financial support fit into the realization of SDGs, why local actions will play an essential role in this process, and how GIS-based methodologies relate to the monitoring and evaluation of SDGs. Nonetheless, because the EU's work in relation to international finances, local authorities in Türkiye regarding local actions, and SD-GIS integration in relation to GIS will be discussed in the following sections, in this section they will merely be investigated within the scope of their involvement in the SD concept.

### **2.2.1 The Paradigm of Sustainable Development**

#### **2.2.1.1 Formative Basis and Assumed Meaning of the Concept**

Nobel Prize winner Paul Crutzen, one of the discoverers of the chemistry behind ozone depletion, leads to coin the term "Anthropocene" to refer to the anthropogenic

era of the planet (Sachs, 2012). In this context, the relationality between planetary boundaries and human activities is deepened. At the crux of the debate is the idea that human activities are pushing important global ecosystem functions beyond a dangerous threshold, beyond which the world could face sudden, highly non-linear and potentially catastrophic consequences for human well-being and life in general. The fact that the Anthropocene period, which corresponds to a very short period of universal existence, has created such a deep process of destruction is an important self-critique of humanity's living practices.

People became more conscious of the cost of the conventional development approach to the earth in the second half of the 20<sup>th</sup> century as a result of rising ecological risks and disasters, and a new ethically justifiable paradigm was required (Pisani, 2006). The basic premise of this requirement is that if the biosphere is unable to support development based on economic growth, then development, and even life itself, will be truly unsustainable. In the process of seeking solutions to these concerns, the concept of SD was put forward as an alternative growth method in the face of the possibility of economic zero-growth due to ecological limits. Within this alternative methodology, the emerging consensus for progress, growth and development was that for development to be sustainable. Additionally, it must "improve economic efficiency, protect and restore ecological systems, and enhance the well-being of all people" (Pisani, 2006, p.93). In this context, SD meant balancing growth's limit with the requirement for development (Mitcham, 1995). In other words, it points to a life that generates, not a life that consumes.

All definitions of SD in the literature share common foci, such as intergenerational justice, the importance of natural resources, and the elimination of poverty. Freeman and Soete (2003) define SD as an economic system that transfers the needs of present generations to future ones without making natural resources non-renewable and without irreversibly destroying the environment. This definition reflect the idea that current trends in the development process cannot be sustained for a long time, and at the same time emphasizes the necessity of balancing the needs of future generations with the needs of the present (Altiok, 2014).

Growing populations and indirectly increasing demands are putting unprecedented pressure on the world's ecosystems. It can be stated that the concept of SD offers hope against extinction and destruction. This hope is mainly based on the fact that SD does not close the door to technological innovation and wealth. Also, social inclusion within the SD framework has enabled it to be adopted by different groups. From this perspective, it has become the slogan of international support organizations, the jargon of development planners, the subject of conferences and academic papers, etc. (Ukaga et al., 2011).

There is a flip side to the widespread use of the concept by various groups. As a matter of fact, the concept has brought along a paradox in itself. On the one hand, "sustainability" is seen as a property of a process or situation that can be maintained indefinitely. "Development", on the other hand, is an environmental change that requires deep intervention in nature and depletes natural resources (Jabareen, 2008). Thus, SD has not been fully embraced by both sides of the growth and conservation debate, especially by those representing the extremes. Because it was created as a response to the zero-growth option, it skewed favorably towards growth and modernization, which was a major factor in its failure to gain widespread acceptance (Pisani, 2006).

The concept of SD has been subjected to criticism by different groups in different contexts. It is useful to highlight three of these criticisms. One issue was that it served neoliberal interests by remaining silent on the concept of economic development and failing to adequately criticize consumer culture (Euractive, 2002, as cited in Pisani, 2006). Second, conservative critics have interpreted sustainability as a stagnation that is insufficient to meet the demands of a growing population (Mitcham, 1995). Third, some free-marketeers have said that SD policies are pointless since humans can figure out solutions to growth and development problems on their own (Euractive, 2002, as cited in Pisani, 2006). Despite all these criticisms, it is seen that the steps taken in light of this concept today allow for promising advancements.



### 2.2.1.2 Three Dimensions on Which the Concept Founded

The Brundtland Report characterizes SD as a process of change (WCED, 1987). In other words, SD is the process of creating a set of opportunities that will enable individuals and society to realize their aspirations and potential in a sustainable timeframe, while maintaining the resilience of economic, social and environmental systems (Islam et al., 2003). Therefore, SD achieves the integrity of meaning on a three-legged plane.

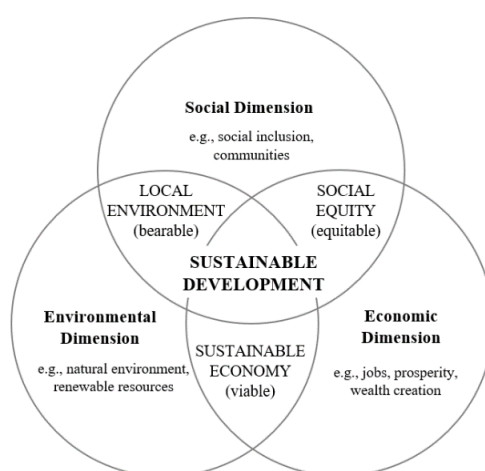


Figure 2.2 Dimensions of SD (Leat et al., 2011).

These dimensions, visualized in Figure 2.2, are the economic, social and environmental dimensions of SD, which overlap with the weak sustainability approach shown in Figure 2.1, although the terms have changed slightly. The three dimensions of SD can be briefly explained as follows (Gürlük, 2010):

- (1) A system is economically sustainable if it can generate commodities and services on a sustainable basis, avoids sectoral imbalances that affect agricultural and industrial output, and maintains domestic and external debt levels in a manageable manner.
- (2) A socially sustainable system assures adequate and fair distribution of social services such as education and health, as well as gender equality, political accountability, and participation.

- (3) An environmentally sustainable system should avoid the exploitation of renewable resource systems or environmental investment functions, keeping the resource base constant and consuming only those non-renewable resources that have been adequately replaced by investment. It also includes the protection of biodiversity, atmospheric balance and other ecosystem elements that cannot be classified as economic resources.

The interlinkages between economic, social and environmental dimensions are as important as their holistic approach to SD. Moreover, these three dimensions will depend on a fourth condition: good governance at all levels; local, national, regional and global (Sachs, 2012). According to Fukuyama (2013, p.350), governance is a “government’s ability to make and enforce rules, and to deliver services, regardless of whether that government is democratic or not”. That is why good governance is stated as the coordination of a political response to a set of challenges that is promised by SD and it is how SD is built. In this context, providing a holistic and integrated framework for good governance is an indispensable part of successfully addressing all dimensions of SD for the construction of the future and avoiding potential setbacks.

### **2.2.2 Origins and Evolution**

There are two main driving forces behind a new development strategy based on the consequences of the unprecedented period of industrial and commercial expansion after WW-II. These are the ecological crises arising from the negative interventions of industrial society in nature after the Industrial Revolution and the social divisions resulting from the unequal distribution of wealth. In connection with these problems arising from this expansion, people have grown more aware of the hazards that are related to rapid population increase, pollution, and resource depletion.

From the 1960s onwards, several books were published, such as Carson's *"The Silent Spring"* (1962), Ehrlich's *"The Population Bomb"* (1968), Goldsmith's *"A Blueprint for Survival"* (1972), Schumacher's *"Small is Beautiful"* (1973) about chilling scientific information about the damage to the natural environment caused by human activities (Pisani, 2006). These books shocked a wide audience. They raised awareness of the environmental dangers posed by economic growth. They pointed out that economic growth could endanger the survival of the human race and the planet. In short, a growing body of scientific literature has expressed worry that if we maintained our current behaviors, our living circumstances would deteriorate steadily, and humans may ruin the planet's ability to support life. This fearful outlook on the environment paved the way for SD as an alternative to unbridled economic growth and as a new way of thinking about development.

Ecological disasters have received a lot of media coverage. The "Green Movement" started and environmental groups became more outspoken and the idea has had a great resonance in public opinion (SD Gateway, 1999, as cited in Pisani, 2006). Nonetheless, after the first oil crisis in 1973, which revealed the potential consequences of resource scarcity, there was a worldwide recession and the prospects for unlimited economic growth diminished. The possibilities for SD were bolstered, and the mainstream theoretical framework and knowledge of SD were established via a series of international conferences and efforts between 1972 and 1992, mostly spearheaded by the UN (Adams, 2009).

The evolution of SD is visualized in a timeline that includes the core turning events and publications in Figure 2.3. In this visualization, the global goals, global initiatives, reports, books and other writings, peer-reviewed articles and crises affecting the process defined for SD are categorized and presented. For events that recur periodically, such as the "UN Climate Change Conference (COP)" or "UN-Habitat Conference" series, only the start dates are included. In order to provide a snapshot of the key points in the development of the concept, the author has included those developments.



Figure 2.3 The core turning events and publications in the evolution of SD.

Note: Figure in this review has been originally produced by the author with reference to the information retrieved from Estoque (2020), Güldüren Özcan (2019), Mensah (2019), Pekiştiricioğlu (2016), Scott and Rajabifard (2017) and Serrat (2012).

The first comprehensive warning came in 1972 in the Club of Rome's report "*Limits to Growth*" (Pekiřtiriciođlu, 2016). According to the results, humanity is under threat if current policies and habits under the influence of overconsumption and overpopulation continue (Güldüren Özcan, 2019).

In 1972, the "UN Conference on the Human Environment" (also known as the "Stockholm Conference"), was held in Stockholm, was the first major discussion on environmental sustainability issues globally (Eryılmaz, 2011; Mensah, 2019; Pekiřtiriciođlu, 2016; Pisani, 2006; Scott and Rajabifard, 2017). This conference was a watershed moment in the evolution of international environmental policy, as it emphasized the need for all nations to make the protection and restoration of their natural resources a priority alongside economic and social concerns. It emphasizes the management of the environment for the benefit of present and future generations by capturing the core of SD without using the term as a noun (Scott and Rajabifard, 2017).

In 1987, the UN Commission produced the report "*Our Common Future*" (also known as the "*Brundtland Report*"), which laid out the classic definition of SD. This report also advanced the comprehension of global interconnectedness and the link between the economy and the environment (Scott and Rajabifard, 2017). In this report, the concepts of balanced sustainability of the world system and eco-development were evaluated together for the first time, and environmental problems are addressed on the axis of poverty and inequality (Pekiřtiriciođlu, 2016). Thus, the report emphasized that environmental protection is inextricably linked to economies and people and drew attention to the necessity of global cooperation, stating that SD is only possible through joint efforts (Tracey and Anne, 2008).

In 1992, 20 years after the "Stockholm Conference", the "UN Conference on Environment and Development" (the "Earth Summit") held in Rio, was one of the most critical meetings in the advancement of the SD concept (Eryılmaz, 2011). At this summit, the next period was named the "Age of Sustainable Development". After this conference, SD was adopted as a global development strategy (Akgül,









2010). More than 178 governments accepted the “Rio Declaration” on environment and development as well as “Agenda 21”, a worldwide SD action plan (UN-GGIM, 2011). Additionally, the world community has acknowledged that SD has three pillars - environmental, social, and economic - and that each pillar has its own information requirements (UN-GGIM, 2011). With this conference, the scope of the concept has broadened considerably and it has gained a place in the fields of many disciplines.

In 1997, the “Kyoto Protocol” was adopted by 192 parties. It makes the “UN Framework Convention on Climate Change (UNFCCC)” a reality requires industrialized nations and economies in transition to limit and reduce their greenhouse gas (GHG) emissions in line with agreed individual targets (UNFCCC, n.d.-b). The sole obligations placed on these nations under the convention are to implement mitigating plans and actions and to submit periodic reports.

In 2000, the UN General Assembly held the “Millennium Summit” in New York to capture a unique and symbolically powerful opportunity for a vision of globalization as a constructive force for all of humanity (Scott and Rajabifard, 2017). All delegates agreed that the global strengthening of the principles of human dignity, equality and prosperity is a shared responsibility of the world community. They declared their unanimous agreement to achieve improvements in the world’s economic, environmental and social conditions - the three dimensions of SD - by 2015 and unanimously declared the Millennium Declaration (Pekiştiriciöglü, 2016). This points to a historic and effective method of global mobilization (Sachs, 2012).

As a result of the “Millennium Summit”, the “Millennium Development Goals (MDGs)” are a collection of eight goals to end extreme poverty by 2015, with corresponding targets and indicators (see Table 2.2). The MDGs are the first global step, as is commonly agreed, which helps to promote global awareness, political accountability, improved measurement, social feedback and public pressure in the scope of SD.

Table 2.2 MDGs, their definitions and the number of targets (T) and indicators (I).

MDG	Definition	T	I
	Eradicate extreme poverty and hunger.	3	9
	Achieve universal primary education.	1	3
	Promote gender equality and empower women.	1	3
	Reduce child mortality.	1	3
	Improve maternal health.	2	6
	Combat HIV/AIDS, Malaria and other major diseases.	3	10
	Ensure environmental sustainability.	4	10
	Develop a Global Partnership for Development.	6	16
<b>Total number of Targets (T) and Indicators (I)</b>		<b>21</b>	<b>60</b>

Source: (UNStats, n.d.)

In 2002, the “World Summit on Sustainable Development (WSSD)” (known as “Rio+10”) was held in Johannesburg to review the progress made in implementing the outcomes of the “Rio Earth Summit” (Mensah, 2019). It has led to a significantly increased focus on development issues, in particular the integration of MDGs with SD principles and practices. This summit identified the challenges that stand in the way of SD and set forward-looking targets and a timetable for work on priority issues such as poverty eradication, health, education, agriculture, access to water and environmental protection (Güldüren Özcan, 2019). Thus, the global commitment to achieving SD has been revitalized at the highest political level (Elliot, 2006). Also, the need to take a holistic approach to SD, which includes the value of having access to high-quality data and information for decision-making processes. The importance of geographic data in this regard was initially brought up in the international SD dialogue (Scott and Rajabifard, 2017).

In 2012, the “United Nations Conference on Sustainable Development (UNCSD) (Rio+20 Summit)” was held. Allen et al. (2018) claim that two main topics, the green economy and institutional framework, were discussed at the conference in relation to SD. This summit was pivotal because it was intended to kick off a new development agenda. “*The Future We Want*”, a focused political result paper, outlined a clear and realistic roadmap for the establishment of a set of SDGs that would expand on the MDGs (Scott and Rajabifard, 2017).

In March 2015, the “Sendai Framework for Disaster Risk Reduction” was adopted. It aims to achieve a substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries by 2030 (UN, 2015a). Therefore, resilience has been placed on the global agenda as one of the key issues for the next 15 years of action to build a better life within the SD approach.

In September 2015, the “UN Sustainable Development Summit” took place in New York and resulted in the publication of “*Transforming Our World: The 2030 Agenda for Sustainable Development*” (Scott and Rajabifard, 2017). This process is based on three main objectives (Eşkinat, 2016). The first is to evaluate the emergence of the process related to the MDGs and the performance in achieving the set targets based on various reports. The second is to clarify the developments that set the framework for the new development approach. The last one is to discuss the priorities that will shape the future development approach based on the periodic differences between development approaches. The “2030 Agenda” sets new global targets for the 15 years after the MDGs. This agenda was adopted with the signatures of 193 member countries, including Türkiye. This new global agenda envisages that by 2030, the same year as the “Sendai Framework”, the development plans and policies of countries will be shaped with an understanding of the principle of human rights for all (Eşkinat, 2016). With the identification of the SDGs, the concept of SD has reached a new dimension that is no longer just about the conflict between the economy and the environment but encompasses basic human needs, climate change,



environmental protection, peace, democracy, fundamental rights and freedoms (Pekiştiriciöğlu, 2016).

In December 2015, the “Paris Agreement”, which is a legally binding international treaty on climate change, was adopted at the annual gathering of parties to the UNFCCC (COP21) (UNFCCC, n.d.-a). It is a milestone in the global climate change process because, for the first time, a legally binding agreement unites all nations in a single effort to battle and adapt to the consequences of climate change. Its primary objective is to keep global warming substantially below 2 degrees Celsius, ideally 1.5 degrees Celsius, relative to pre-industrial levels and to cut emissions by roughly 50% by 2030, which is the same as the target years of the “2030 Agenda” and “Sendai Framework”, with eco-friendly and sustainable methodologies (Falkner, 2016). Thus, an integrated and coherent approach to climate action and SD offers an approach that can enable countries to achieve their goals efficiently and rapidly under the “Paris Agreement” and the “2030 Agenda”.

In conclusion, SD is a burgeoning approach to the search for a solution to a true self-criticism of human history. It is a development strategy that has remained hot and important from the 1960s to the present day, perhaps a strategy that has been most widely adopted by so many different groups. In its discourse, it supports economic growth and technological development that is fairer, resilient to risks and threats, respectful of human rights and environmentally sound. Indeed, it is stated with the motto “Leave no one behind”, which is the central, transformative promise of the “2030 Agenda” for SD (UNSDG, n.d.). In addition to its evolution in the hundreds of academic publications written in it for more than half a century, it has found its way onto the global agenda and has permeated the lives of all societies. Looking at its roots in history and its development in the process, it can be stated that it has acquired a more comprehensive, inclusive, measurable, monitorable and evaluable form. Moreover, the strategy has become more precise with time-bound targets, indicators, and action plans that have been prepared for the near future. Especially after the developments in 2015, it can be asserted that there has been a mobilization for SD all over the world, with global partnerships and financial support provided by

international organizations. At the end of this mobilization, the progress made to date has been reflected in the indicators defined, further strengthening faith in the SDGs.

### **2.2.3 The 2030 Agenda: Sustainable Development Goals**

The SDGs were driven by the widespread recognition that the MDGs have played an important role in progress against poverty, hunger and disease. In other words, world leaders have a consensus that globally agreed-upon goals to fight poverty should continue beyond 2015 (Sachs, 2012). The emerging post-2015 development agenda, with the target year of 2030, claims to make more effective use of the lessons learned from fifteen years of experience (Eşkinat, 2016). This development agenda is an agreed-upon global and unified policy to guide the way people and the planet collectively manage and transform their social, economic and environmental dimensions.

The “2030 Agenda” is supported by 17 SDGs, which include 169 targets and an international framework of monitoring indicators (Scott and Rajabifard, 2017), illustrated in Table 2.3. In general terms, the SD program in line with the SDGs aims to: fight poverty in the world; achieve economic growth; meet many social needs such as education, health, social protection and unemployment; reduce violence against women; bring equality and better quality education for girls and boys; reduce infant mortality; improve public transport and provide quality housing; prevent income inequality; combat climate change and protect the environment more effectively (Pekiştiricioğlu, 2016). Also, the main features of SDGs can be summarized as being inclusive and excluding nobody from the system. While doing so, it is putting sustainability at the center of development; emphasizing green growth and climate change as beyond an environmental issue; relying on global cooperation based on values and principles such as universality; equality, sustainability, solidarity, human rights, the right to development and the ability to take responsibility (Castelao Caruana and Srnec, 2013; Sachs, 2012).

Table 2.3 SDGs, their definitions and the number of targets (T) and indicators (I).

SDG	Definition	T	I
	End poverty in all its forms everywhere.	7	13
	End hunger, achieve food security and improved nutrition and promote sustainable agriculture.	8	14
	Ensure healthy lives and promote well-being for all at all ages.	13	28
	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.	10	12
	Achieve gender equality and empower all women and girls.	9	14
	Ensure availability and sustainable management of water and sanitation for all.	8	11
	Ensure access to affordable, reliable, sustainable and modern energy for all.	5	6
	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.	12	16
	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.	8	12
	Reduce inequality within and among countries.	10	14
	Make cities and human settlements inclusive, safe, resilient and sustainable.	10	15
	Ensure sustainable consumption and production patterns.	11	13
	Take urgent action to combat climate change and its impacts.	5	8
	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.	10	10
	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	12	14
	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.	12	24
	Strengthen the means of implementation and revitalize the global partnership for sustainable development.	19	24
<b>Total number of Targets (T) and Indicators (I)</b>		<b>169</b>	<b>248</b>

Source: UN (n.d.-a)

Considering its scope, content (the MDGs presented in Table 2.2 and the SDGs in Table 2.3 may be compared) and strategies determined in line with these goals, it can be stated that it is the production of a vision far beyond being a continuation of the MDGs (Bilgiç, 2016). This is because the new era was defined as the common agenda of developed, developing and less developed countries, not just developed countries; unlike the MDGs. This will enable more efficient use of resources and access to alternative funds to reach the maximum realization ratio for the 17 defined goals in each part of the world together. In this case, it goes beyond the MDGs and is a common call to action for all organizations related to humanity. In this respect, at the “SDG Summit” in September 2019, world leaders called for a “Decade of Action” and delivery for SD and pledged to mobilize finance, improve national implementation and strengthen institutions to achieve the SDGs (UN, n.d.-b).

Since it is not possible to use a single SD measure for all geographical areas, SDG localization studies have started to be carried out within the framework provided by the SDGs. The country-specific indicators were based on factors such as local preferences, economic activities of interest, limited local resources and resource compatibility (Smutko, 1996). SDG contribution targets were set by countries based on these country-specific indicators, “Voluntary National Review (VNR) Reports” were systematized to track these contributions (UN, n.d.-c). Further, local actions have also found their place in the SDG agenda, as UN-Habitat (2022) states that “success in meeting current and future challenges and steering our world on more sustainable paths will depend on building the capacity of local and regional governments”.

Countries have vastly diverse SDG implementation strategies (Lanshina et al., 2019). Localization of the SDGs has thus far received scant attention. Given the numerous agendas and the complexity of local practice, it is currently unclear how this will be implemented locally (Krantz and Gustafsson, 2021). Furthermore, Fenton et al. (2015) argue that the knowledge deficit regarding the SDG implementation within the extant strategies, policies, and practices of municipalities must be further clarified. Recent publications, such as Krellenberg et al. (2019) and Valencia et al.

(2019) have addressed the localization of the SDGs in cities; however, they have not explicitly focused on integrated approaches to sustainability management in municipal organizations.

There is currently no unified approach to SDG localization. Nonetheless, the "Roadmap for Localizing the SDGs: Implementation and Monitoring at Subnational Level" was developed jointly by the "Global Taskforce of Local and Regional Governments", UNDP, and UN-Habitat to define certain strategies (UNDP et al., 2016). These strategies include the following: awareness raising and/or advocacy, implementation and monitoring. In addition, in order to support the localization of the SDGs, a number of networks have initiated partnerships and platforms that provide guidance on how to introduce the SDGs to the local level. These include the following: "Local2030" (see, Local2030, 2017), "JRC URBAN2030" (see, EC, 2021), "Localizing the SDGs" (see, UNDP, 2019), "Towards the Localization of SDGs" (see, UCLG-MEWA, 2022).

Furthermore, experience in implementing the MDGs clearly demonstrates that effective use of data supports development efforts and enables successful interventions to achieve goals. Accordingly, discussions on the post-2015 development agenda reflect the high need to produce quality data to identify and execute the necessary development policies. A particular emphasis in these discussions has been on the idea that it is easier to achieve goals when there is a sustainable flow of data. These data are required to be readily available, appropriate, of good quality, disaggregated or integrated when and where needed (Eşkinat, 2016). The data quality demands of this new development agenda can be summarized as follows (Eşkinat, 2016):

- (1) The way to reach what we cannot reach is to count what we cannot count,
- (2) It is important to reach real-time data in order to make the right decisions in a short time,
- (3) Spatial data sources provide solutions to many development problems, from health to natural resource management.

As a result, the SDGs reflect a global call to action and a mobilization that includes all countries. This call covers almost every topic that can be considered SD-related. The realization of the SD is becoming more urgent due to the global crises that are taking place. This urgency has been reflected in a course of action in which the goal can be attained with the collective contribution of the entire world. Accordingly, international cooperation has increased more than ever before. Additionally, the most effective and efficient way to achieve global targets is to integrate the set targets into local actions based on local characteristics and needs and to accurately monitor the precise data collected locally within the framework of global indicators. In this direction, GIS has taken on an important role in the SD agenda by emphasizing the importance of spatial data to track the progress of SDGs.

### **2.3 EU in the Global Partnership for Our Common Future**

This section focuses on the EU as the funding donor for the investigated municipal projects under the scope of the study. It aims to explain the EU's approach to SD which forms the basis of Union's initiatives and examine the EU-Türkiye financial cooperation processes in order to unveil the main financial sources and concepts of the municipal projects' data set of the thesis.

#### **2.3.1 Sustainable Development in the EU**

Since the early 1990s, the EU has been an international leader in climate change initiatives and global environmental governance (Çörtoğlu, 2019). Further, the EU emerged as one of the key actors in international cooperation on SD by integrating this environmental approach with SD. Accordingly, the EU has taken steps to ensure the integration of its environmental policy and has recognized the importance of SD in advance and included in its decision-making processes through various legal arrangements, all of which have played a major role (Çörtoğlu, 2019). In fact, the EU has not only considered this concept as part of its policies but has adopted SD as

a fundamental principle (Ada, 2015). The Union has established the necessary infrastructure and system to consistently carry out its activities in this field and monitor the impacts. Looking at the historical developments that created this system, it can be stated that the process of shaping the approach to SD in the EU developed in parallel with the agendas carried to the international arena by the UN (Ergün and Çobanoğlu, 2011; Ökten and Ökten, 2018).

It is observed that the Treaty of Rome (1957), which is the basic legal document of the EU, did not include a provision on the environment. The environmental policies started to be formed for the first time in the 1970s in the EU (Bozkurt, 2010, as cited in Ergün and Çobanoğlu, 2011). Additionally, the introduction of SD into the agenda of the Union has developed as a result of the support for the SD principle that was put forward by the “*Brundtland Report*” in world public opinion. The strong international discourse in this report has created, and the need for a transformation in the EU bring about a new vision in line with the SD (Çörtoğlu, 2019).

SD was first introduced as an objective of the European Community in the “Single European Act” (1987), which marked the beginning of fundamental political changes and the inclusion of chapters on “environment” in the “Treaty of Rome” (Ada, 2015; Çörtoğlu, 2019; Ökten and Ökten, 2018). In 1992, the need to incorporate the SD idea into all Community policies and the importance of starting integration processes was stated in the “Maastricht Treaty” (EC, 2004). Additionally, the most important document accepted within the scope of SD throughout the EU was the 5<sup>th</sup> “Environmental Action Plan” in the same year (Eryılmaz, 2011). The most important feature of this study, published as “*Towards Sustainability*”, is that it is the first program to see local authorities as government partners. Five years later, in 1997, the “Treaty of Amsterdam” established SD as the main objective of EU policies (European Council, 2001) and adopted the principle that the EU should pursue SD objectives in line with the UN (Ergün and Çobanoğlu, 2011).

In order to grasp the EU’s SD perspective, it is necessary to address the EU’s “Sustainable Development Strategy (SDS)”. The EU SDS is an ambitious and long-

term strategy that emerged from the wider global Rio process (Boissière, 2009). Approved in 2001 at the “Gothenburg European Council Summit”, the main objective of “A Sustainable Europe for a Better World: EU Sustainable Development Strategy” (Ada, 2015; Boissière, 2009; Toprak, 2006) is to systematize actions to address the combination of economic, social and environmental policies for SD. Also, it calls on member states to develop SD strategies (Moussis, 2004). Building on this strategy with a more detailed structure, the new EU SDS was adopted by the European Council in 2006. Thus, it accelerated SD-related progress in a comprehensive manner (Boissière, 2009). The main focal topics of this strategy are stated as follows (EC, 2007):

- Climate change and renewable (clean) energy,
- Sustainable transportation,
- Sustainable consumption and production,
- Protection and management of natural resources,
- Public health,
- Community participation, demography and migration,
- Global poverty.

The new strategy explicitly adopts UN SD policies and aims to promote coherence between all EU policies. Further, it aims to foster alignment between local, regional, national and global efforts in order to increase SD contributions. Accordingly, it intends to achieve better integration of policy-making processes not only horizontally across sectors, but also vertically between different levels of government (Steurer and Hametner, 2013). It also reaffirmed the need for global solidarity and recognized the importance of strengthening work with partners outside the EU, including rapidly developing countries that will have a significant impact on global SD (Council of the European Union, 2006). According to the EC (n.d.), the revised EU SDS sets out a single, coherent strategy on how the EU can more effectively deliver on its long-standing commitment to meet the challenges of SD.



The "2030 Agenda" did not catch the EU unprepared, as the EU's SDS has been in place since 2001. In the face of the new and ambitious UN program, the EU responded in 2016 and launched an SD package reflecting the priorities. Accordingly, a multi-stakeholder platform on sustainability issues in all EU countries was established in 2017 to support and advise the European Commission (EC) on the implementation of the SDGs at the EU level (EBLIDA, n.d.).

The SDGs are an integral part of the EU political guidelines and are at the heart of policy-making processes and actions regarding internal and external action across all sectors. Therefore, all the 17 SDGs are referenced in one or more of the six headline ambitions announced in the president's political guidelines as depicted in Table 2.4. One of these priorities is the "European Green Deal", the EC's growth plan to make Europe climate-neutral, resource-efficient, innovative and socially inclusive (UNSDSN, 2022b). This deal includes a comprehensive set of targets aligned with the SDGs, which is why the EU has developed a "Joint Implementation Strategy" for a more efficient and effective implementation of the "2030 Agenda" and the "EU Green Deal".

Table 2.4 The EC's priorities and related SDGs.

EC Priorities	Related SDGs
European Green Deal	
Economy that works for people	
Europe fit for the digital age	
European way of life	
Stronger Europe in the world	
European democracy	

Source: (EC, n.d.-d)

The EU has put in place the necessary institutional mandates and infrastructure to ensure that the SDGs are not only properly integrated into policies and strategies, but also efficiently incorporated into their implementation. Regarding policy integration, the EU has developed the “SDG Policy Mapping Tool”. This tool aims to better understand and improve how EU policies relate to the SDG framework by matching policy documents to the SDGs and targets through specific keywords (EC, n.d.-g).

Furthermore, the “European Environment Agency” is also a driving force in the development of the concept of SD with the concrete indicators it has published (Eryilmaz, 2011). This indicator set has been prepared in line with the Union’s approaches, the Union’s data generation and storage strategies, the characteristics of the member states and grouped in the SD perspective in order to monitor progress in implementation (Ada, 2015). In light of these exemplary initiatives, it can be stated that the EU approaches the SDGs in a very systematic and sensitive manner and the EU is determined to play a key role in the “2030 Agenda” process.

The EU is committed to applying its stance on SD in its contribution to the global response. In this regard, one of the important discourses is said by the high representative/vice president Federica Mogherini as follows:

In our times we are more interconnected than ever before, so investing in people beyond our borders is also an investment for Europe. Today’s proposals have the common aim of strengthening the impact of our cooperation with our partners across the world, whilst promoting sustainability at home and abroad. This is at the heart of the EU’s Global Strategy published in June. The EU will keep leading an external action that supports peace, democracy and good governance, that reinforces resilience at all levels and promotes shared and sustainable prosperity for all (EC, 2016).

The approach outlined in this reference permeates the EU’s entire external action. Therefore, the fact that Türkiye is a country in the process of negotiations for full EU membership and that the EU is striving for leadership in SD (Ada, 2015) are the main reasons for choosing to examine the contribution of EU financial assistance to Türkiye to the SDGs in this thesis.

### **2.3.2 The EU Financial Assistance to Türkiye**

Financial assistance, which functions as an important instrument serving the objectives of the Community, has been and is being provided to member and non-member countries in the form of grants and/or loans (Karabacak, 2004). The diversification and significance of the Community's financial assistance have expanded as a result of its expansion and development since its establishment.

The EU's financial support has undertaken important functions in the realization of SD (Çetin, 2006). In the broadest sense, these financial assistance mechanisms may be divided into two categories: those supplied by the EIB and those supplied within the context of the general budget expenditures of the European Communities. Brief explanations for these two categories are as follows:

- (1) Established by the 1957 Treaty of Rome, the EIB serves the EU's objectives by providing long-term financing for investments within the framework of banking operations (Karabacak, 2004). Through its operations, the EIB supports projects that make a significant contribution to growth, employment, regional cohesion and environmental sustainability in Europe and beyond (EIB, n.d.-a). Projects for financial assistance from the EIB can be prepared by public institutions, the private sector or non-governmental organizations (Efe, 2017).
- (2) Funds can be provided from the European Communities budget in the form of grants or loans with special conditions (Karabacak, 2004). Especially for the grants, it is critical that the nature of the investment serves the Union's priorities. Depending on developments over time, one of these has been shaped by the contribution of the investment to the SDGs and combating climate change.

The Union provides financial assistance not only to its member states but also to candidate countries to help them reduce regional development disparities (Efe, 2017). This financial assistance is one of the main dynamics of Community relations

with candidate countries. However, the Union's financial assistance to Türkiye goes back further than its candidate status. Since the entry into force of the "Ankara Agreement" in 1964, the Union has been providing financial assistance to contribute to the development of Türkiye's economy and to support Türkiye's fulfillment of its obligations arising from the association relationship (Efe, 2017).

Moreover, EU financial assistance programs have enabled many different institutions and organizations across Türkiye to implement projects in various fields. In this context, EU financial assistance is divided into two categories in terms of its scope of application, as follows (Köseçik and Akbaş, 2009):

- (1) Framework Projects (Macro Projects): These are the projects for which ministries and ministry-affiliated institutions, regulatory/supervisory boards, the TBMM, municipalities and municipal unions, universities, Higher Education Council, Court of Accounts (CoA) and non-governmental organizations addressing large masses are responsible.
- (2) Grant Programs (Micro Projects): These are projects prepared by local administrations, local administration unions, universities, research institutes, primary and secondary schools, SMEs, chambers of industry, commerce, agriculture, professional chambers and organizations, foundations, associations, trade unions and cooperatives, and farmer groups to achieve the objectives of the framework projects.

In 1999, with the "Helsinki Summit", Türkiye was officially granted candidate country status (Çınkır, 2020). Türkiye's relations with the EU gained a new dimension after this granting. This development constitutes the first step towards targeting financial assistance to Türkiye's accession to the Community or giving it a pre-accession strategy perspective (Karabacak, 2004).

The expectations of the EU from Türkiye in the candidacy process are basically based on three pillars for each subject. These are the necessity of a participatory state authorizing local administrations, the reduction of regional disparities and effective decentralization, and the importance of establishing implementation and

enforcement mechanisms as well as legislative harmonization (Eryılmaz, 2011). These conditions naturally apply to the harmonization of SD and environmental policies.

Furthermore, the decentralized implementation system for the use of financial assistance was published in 2001 (Durukal, 2013). According to this circular, the use of financial assistance in Türkiye has been legally coordinated through the establishment of elements such as the National Aid Coordinator (NAC), Financial Cooperation Committee, National Authorizing Officer (NAO), Joint Monitoring Committee, Central Finance and Contracts Unit (CFCU). All these developments laid the foundations for the biggest change in the relationship between Türkiye and the EU since the “Helsinki Summit” in the field of financial cooperation. The Union provides financial support in areas such as structural changes, reducing interregional development disparities, increasing living standards, increasing employment, education, environment, health, communication, energy, transportation, human rights, rule of law, etc. (EUD, 2016). In this context, financial support for Türkiye is provided in the form of grants and loans, which are provided to public or private sector organizations.

Türkiye has benefited from the EU’s financial assistance programs such as MEDA, PHARE, SAPARD and ISPA in different scopes and budgets (Efe, 2017). Subsequently, the EC envisaged the implementation of a new single financial assistance instrument for accession countries and “The Single Framework” on the “Instrument for Pre-Accession Assistance (IPA)” was adopted by the EC in 2006 (EC, 2006).

With the establishment of IPA, Türkiye started to use financial assistance under a single budget item. The purpose of this transfer is to speed up and facilitate the procedures for the utilization of financial support (Karabacak, 2004). This study examines the contribution of EU financial assistance towards the SDGs presented in the “2030 Agenda”. In the historical trajectory of EU-Türkiye financial cooperation,

this period corresponds to the IPA implementation processes. Therefore, this section examines developments after the implementation of the IPA.

Albania, Bosnia and Herzegovina, Croatia, Iceland, Macedonia, Montenegro, Kosovo, Serbia and Türkiye (Çınkı, 2020) have benefited from the IPA financial assistance programs and will continue to benefit. In terms of budget distribution, Türkiye has the largest share among these countries within the periods of IPA-I and IPA-II (MoFA, 2020). Moreover, compared to the previous periods of EU-Türkiye financial cooperation, the IPA has led to a significant increase in assistance to Türkiye (Efe, 2017).

Country strategy papers for this financial assistance program are prepared by the beneficiary institutions for seven-year periods. In this way, the beneficiary institutions also plan their own reform and development agendas. The planned reforms are prepared for the areas prioritized by the IPA components. The priorities of IPA components are set in the “Multi-Annual Indicative Planning Document (MIPD)” prepared by the EC with the support of the country concerned (Efe, 2017).

Türkiye’s IPA experience started after the establishment of accredited units and authorities, which is an obligation for the IPA program. The programs have been managed in series and so far, IPA-I, IPA-II and IPA-III periods have been implemented. In this context, Türkiye signed the “Financial Framework Partnership Agreement (FFPA)” for IPA-I with the EC in 2008 so Türkiye’s first IPA process is started (Efe, 2017). This agreement covers the seven-year period and sets out common rules for the implementation of the work financed by the EU in Türkiye. In the continuation, in order to ensure that the IPA II period is carried out in accordance with the EU regulations, the FFPA transposing the implementation principles into domestic law was signed in 2015 (EUD, 2016). Finally, the EU and Türkiye have finalized the signature and ratification of the FFPA for IPA III. The agreement was ratified by the TBMM of Türkiye on December 2, 2022, and entered into force after being published in the Official Gazette of the Republic of Türkiye on 12.12.2022 (EUD, 2022).

Table 2.5 provides a general overview of IPA programs. It can be seen that the budget for the program is increasing every year. Also, the FFPA for IPA-III has recently been signed, so the details are not yet clear. The projections of the SD approach are clearly visible in the “Components/Thematic Windows” column of the IPA series. For example, in IPA-III, there is a “Green agenda and sustainable connectivity” window, which was not found in the previous two periods. Here, the evolution towards SD, which we can see in the titles, is also reflected in the details of the projects and sub-projects.

Table 2.5 General overview to IPA programs.

<b>Program</b>	<b>Period</b>	<b>Components/Thematic Windows</b>	<b>Total Budget</b>	<b>Allocated Budget to Türkiye</b>
<b>IPA-I</b>	2007-2013	<ol style="list-style-type: none"> <li>1. Transition assistance and institution building</li> <li>2. Cross-border cooperation</li> <li>3. Regional development</li> <li>4. Human resources development</li> <li>5. Rural development</li> </ol>	EUR 11,5 billion	EUR 4,8 billion
<b>IPA-II</b>	2014-2020	<ol style="list-style-type: none"> <li>1. Reforms in preparation for Union membership</li> <li>2. Socio-economic and regional development</li> <li>3. Employment, social policies, education, promotion of gender equality, and human resources development</li> <li>4. Agriculture and rural development</li> </ol>	EUR 12,8 billion	EUR 4,5 billion
<b>IPA-III</b>	2021-2027	<ol style="list-style-type: none"> <li>1. Supremacy of law, fundamental rights and democracy</li> <li>2. Good governance, conformance of acquis, strategical communication and good neighbor relations,</li> <li>3. Green agenda and sustainable connectivity</li> <li>4. Competitiveness and inclusive growth</li> <li>5. Regional and overseas collaboration</li> </ol>	EUR 14,2 billion	TBD

Source: EC (n.d.-b, 2021), EUD (n.d.), MoFA (2019)

While the IPA is the EU’s main financial support instrument for Türkiye, Türkiye also benefits from other funding, in particular from the EU's “Facility for Refugees in Türkiye (FRIT)”, the “The European Instrument for Democracy and Human Rights (EIDHR)”, the “The EU’s Instrument Contributing to Stability and Peace (ICSP)”, “Erasmus+” and “Horizon Europe” (EUD, n.d.-a).

The process of the grant schemes offered by the EU may differ according to the programs. However, to understand the processes in general terms, it is useful to refer to the common functioning of the EU project implementation processes according to the document presented by (MoFA, n.d.-a). First, the scope and criteria of the grant program are defined by the EU. A call for these grant packages is then launched. According to the formats specified in the published call, individuals, institutions or organizations wishing to benefit from these funds submit their project proposals. What is important here is that the proposal is in line with the scope and criteria of the program and that its design is mature. The components and objectives of the design of these projects should not contradict the priorities of the beneficiary country and the EU. In addition, the preconditions of some programs may include certain geographical preferences depending on their scope, which can be seen especially in the funding sources allocated for SuTP.

Secondly, proposers who pass the pre-proposal assessments are asked to apply to the grant programs. Subsequently, applications containing detailed project designs are collected and the second evaluation process begins. The important issues at this stage are the adequacy of the financial and operational capacity of the beneficiary; the relevance, effectiveness and feasibility of the project; the sustainability of the project; and the financial feasibility of the project. After the second evaluation process, the projects found eligible for the program are announced on a project-by-project basis in "Award Notices". The project preparation period starts for the eligible projects until the signing of the contracts and grant agreements. At this stage, the preparation of the documents through mutual consultations between EU program managers and grant beneficiaries and signature stages are completed after the establishment of the units responsible for project execution. Following the signature stages, resources are mobilized and project implementation processes begin. All phases are carried out by the grant beneficiary according to the procedures and principles determined by the EU. Following the completion of the projects, grant closure and project evaluation processes are realized.



As this study focuses on municipal projects, it would be useful to elaborate on the FRIT funds, as many of the municipal services projects currently underway are financed through this fund. FRIT was established in 2015 in response to a call by the EU Council for significant additional resources to support Syrians Under Temporary Protection (SuTP) in Türkiye (EUD, 2019). The program provides a joint coordination mechanism designed to meet the needs of SuTP and host communities in a comprehensive and coordinated manner. Funding from the program has been and continues to be channeled to projects that address the needs of SuTP and host communities, particularly in the areas of humanitarian assistance, education, health, municipal infrastructure and socio-economic support.

In addition to the FRIT fund, the “EU Regional Trust Fund (EUTF)” in response to the Syrian crisis, also known by the Arabic term “MADAD” which translates to “sustaining” or “reinforcing” in English, places the EU at the forefront of the international response to the Syrian crisis. Since its inception in December 2014, it has contributed to meeting the critical needs of SuTP, their host communities. This funding has enabled the implementation of vital projects in the sectors of basic and higher education, livelihoods, health, water and sanitation, protection, and social cohesion. The MADAD ceased formally in December 2021, although projects continued until June 2025 (EC, n.d.-h). Nonetheless, the EU response to the Syrian crisis is set to continue through the transition to the “Neighborhood, Development and International Cooperation Instrument (NDICI)”.

The support forms part of the EU’s comprehensive approach to addressing the crisis inside and outside the Union. With this support, the EU aims to improve conditions for SuTP in Türkiye, while at the same time reducing the burden on host communities. According to data published by the DGMM (2022), Türkiye is home to over 3.600.000 SuTPs. The distribution of SuTP population by provinces in Türkiye is illustrated in Figure 2.5. This map is presented in order to understand the impact area of FRIT and MADAD funds on space. As the map clearly shows, a SuTP population density is seen in the southern and south-eastern parts of Türkiye.

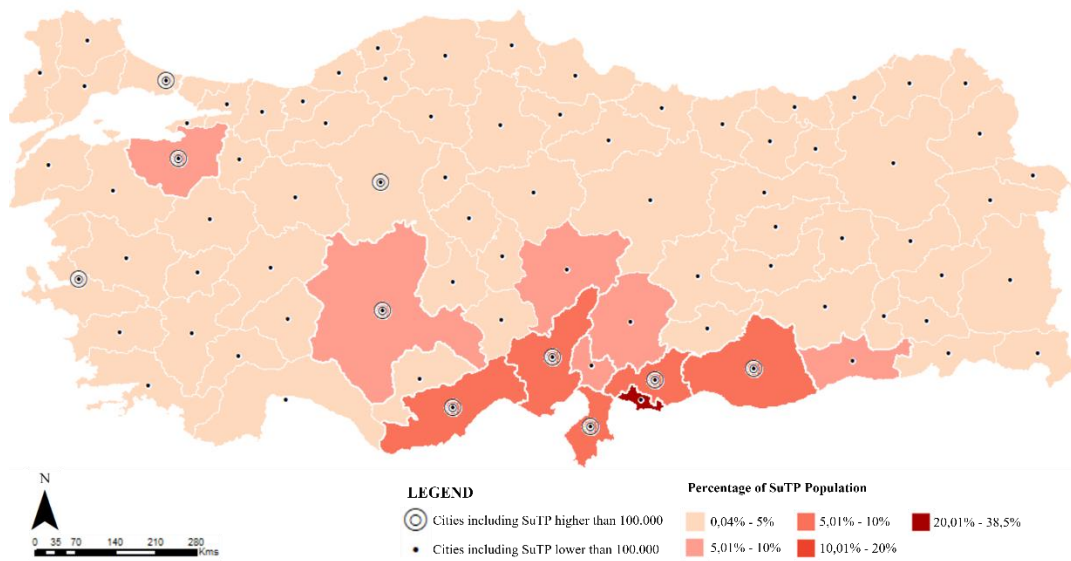


Figure 2.4 The distribution of SuTP population by provinces in Türkiye.

*Note:* Figure in this review has been originally produced by the author with reference to the information retrieved from DGMM (2022), and TURKSTAT (2022a).

When we look at the documents that constitute the basis for development investment practices in Türkiye, it is seen that they aimed to reduce the development level differences between regions and to implement a sustainable development model nationally as a whole (MoD, 2016). Accordingly, regional policies, strategies, plans and programs have been prepared in line with regional diagnostics and baseline analyses, risks and potentials. The Development Plans (DPs) prepared by the State Planning Organization (SPO) constitute the basis for these. In addition to the DPs, documents such as “Regional Support Programs of Development Agencies”, “National Strategy for Regional Development”, “NUTS-II Regional Plans”, “Centers of Attraction Support Program”, “Social Projects Support Program” and “Regional Incentive System Aids” have been prepared and put into practice. In the light of these documents, spatial trends and prioritization brought about by national priorities are also influential in the distribution of international financing. As a matter of fact, international financing should be in line with national priorities as well as the priorities of the donor organization.

In addition, the fact that the 9th DP is designed as the main strategy document to contribute to the EU accession process (Çelikkaya et al., 2018) is an indication that the main document on which EU funds will be based is the DPs. Moreover, the “Indicative Strategy Paper for Turkey (2014-2020)”, the document outlining the main financing priorities for IPA assistance, also frequently refers to DPs priorities. Although it is mentioned that spatial strategies should be developed in the overall structure of the IPA program, it would not be meaningful to say that there are direct spatial preferences because the program is built on thematic areas. Therefore, it would be more appropriate to say that there are indirect references to the places that are suitable for thematic priorities. For example, under the theme of “cross-border cooperation”, the Bulgarian border and the Black Sea Region in particular are covered, while under the theme of “agriculture and rural development”, the “Agriculture and Rural Development Support Institution”, which is the implementing agency in Türkiye, concentrates its work in the central and eastern parts of Türkiye.

While specific spatial choices for IPAs are not directly given, there are spatial priorities set by national plans and strategies that are frequently referenced in the IPA documents and to which these programs are subject. For example, while the “Centers of Attraction Support Program” includes Konya, Gaziantep, Kayseri, Şanlıurfa, Diyarbakır, Elazığ, Malatya, Sivas, Erzurum, Samsun, Trabzon, and Van (Gelici, 2014; Toy and Gündüz, 2016) MoIT's “Producing Cities Program” covers the provinces of Adana, Antalya, Balıkesir, Denizli, Eskişehir, Gaziantep, Kahramanmaraş, Kayseri, Konya, Manisa, Mersin, Sakarya and Tekirdağ. In addition, comprehensive projects such as “Southeastern Anatolia Project (GAP)” and “Eastern Anatolia Project (DAP)”, which were established to support regional development, were prioritized and implemented. The 10th DP, which is the reference point for the post-2015 financing period, also states that the southern and eastern parts should be prioritized in order to eliminate regional disparities (SBO, 2014). Finally, the need for prioritization to strengthen cross-border competitiveness and structures in these regions is also frequently mentioned in national and EU

documents. Therefore, the documents that will form the basis for channeling investments may differ in terms of themes and sectoral priorities, but it can be said that the south-eastern part in particular is a region that is planned to be prioritized in many different contexts. In addition to all these documents, considering that the prioritization of the FRIT and MADAD funds, which were implemented after SuTP became an intensive region, it seems likely that the investments implemented especially in the post-2015 period will be concentrated in the south-eastern region.

To sum up, this section has examined the scope of EU-Türkiye financial cooperation. This cooperation dates back to the “Ankara Agreement”, long before Türkiye’s candidacy, but the scope and scale of financial assistance have evolved significantly since the “Helsinki Summit”. This cooperation has been further strengthened by the transfer of financial assistance to a single budget item, the IPA program. The developments in the UN’s approach to SD in the global arena and the EU, detailed in the previous sections, have also been reflected in the scope of the financial assistance programs. As the study focuses on EU-funded municipal projects, the focus is on the programs where the most investment in this area has taken place, namely the IPA, FRIT, MADAD, Erasmus+ and Horizon Europe funds.

## **2.4 Türkiye’s Local Authorities in the Construction of Sustainable Cities**

This section aims to introduce the progress made towards the SD in Türkiye, the geography in which the spatial traces of the study are examined, the prevailing administrative structure and the characteristics of the municipalities. In this context, the main historical developments are first presented to understand Türkiye’s national approach to SD. Thus, it tries to understand whether the contribution of EU-funded projects to the SDGs is merely a result of the Union’s sensitization towards the SD or Türkiye’s approach to the issue also has its share. Next, the general characteristics of Türkiye’s administrative structure, the legal framework for local authorities, the types of municipalities and the jurisdictions of them are analyzed to understand the framework in which the scope of municipal projects is embedded. Finally, the access

of local authorities in Türkiye to international sources of financing is analyzed to understand the corresponding position of EU financial assistance.

#### **2.4.1 Sustainable Development in Türkiye**

Türkiye attaches importance to the development of SD approaches and practices at both national and international levels. It closely follows international legislation in this context and continues its harmonization efforts. Examining the historical evolution of Türkiye's SD perspective will help to understand the country's current SDS. Following the rise in environmental awareness and sensitivity in the 1970s, reflections on SD in Türkiye followed global developments. In this respect, many laws, by-laws and regulations on the environment and environmental protection have come into force in Türkiye.

The first discussions on the development of national environmental policies in Türkiye emerged in parallel with the advancements in the world after the "Stockholm Conference" in 1972 (Eryılmaz, 2011). Then, in the 3<sup>rd</sup> "Development Plan (DP)" (1973-1977) prepared by the "State Planning Organization (SPO)", the environmental issue was evaluated under a separate heading for the first time (Egeli, 1996). In 1978, with the establishment of the "Prime Ministry Undersecretariat of Environment" to deal with the activities related to the environment, environmental activities took their place in state policy (Özmehmet, 2008).

The most important regulation on environmental issues, which is the starting point of SD strategies in Türkiye, was its inclusion in the 1982 Constitution (Budak, 2000). The concept of environmental protection was included in the constitution for the first time and this development has also a global significance as Türkiye is one of the few countries where environmental issues are directly included in the constitution. Following the inclusion of environmental issues in the constitution, "Environmental Law No. 2872" came into force in 1983 (Eryılmaz, 2011). This law established the

legal basis for the regulation of environmental issues by considering the environment as a whole, and in this law, the concept of SD is indirectly included.

In the “Rio Conference”, the SD-targeting approach started to come to the fore for the first time in the 6<sup>th</sup> DP (1990-1994) and the “Undersecretariat of Environment”, which could not keep pace with industrial development in this period, was replaced by the “Ministry of Environment” in 1991 (Okumuş, 2002, as cited in Özmehmet, 2008). This ministry was responsible for determining environmental policies and strategies; ensuring coordination of environmental activities at local, national and international levels; and regulating permits and related training activities (Erim, 2000). Another important area of activity in terms of SD commitments in Türkiye has been the work carried out jointly with the OECD. The “OECD Report on Environmental Policies in Türkiye” prepared in 1992 contains recommendations for Türkiye, which is faced with a dilemma between environment and development (Talu, 2007). In the same period, the implementation of the “Local Agenda 21 Action Plan” started (Erim, 2000). Subsequently, Türkiye’s “National Environmental Strategy and Action Plan” was completed in 1998. This plan envisages taking steps toward the adoption of EU environmental standards and regulations (Altunbaş, 2004). The succeeding 7<sup>th</sup> DP (1996-2000) adopted the principle of SD, harmonizing economic and social policies with environmental policies, adhering to international agreements, promoting social reconciliation and mass participation, and envisaging the rehabilitation of values and actions and the reform of social, institutional and legal structures (Özmehmet, 2008). These developments are Türkiye’s SD milestones that laid the foundations of the national SD approach. In the following processes, many legal regulations, changes in institutional structures, and workshops have been carried out in line with the global agenda.

The fact that DPs have been referred to several times in the developments mentioned so far is a reflection of the salience of DPs for national strategies. DPs set out the national development strategy, priorities and objectives in five-year periods. According to “Law No. 3067”, DPs prepared by the central government are documents that guide national policies and approved by the TBMM and enter into

force (Yereli and Ünal, 2022). These are binding for all public institutions and serve as a guide for the private sector and civil society organizations, academics, investors and citizens. As of 2022, a total of eleven DPs have been put into force.

DPs include policies, measures, duties and responsibilities related to various dimensions of development. From time to time, conceptual expressions are included in the plans for making development sustainable. Table 2.6 demonstrates the frequency of the use of sustainability and SD. As can be seen in the table, these concepts have become part of the country strategy, especially with the 9<sup>th</sup> DP. The same corresponds to parallel processes for the concept of SD, but with a more limited use in DPs. On the other hand, the 10<sup>th</sup> and 11<sup>th</sup> DP, which coincide with the period of preparation and adoption of the “2030 Agenda” on SDGs, have become more intense.

Table 2.6 Number of references to sustainability and SD concepts in Türkiye’s last four DPs.

<b>Concept</b>	<b>11<sup>th</sup> DP (2019-2013)</b>	<b>10<sup>th</sup> DP (2014-2018)</b>	<b>9<sup>th</sup> DP (2007-2013)</b>	<b>8<sup>th</sup> DP (2001-2005)</b>
Sustainability	97	100	35	0
SD	11	12	1	0
<b>Total</b>	108	112	36	0

Source: (Yereli and Ünal, 2022)

In Türkiye, work has been initiated on the 10<sup>th</sup> DP, and gaps have been identified by comparing policies and measures with the SDGs (CoA, 2020). For the first time, the 11<sup>th</sup> DP includes a separate heading on SD. In this DP, it is stated that the “2030 Agenda” and SDG implementation process will be coordinated and reflected in the main policy and sectoral strategy documents (SBO, 2019a). Additionally, it is stated that strategic plans, performance programs and annual reports should be prepared in line with and integrated with the “2030 Agenda” (SBO, 2019a). Thus, an important step has been taken for Türkiye in the integration processes for SD in relation to the 11<sup>th</sup> DP at the upper scale. In addition, studies were carried out by the “Strategy

Budget Office (SBO)” on the localization of the SDGs in 2019. As a result of these studies, Türkiye’s SDGs and indicators were published. In this booklet, it is stated that revisions are planned to be made to the indicator set between 2020-2025 (SBO, 2019c). Furthermore, a total of 131 SDG indicators and their definitions, including substitute indicators that are considered suitable for Türkiye by TURKSTAT. Also, the first data set for the localized SDGs was published in 2021 and integrated GIS data was created (TURKSTAT, 2021).

#### **2.4.2 Understanding the Administrative Structure in Türkiye**

In Türkiye, the public administration system is organized as a central government and local administrations to ensure the continuity of social order and state affairs and to deliver the public goods and services produced to citizens more efficiently and effectively. The central government and local administrations are two complementary elements of the administration and constitute a whole with their establishment and duties.

In centralized administration, services are gathered in a center, and decision-making and implementation decisions are within the authority of the central administration. In addition, the services undertaken are carried out by officials belonging to the center and there is a provincial organization for the distribution of these services (Gözübüyük, 2016). With the 2017 constitutional amendment, the organizational structure in Türkiye was redesigned. According to this amendment, the central government is formed of the presidential office and the presidency of administrative affairs (Akbay, 2020).

Decisions and actions taken for the fulfillment of public services outside the central organization are called decentralization and these services are carried out by local administrations (Kabaalioğlu and Yıldırım, 1995). According to Parlak and Ökmen (2015), local administrations are public legal entities established with the aim of providing services to the individuals of the local community living in a certain



geographical area on the issues that concern them most due to living together, whose decision-making bodies are elected by the local community, have duties and powers determined by law, special revenues, budgets and personnel, can establish their own organizational structure for the services they undertake, and benefit from administrative autonomy in their relations with the central government. Based on this definition, the reasons for the formation of local administrations can be summarized in two points: “functional efficiency” and “democracy” (Eryılmaz, 2011).

Understanding the benefits and drawbacks of centralized administration and local administrations will help to better understand the relationship between these two legal entities. The benefits can be summarized as ensuring unity and integrity in political and administrative management, ensuring stable and regular distribution of development and public services throughout the country, providing impartial services to all regions, and carrying out indivisible and country-wide services such as national defense. The drawbacks can be generalized as causing delays in public services due to bureaucracy and stationery, the possibility that the decisions taken from the center may not be in line with the characteristics and preferences of the locality, the decrease in efficiency and productivity due to daily and repetitive work and increased service loads, and the decrease in public participation in governance (Akbay, 2020). It can be said that the benefits of decentralization outweigh the drawbacks of centralization. The risks that may arise from the drawbacks of local authorities can be summarized as creating a segregation that is incompatible with unity and solidarity due to the fact that they are independent units, causing development differences between regions, discriminating between citizens and regions to protect party interests, creating irrational situations because they act with electoral concerns, experiencing difficulties in audits due to different methods of data collection and management (Günday, 2002), and creating quality differences in services due to different financial and technical capacities (Köseçik, 2010).

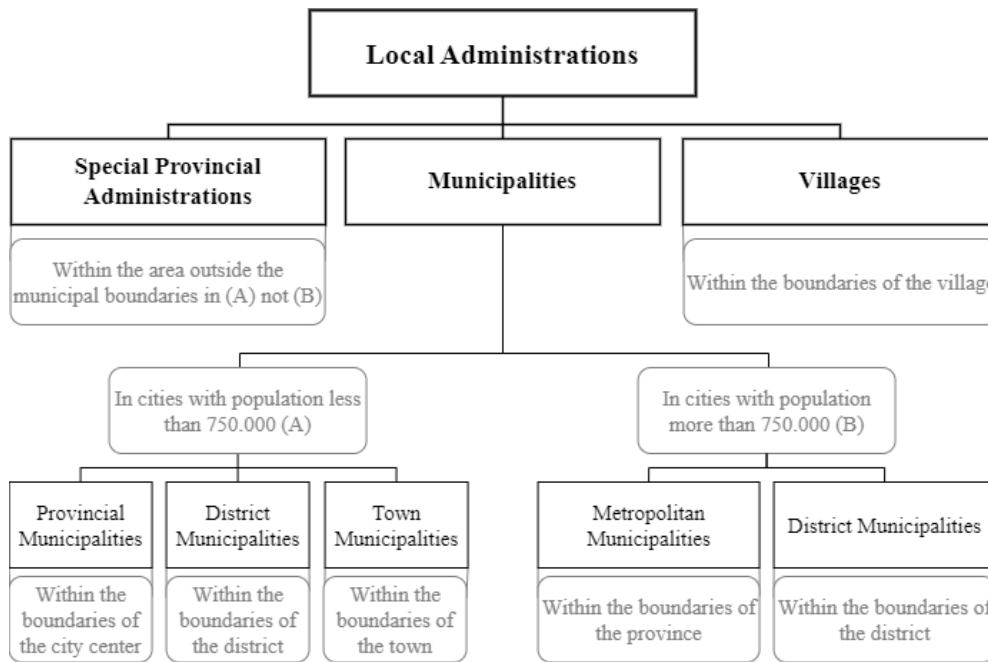


Figure 2.5 The general structure of local administrations in Türkiye with their geographical jurisdictions (produced by the author).

Local administrations in Türkiye are classified into three groups: special provincial administrations, municipalities and villages, as illustrated in Figure 2.6 in a hierarchical order and with their jurisdiction areas. Among the administrations shown here, their areas of competence may also vary in the context of the duties determined by law. For example, in provinces without a metropolitan municipality (type A), special provincial administrations are responsible for some activities within the entire provincial boundary, while a similar situation is observed in metropolitan municipalities. For example, Metropolitan Municipalities are responsible for water and sanitation works in the entire province of type B. In addition, there are some units that are not included in the scheme due to their legal status but play an active role in the functioning of local actions. At this point, it is necessary to mention the "Investment Monitoring and Coordination Directorates" within the scope of this thesis. These directorates work for the efficient, fast and effective realization of public investments and support the implementation of the determined policies through good governance practices at the local level (Official Gazette, 2014).

Special provincial administrations and villages have lost their characteristics as local authorities in terms of structure, composition of organs and functions transferred to central government institutions (Durukal, 2013). After these changes, it would not be incorrect to say that only municipalities remain as local administration units within their sphere of influence and power of authority. In this context, the study area of the thesis is municipalities representing the activities of local administrations, and the characteristics and conditions of municipalities will be examined.

A municipality is a public legal entity with administrative and financial autonomy, whose decision-making bodies are elected by popular vote, and which is responsible for providing all kinds of infrastructure and urbanization services in order to meet the social, cultural and common needs of the people (Akın, 2005). Municipalities, as the provincial representatives of the central government, try to fulfill the duties assigned to them by the central government within the limits set for them. The first of the regulations on the activities of municipalities is “Law No. 1580” dated 1930 (Yıldırım and Öner, 2004). This law is the first legal regulation of the republican administration of Türkiye regarding the understanding of municipalism. Both the aspect of Ottoman centralism reflected in the Republic and the strong centralist structure in the French system significantly influenced this law (Görmez, 1997). This law remained in force for about seventy-five years and with “Law No. 5393” enacted in 2005 (Akyol, 2017). With this new law, the development of municipalism in Türkiye took on its current form. Accordingly, the total number of municipalities in Türkiye by type is shown in Table 2.7.

Table 2.7 The total number of municipalities in Türkiye by type.

<b>Municipality Type</b>	<b>Total Number</b>
Metropolitan Municipality	30
Provincial Municipality	51
District Municipality	922
Town Municipality	388
<b>Total</b>	<b>1391</b>

Source: (MoI, 2019)

With “Law No. 3030” of 1984, a separate administrative model for metropolitan areas was envisaged for the first time in Türkiye (Deniz and Kantürk Yiğit, 2013). This law was later replaced by the new “Law No. 5216” in 2004 within the scope of local authority’s reform efforts (Durukal, 2013). In 2012, with “Law No. 6360”, the borders of metropolitan municipalities were extended to the provincial boundaries. Additionally, special provincial administrations and village organizations were abolished in these provinces, and district municipalities were transformed into metropolitan district municipalities. The provinces covered by provincial municipalities in Türkiye and the provinces that gained metropolitan municipality status, by year of establishment, are displayed in Figure 2.6. As of 2021, a total of 94.60% of the population in Türkiye lives within municipal boundaries, 78.05% within metropolitan municipality boundaries and 16.55% within other municipal boundaries (MoEUCC, 2022). This is a striking demonstration of the constructive power of municipal actions and their potential to bring about change, given the density of the population in the municipal sphere of influence.

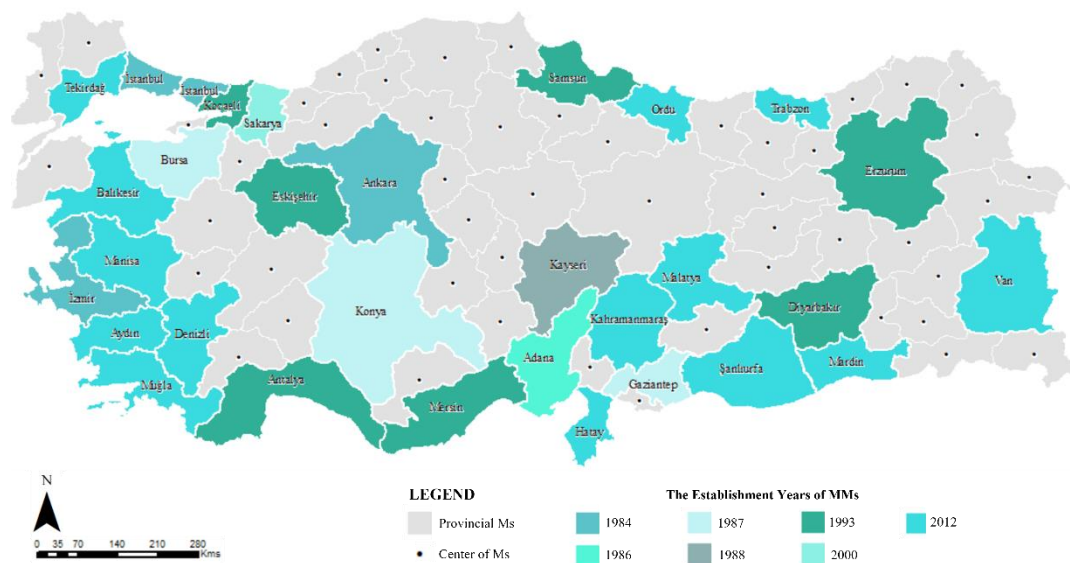


Figure 2.6 The map of provincial municipalities and metropolitan municipalities with the establishment years of metropolitan municipalities.

*Note:* Figure in this review has been originally produced by the author with reference to the information retrieved from Ertaş (2016).

In order to understand the general framework of the investment areas analyzed in this study, it would be useful to specify the duties and responsibilities of municipalities. Depending on the type of municipality (metropolitan, provincial, etc.), there are differences in the definition of duties and responsibilities or in the way they are implemented, but in general terms, municipal services can be grouped under one umbrella. For example, “Water and Sewerage Administrations (WSA)” affiliated with metropolitan municipalities with a separate budget and public legal personality have been established to perform duties related to drinking water, sewerage and stormwater removal (Alici, 2020), which are not available in the other types of municipalities. Nonetheless, provincial municipalities are also responsible for carrying out activities related to water and wastewater management. In this regard, some of the duties of municipalities in Türkiye, which are defined by law to be carried out within their geographical jurisdiction, can be summarized as follows (MoEUCC, 2022):

- Plans within their jurisdictions and related to their services (zoning, SUMP, SECAP, etc.),
- Water and waste water management,
- Urban transportation/mobility services including the infrastructure and public transport operations,
- Environmental health and sanitation, solid waste management,
- Housing,
- Disaster and risk management,
- Geographic and urban information systems management,
- Social and cultural facilities,
- Open and green area services, afforestation, cemeteries,
- Protection of cultural and natural assets and historical texture.

It is of utmost importance that municipalities have the necessary technical capacity and access to financial resources in order to effectively carry out the activities within the scope of municipal services (Durukal, 2013). In this context, the technical and

financial capacities of municipalities may be at very different levels depending on factors such as the size of the population served by the municipalities. Therefore, the quality and quantity of the activities and services provided vary in direct proportion to these capacities. Therefore, this study focuses on the investments of metropolitan and provincial municipalities with higher financial and technical capacity than other municipalities.

There have been significant developments in municipalities over the last thirty years and these developments have naturally been influenced by governance. Thus, municipalities have moved out of their classical roles and assumed new and important tasks.

The classical municipal services of the past have now become citizen-centered urban services, making municipalities authorized and responsible for almost everything that will increase people's prosperity and happiness. Furthermore, over time, concepts related to development have been identified with local administrations as implementers, and the idea that SD can be made possible starting at the local level has gradually become established (Graute, 2016). In fact, local administrations have been identified as the primary implementers of some of the goals set by transnational actors for the realization of SD. Thus, the activities of local administrations for development have enabled them to establish transnational partnerships. This duty assigned to municipalities within the framework of the SD and their cooperation with international organizations in connection with it have formed the main skeleton of this thesis.

### **2.4.3 Access of Turkish Municipalities to the International Financing**

There is a widespread view that empowering local authorities can improve central policies and is crucial for strengthening democracy, providing equal opportunities for all and ensuring social cohesion. Local and regional authorities, local organizations and other actors are therefore key partners in achieving SD. Today,

local initiatives are more integrated into national and global strategies and more powerful than ever before (Çiçekoğlu, 2006). This has laid the foundation for local authorities to be involved in international cooperation and to become stakeholders in an ever-increasing global partnership. In this context, the door to international financial and technical cooperation has been opened for local administrations.

Furthermore, the local administrations have significant roles in the development of democracy, the improvement of quality of life and the structuring of cities within the scope of SD. Thus, the importance of their role is increasing day by day. This increased importance has also led to an increase in the budget items related to their expenditures due to the increase in the quantity and quality of the services they provide (Tuna and Bostancı, 2021). There are seven main reasons for the increase in these financial needs, as follows (Akın, 2005; Doğan and Baş, 2013; Gül, 2009; Tuna and Bostancı, 2021):

- Population growth (natural and unnatural) and concentration of population in urban areas,
- Increased duties and responsibilities with legal regulations,
- The need for restructuring in line with the requirements arising from concepts such as transparency, governance and inclusiveness,
- Due to resource scarcity, the cost burden of the data management systems that local administrations need to prepare, and the analysis and action plans that need to be prepared in line with this data, to improve performance and make needs-based investments,
- Increasing needs and responsibilities for infrastructure and superstructure reconstruction in the context of building resilience and adaptive capacity due to environmental crises,
- Investment requirements related to the digitalization of urban infrastructures and local administration processes due to technological advances,
- The requirement to enhance the quality of services provided in line with the SDGs and the goals of improving quality of life.

The central government provides financial support to municipalities in proportion to their size to enable them to fulfill their duties and responsibilities (Akın, 2005). However, these subsidies have not increased in parallel to meet the increasing needs, and as a result of the economic crisis in Türkiye, the value of the Turkish Lira has decreased. Therefore, a large gap between revenues and expenditures has started to emerge in municipal services over time. In fact, today it is not possible for municipalities to fully fulfill their duties and responsibilities with their internal resources (Tuna and Bostancı, 2021). In addition, the budget provided by the central government is provided to all local authorities through the same budget line items. This standardized budget structure leads to the failure to finance some of the activities of local administrations that differ according to the characteristics of the region they serve and the structure of local beneficiaries (Durukal, 2013).

In order to overcome both the financial difficulties and technical inadequacies in the realization of some activities that municipalities are trying to cope with, they are turning to alternative sources of finance. This search has led local administrations to turn to international resources as they are long-term, low-interest financial resources and also offer technical assistance (Acar, 2019; Akın, 2005; Gül, 2009; Tuna and Bostancı, 2021). The demand for international financing, which has become almost a necessity for local administrations to achieve budget balance, is increasing day by day. These alternative sources are supported by international organizations with which the central government and local administrations are in contact, the protocols established, and the institutions and organizations of foreign countries operating within national borders (Durukal, 2013). Among the organizations that respond to this demand, the WB, the UN and the EU stand out in terms of the support they provide in Türkiye. While the resources allocated for international cooperation on a global scale are growing slowly, the demand for these resources is growing very rapidly, making the competitive environment even tougher (Akın, 2005).

As a requirement, financing is provided on a project basis. Thus, a municipality's access to finance depends on the technical skills of project writers required at the project preparation stage (Akbaş, 2008). The term project here refers to "a collection



of activities in a specific place, within a specific time and budget framework, with a starting and ending point, which will ensure the achievement of certain targeted objectives” (DOKA, 2013 as cited in Durukal and Tekeli, 2016, p.37). International organizations sift the prepared project documents based on evaluation criteria such as overlapping with country objectives, compatibility with their own strategies, maturity stage of the project, contribution to SDGs, and feasibility. Therefore, the technical capacity of municipalities to prepare projects constitutes the crucial bridge to accessing international funds, besides their financial capacities.

From a financial perspective, municipalities utilize international financial resources through three main financing mechanisms for projects: grants, loans, and blending. Among the project finance types, grants are funding sources with no repayment conditions, while loans are long-term and low-interest financing instruments that can have more flexible project designs and larger budgets than grants. Loans used by municipalities through external borrowing can be obtained in three ways within the framework of the law and these are: “obtaining external loans without a treasury guarantee”, “obtaining external loans with a treasury guarantee” and “obtaining loans through direct borrowing by the treasury and lending external loans on credit” (Akın, 2005; Doğan and Baş, 2013; Gül, 2009). Each of these methods has different mechanisms, advantages and disadvantages. For instance, the interest rates of treasury-guaranteed external loans through İLBANK, Türkiye’s investment and development bank that provides financial and technical support to local administrations, may be lower than the municipality’s direct external loans without a treasury guarantee. However, projects are also subject to a further evaluation process in line with the project selection criteria of İLBANK, which is the intermediary institution in this method. Thus, this reason may lead municipalities to obtain direct external loans for some projects.

The important issue regarding the use of international loans is that the repayment of external borrowing is over a period of years. This is because, along with the ease of repayment, it also means that the revenues of future generations are mortgaged (Gül, 2009), and in this case, the local administrators of the following years have budgetary

rights over the resources (Doğanyigit, 2001). In this framework, external borrowing by municipalities is of great importance to fulfill the requirements of SD. Hence, municipalities and the central government, which is in charge of disbursing this financing, have critical duties in the most efficient management of these investments, which will significantly affect the budgets of future generations.

While international loan financing has a very prominent role in providing services for local administrations, there are some constraints that municipalities face in accessing these international loans. These can be categorized into four main categories as follows:

(1) Policy-based factors (Akbaş, 2008):

- The projects prepared should support the priorities set out in the national program prepared by Türkiye,
- The prepared projects should contribute to the implementation of the global strategy of the international financing organization.

(2) Bureaucratic factors (Akın, 2005):

- The obligation of the SBO to include the project in the yearly investment plan, prepared in the context of national development plan priorities,
- The requirement to approve the use of external financing for the municipalities' project by MoTF.

(3) Factors based on economic and technical capacity (Durukal, 2013; Tuna and Bostancı, 2021):

- The belief that local administrations and the national treasury may be in a difficult situation due to exchange rate risk,
- The prerequisite that the financial capacity of municipalities is sufficient to meet the repayment conditions,
- The need for the municipality to have technical expert staff and equipment to carry out the project life cycle in an appropriate manner.

(4) Political factors (Doğan and Baş, 2013):

- The fact that the central government and local authorities are composed of different political parties,
- Non-approval of the council decision due to incompatibility between the Mayor and the Municipal Assembly.

On the other hand, grants, the other international financing mechanism, have a very vital role in the creation of equitable development between regions due to the limitations of loans. Grants eliminate many of these constraints of loans, due to the absence of repayment conditions. Thus, they provide essential support for smaller-scale municipalities. In addition, the technical assistance projects offered to municipalities through grants allow them to benefit from capacity-building activities for future investments. In this respect, grants are more in line with interregional equity than loans, which is why grants are the focus of this thesis.

Finally, in line with the scope of this study, it would be useful to touch upon EU funding for municipalities. In general, EU financial assistance is perceived as an important financial resource by local administrations (Akbaş, 2008). Within the framework of the relations between Türkiye and the EU for more than 60 years, the EU has supported important projects developed by local administrations under various financial assistance programs. In this framework, it is seen that local authorities try to obtain the financial support provided by the EU (Akbaş, 2008). EU financial assistance is important for local authorities, which are the closest administrative units to the people, to provide more effective and efficient services in line with the Union's objectives. In this respect, the EU has supported and continues to support many micro-scale projects prepared by municipalities focusing on infrastructure, strengthening local civil initiatives, promotion of economic activities in line with the characteristics of the regions, training of the labor force, combating social and environmental problems, protecting local cultural and historical heritage, capacity-building activities and planning studies under the framework projects (Köseçik, 2008).

## **2.5 Integrating Geographical Information Technologies into Sustainable Development Strategy**

This section aims to provide a foundation for understanding the meaning, components and challenges of geographic information and its place in the concept of SD. It then briefly discusses the process of integrating GIS technologies into SD approaches in order to clarify the current state of the art and present the foundations on which this study is based.

### **2.5.1 Understanding the Role of Geographical Information**

With the information society, information has become one of the most fundamental sources of power. In this direction, different systems have been developed for the production of information and the management of these processes. One of the most important of these is GIS. According to Demirtaş (2022, p.12), “GIS is a high-performance computer system that collects information about the objects that exist in the world and the events that occur, stores them in the computer environment, makes inquiries, maps and analyzes them in the desired format and scale”. In these tools, reality is expressed in maps where each semantic data or event of interest has a spatial component. Accordingly, it can be stated that GIS has an important place in monitoring, evaluation and decision-making mechanisms through a sustainable digital environment enabled by utilizing the power of location in the data produced in every field.

Since human activities are dependent on the environment, all activities that are directly or indirectly affected by environmental factors also affect the environment. These environmental factors are handled within the scope of geography. Because the science of geography does not only consider space as a field that is studied, but it also evaluates space as a living organism with its visible and invisible features and tries to understand, use, shape and manage it (Demirci, 2008). In this context, accurate production, management, analysis and integration of geographic data into

policies and other systems are among the most important factors that will increase effectiveness and efficiency.

Geographic information is not only considered a fundamental element in better understanding environmental factors but also a tool of democracy as it allows visualizing the effects of planning decisions on society and explaining the rationale behind certain decisions (Uçar and Doğru, 2005). In addition, the use of GIS in economic activities has become widespread with concerns such as business tracking, target audience identification, productivity-enhancing solutions and cost reduction. Therefore, Roger Tomlinson's claim that "GIS is a unique technology that we use to solve the problems we face in our time" (Değerliyurt and Çabuk, 2015) has become a reality in different fields. So much so that GIS is used in understanding and solving problems from a local to global scale and its capacity continues to advance with each passing day.

In order to understand GIS, it is very important to comprehend its components because deficiencies in its components create obstacles to its effective functioning. Classically, GIS consists of five components, as shown in Figure 2.8. Each component in this figure has its own requirements and subcomponents. In addition, depending on the usage area of GIS, structures with different components may emerge in cases of integration with other systems. However, in this section, the basics of the system are discussed. The most important thing to recognize at this stage is a good understanding of the information and data within these systems. Since information is accessed by processing data, the system is based on appropriately generated data.

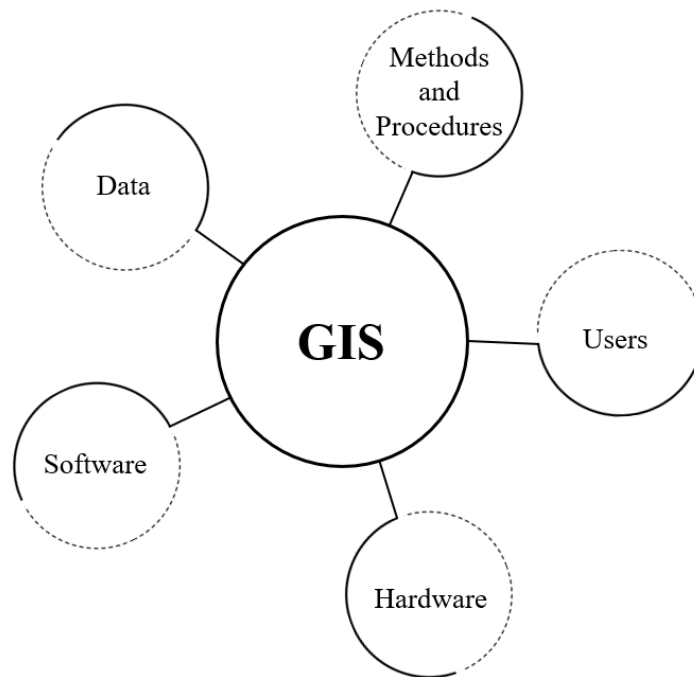


Figure 2.7 Basic components of GIS (Adrees et al., 2016).

Success in the near future depends on multidimensional development strategies, the proper management and spatial distribution of the associated resources, which in turn depend on the effective use of GIS. The main reason for this can be clearly explained by the coincidence theory proposed by McHarg (1969) in his book “*Design with Nature*”. According to this theory, when making a decision, many features of a place need to be evaluated together, and this process requires different layers to be combined with non-spatial data and overlaid on top of each other. Accordingly, the most striking point raised with this theory is that if the number of data is more than five, it is impossible to do it properly with human reasoning ability. It has been possible to overcome this limitation with GIS. In this context, the most fundamental issues for GIS to gain such an important place can be summarized as follows:

- Providing a sustainable data management opportunity with the ease of updating brought by the storage of data in the digital environment,
- The opportunity to work on a richer data set by associating attribute data with their location,

- The data obtained can be integrated with RS data, aerial photographs, GPS data, in-situ collected data and real-time data,
- The ability to analyze different layers of data through integrated mathematical operations and logical queries,
- Enabling data transformation between different systems and software,
- The ability to work with large data sets online or offline, ensuring the sustainability of data management,
- Participatory platforms can be created with applications such as PGIS, PPGIS and Co-PPGIS,
- The use of two-dimensional or three-dimensional maps and models, as well as rich visualizations using graphs and tables, to enable comprehensive synthesis.

GIS, which is seen as a key to solving many problems that are considered chronic today, especially in relation to the practices of local administrations in Türkiye, needs many improvements and proper strategies to be prepared in order to fulfill the current expectations. Regarding the weaknesses of the application practices of GIS in Türkiye, the following points are noteworthy (Uçar and Doğru, 2005):

- Lack of Turkish resources and case studies,
- Lack of laws and implementing regulations,
- Lack of standards,
- Lack of inter-institutional data organization, communication and sharing,
- Resistance to change brought about by technological advances,
- Lack of trained technical personnel,
- Lack of support from political decision-makers,
- Lack of national organizations,
- Lack of investment,
- Lack of reliable digitized data,
- Lack of integrated geographic data systems,

- Data access problems,
- Geographic data management policies support monopolistic structures,
- High cost of preparing national baseline data,
- Legal infrastructure deficiencies,
- Weak cooperation between stakeholders in the sector.

Finally, it is worth mentioning the relevance of GIS to justice studies. The topic of social injustice involves research into the opportunities or threats that space presents to other individuals, and the reasons for these and why individuals of these groups are marginalized in this way (Thatcher et al., 2015). In recent years, the issue of environmental injustice (Buzzelli et al., 2003; Higgs and Langford, 2009; Margai, 2001; Raddatz and Mennis, 2013) has also been widely included in this research topic. In understanding the spatial projection of this inequitable distribution, the advantages offered by GIS are utilized. In this respect, it can be said that many issues addressed within the concept of SD such as spatial justice, interregional justice, climate justice are closely related to GIS besides the environmental and economic issues.

### **2.5.2 Measuring and Monitoring SDGs Utilizing Geographic Information Technologies**

The evolution of SD and geospatial information has progressed in a similar and parallel time frame, with the beginning of these processes dating back to the 1960s. Since both are in the throes of completing their developmental processes, the creation of an integrated approach that addresses SD and GIS together has not been brought to the agenda until the last two decades. In other words, space, which is defined as an integral part of the development equation (Potter et al., 2012) has also been ignored in SD processes. Scott and Rajabifard (2017) claim that “while achieving sustainable development presents the global community with a set of significant social, economic and environmental challenges that are almost entirely geographic in nature, geospatial information is able to provide a set of science- and time-based



monitoring solutions to these challenges, driven by data and with ‘geography’ as context”. Indeed, all issues affecting SD can be analyzed, mapped, discussed and modeled in a geographical context. From this perspective, the path to achieving the envisioned sustainable future lies in supporting SDG indicators with GIS-based decision-support mechanisms. However, despite numerous advocacy activities for SD and numerous global dialogues, recognition of the critical importance of geospatial information in SD processes has been limited.

The importance of comprehensive knowledge sharing and the recognition of the role of space technology-based data, in-situ monitoring and reliable geospatial information for SD policy-making, programming and project operations was declared in the *“The Future We Want”* report (UN, 2012). These references show the importance of high quality, timely, reliable and disaggregated data, including earth observation and geospatial information in monitoring and evaluation for the “2030 Agenda”. While the significance of GIS technologies for SD policies is mentioned, there is no mention of how these policy processes will be integrated. While this is yet to be determined, the post-2015 development debate has provided a moment of convergence to capture the power and awareness of geospatial information within the global development community (Scott and Rajabifard, 2017).

Little has been documented on how policies can be implemented to bring geographic information and SD together in a coherent and integrated manner. In 2012, when assessing the contribution of geographic information to “Earth Summit” processes, it was noted that geography, with significant impacts on SD, provides the integrative framework necessary to support the needs of multiple knowledge communities in a timely and effective manner (UN-GGIM, 2012). At its fourth session in 2014, it was noted that the level of understanding and adoption of geospatial information remains sub-optimal and that many do not understand its value in the context of the SD agenda, underlining the need to expand the production and use of geospatial information (UN-GGIM, 2014). Accordingly, in early 2014, the UN Secretary-General called for a data revolution to support SD. This call was made with the emerging SDGs in mind and in anticipation of the need for a sustainable flow of high

quality, timely, reliable and accessible data for the continuous measurement of progress at both national and global levels.

The Secretary-General established the “Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG)” to develop a strategic framework and advise the Secretary-General on what the “data revolution for development” will mean in practice, resulting in the report “*A World That Counts*” (Scott and Rajabifard, 2017). The IEAG proposed a “global consensus on data” to adopt principles on legal, technical, privacy, geographic and statistical standards to facilitate an open exchange of information (IEAG, 2014). Subsequently, in 2015, the Statistical Commission established the “Inter-agency Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs)” to develop the global indicator framework on behalf of the General Assembly (Scott and Rajabifard, 2017). Following this process, it became clear that geospatial information and earth observations can provide new and consistent data sources and methodologies to integrate multiple “location-based” variables to support and inform official statistics and SDG indicators. The IAEG-SDGs’ report to the 47<sup>th</sup> session of the Statistical Commission in 2016 presented a proposal for a global indicator for the follow-up and review of the “2030 Agenda”. It was also noted that, depending on levels of methodological development and overall data availability, the integration of geospatial information and statistical data will also be key to the production of some indicators (UN, 2016).

Despite significant and recognized global achievements, the MDGs have failed to recognize the need for data and geography, and their ability to consistently track and monitor progress has been limited. As a result, the most important lesson learned is that data is an essential element of the development agenda. In this context, the lessons learned can be presented as follows (Scott and Rajabifard, 2017, p.66):

- Real data improvement occurs when demand and policy support meet,
- Despite improvement, critical data for development policy-making are still lacking,

- Real-time data are needed to deliver better decisions faster,
- Geospatial data can support monitoring in many aspects of development, from health care to natural resource management,
- New technology is changing the way data are collected and disseminated,
- Global standards and an integrated statistics system are key elements for effective monitoring,
- Data should be open, easily accessible and effective for development decision-making.

Given the importance of data-driven policies to ensure that appropriate actions can be taken, there is a greater concern for SD. A new reality is emerging that shakes the foundations of SD on “leaving no one behind”. Countries with significant data scarcity are also the most vulnerable and at the highest risk of being left behind (Scott and Rajabifard, 2017). It also requires a review of every detail of regional progress toward meeting the SDGs. Nevertheless, the existing SDG monitoring reports use numerical values to show the status of indicators and targets, as in the “UN Sustainable Development Goals Report” (Liu et al., 2019). However, regional averaging often hides spatial variability, and subdividing the data by multiple dimensions, including age, gender and geographic location, is critical to ensure that no one is left behind (UN, 2017). Therefore, steps for progress should be preceded by the establishment of baselines around indicators and the integration of this data with GIS to support development policies related to implementation processes. While the international community has shown great interest in this hot topic, most of it has remained at the conceptual design and pre-testing stages. There are few good practices for comprehensively measuring and assessing progress toward the SDGs through the integration of statistical and geographic information at the national or sub-national level (Chen et al., 2019).

It is often stated that the struggle for SD “will either be won in cities or lost in cities” (Kharrazi et al., 2016). In this context, in addition to following global and national data, the data produced at the city scale should also be put into a sustainable data

cycle within a standardization framework. Therefore, the initiatives of local administrations, which play an important role in shaping cities, should also be monitored within the SDG framework. Enriching the GIS infrastructures of local administrations and establishing customized databases according to SDG indicators and integrating them into the country-wide system will have a very important role in declaring national contributions. Moreover, GIS-based SDG monitoring and evaluation mechanisms created at the city scale will provide a unique decision-support infrastructure for policies to be prepared in line with inter-regional and intra-regional equitable development.

Looking at the recent state of SDG-GIS integration, it can be said that the importance of GIS in the SD context has become more visible. For instance, in 2021, the UN prepared 17 thematic maps for each SDG on a global scale under the slogan “Geospatial, location data for a better world” and published them (UN, 2021). In addition, the UN presented current situation analyses for 2021 and 2022 under the name “SDGMaps” with geospatial methods (UN, 2022). Further, in 2022, “UN Sustainable Solutions Network (UNSDSN)” made a symbolic innovation by associating its logo design with GIS, stating that they are committed to better visualizing the various elements of the SDGs in their work and to produce, disseminate and empower everyone with the data and geospatial tools they need to make a change (UNSDSN, 2022a). In Türkiye, TURKSTAT has taken an essential step for SDG and GIS integration by making thematic maps available to the public, where indicators are presented between 2010 and 2019 through an interactive map based on localized indicators for monitoring the status of SDGs (TURKSTAT, 2022c). However, in Türkiye’s 2019 and 2020 VNRs, assessments are presented through texts, tables and graphs, but there are no maps to represent the geographical projections of the data (SBO, 2019b, 2020). Likewise, there are many studies in the literature to develop methods for SDG-GIS integration (see, e.g., Acharya and Lee, 2019; Avtar et al., 2020; Erdoğan and Aslan, 2021; Tekin et al., 2022). Therefore, steps have begun to be taken for the SDG-GIS integration process, but there is still a long way to go.

## 2.6 Concluding Remarks

In this chapter, the concepts on which the thesis research is based, historical developments and important points of the literature studies are mentioned, aiming to create a ground that will contribute to the improvement and understanding of the study. In this context, the main pillars of the study; namely sustainability, development, glocalization, SD, EU financial assistance, local authorities in Türkiye and GIS-related foci are addressed separately.

In the first part, the basic concepts of the study are discussed. The main conclusions are that the concept of development based on economic growth has lost its effectiveness as a result of the global environmental crises that have emerged as its drawbacks and that the concept of sustainability has emerged in parallel. In addition, it has been understood that the concerns arising from globalization can be solved with the glocalization approach and the principle of “think globally, act locally”. In this context, it can be concluded that the sustainability approach, which was formed as a solution to the global crises that emerged as a result of development approaches, can be successful by building on the glocalization approach. This means that local authorities are assigned critical roles for the implementation processes of a global SD approach in the steps taken for a sustainable future.

In the second part, the evolution of the concept of SD and the details of the “2030 Agenda” are discussed. SD has been designed as an inclusive growth model as a result of a self-criticism of the activities undertaken throughout human history. This agenda, which is an urgent global call to action in light of the economic, social and environmental crises that have been and are being experienced, offers a detailed global framework of targets and indicators for more systematic implementation of practices. This agenda, which has already found its response in the global arena, has turned into a mobilization for transformation involving all countries. This shows that the SDGs are the last call and need to be taken seriously in order to sustain life for the whole world on very delicate lines. Moreover, the duties of local administrations

in the action plans prepared for the realization of the SDGs reveal that the work of local administrations should be closely monitored in relation to the SDGs.

In the third section, it is stated that developed countries and supranational organizations have established many partnerships in line with international cooperation for the achievement of the SDGs. The EU's approach to SD and its financial assistance to Türkiye are examined. It is concluded that the EU is one of the global leaders in the process of SD realization. In this context, it is seen that all the initiatives of the EU in internal and external activities are linked to the SDGs. Moreover, Türkiye is one of the main beneficiaries of EU financial assistance due to its candidate country status and there are SDG orientations in this financial assistance due to the EU SD approach.

The fourth section attempts to understand the place of local administrations, one of the most critical implementers of SD, in the country's administrative structure. First of all, in order to clarify Türkiye's approach to SD, national initiatives are mentioned and it is concluded that many institutional and regulatory arrangements have been made for Türkiye's national SDG contributions. It is emphasized that local authorities have a very important position in the administrative structure and with the latest legal regulations, the only unit that can be called local administration are municipalities. It is also concluded that there is a large gap in the level of initiatives to be undertaken related to SD due to differences in financial and technical capacities among these municipalities. Finally, the access of local authorities to international finance is analyzed and it is found that municipalities have to turn to international finance due to budget imbalances. In this respect, it was stated that EU grants are critical for small-scale municipalities which have more financial and technical disadvantages.

In the last section, the integration of geospatial information and the SD approach is addressed. It is concluded that GIS offers a unique opportunity as a tool for digital management of the collected quantitative and qualitative data in a geospatial environment. GIS offers decision-support mechanisms by utilizing the visual

capabilities of maps through rich analyses by integrating data obtained by different methods, geographical features and even real-time data and satellite images obtained by RS technologies. However, while there is a growing awareness that data needs to be supported by GIS-based technologies for SD to come to life, much progress has not been made in this area. SDG-GIS integration has emerged as one of the hottest topics on the global agenda. Accordingly, it has become clear that there is a need for methods to be developed in this field.

In conclusion, some radical changes, even revolutions, are needed to stop the destruction of nature as we know it. The “2030 Agenda” is a call to action and it is vital that the SDGs are realized. To this end, it is crucial to make the right decisions based on planning to take the right actions. The right decisions are directly proportional to the scope of the data they are fed with. GIS-based technologies add a very valuable dimension to the monitoring and evaluation processes of the SDGs and serve as decision-support mechanisms for action plans, regional plans and strategic plans. It is crucial to evaluate the baselines as well as the initiatives of local administrations, which are the most powerful forces shaping the cities due to the dense population and economic activities living in the cities, with GIS technologies. This is because the reflection of the contributions of the projects to the baseline values is only possible after the projects are completed, and it takes a very long time for the contributions to be reflected in the indicators, especially when infrastructure projects are taken into consideration. It is therefore vital that the SDG targets of existing initiatives are also monitored so that new investments can be properly directed. However, progress so far in this area has been very limited and a standardized, accurate, high-quality, reliable and sustainable geographic data management system needs to be established before methods can be developed to address these limitations.





## **CHAPTER 3**

### **METHOD**

This chapter seeks to present the methodology of the thesis. It starts with a description of the research design. In this section, the main components of the research and the limitations of the conducted methodology are put forward. Then, the general outline and flowchart of the methodology to be applied are presented and the map of the path to be followed is clarified. Next, the data sets and the methods used in the data collection process are presented. Thereafter, the pre-analysis is explained. The chapter concluded with an explanation of the data analysis processes.

#### **3.1 Research Design**

The research has a multidimensional structure, reflecting its purpose and research questions. Figure 3.1 presents the conceptual framework of the research design. The overall design of this visualization was created in the context of the “2030 Agenda” derived from the literature discussed in the previous chapter. The contributions to the global goals set for SD by 2030 are presented in relation to the actors and actions that this study focuses on. In addition, the positioning of the study area, study sample, dependent variable and method in the conceptual diagram is highlighted.

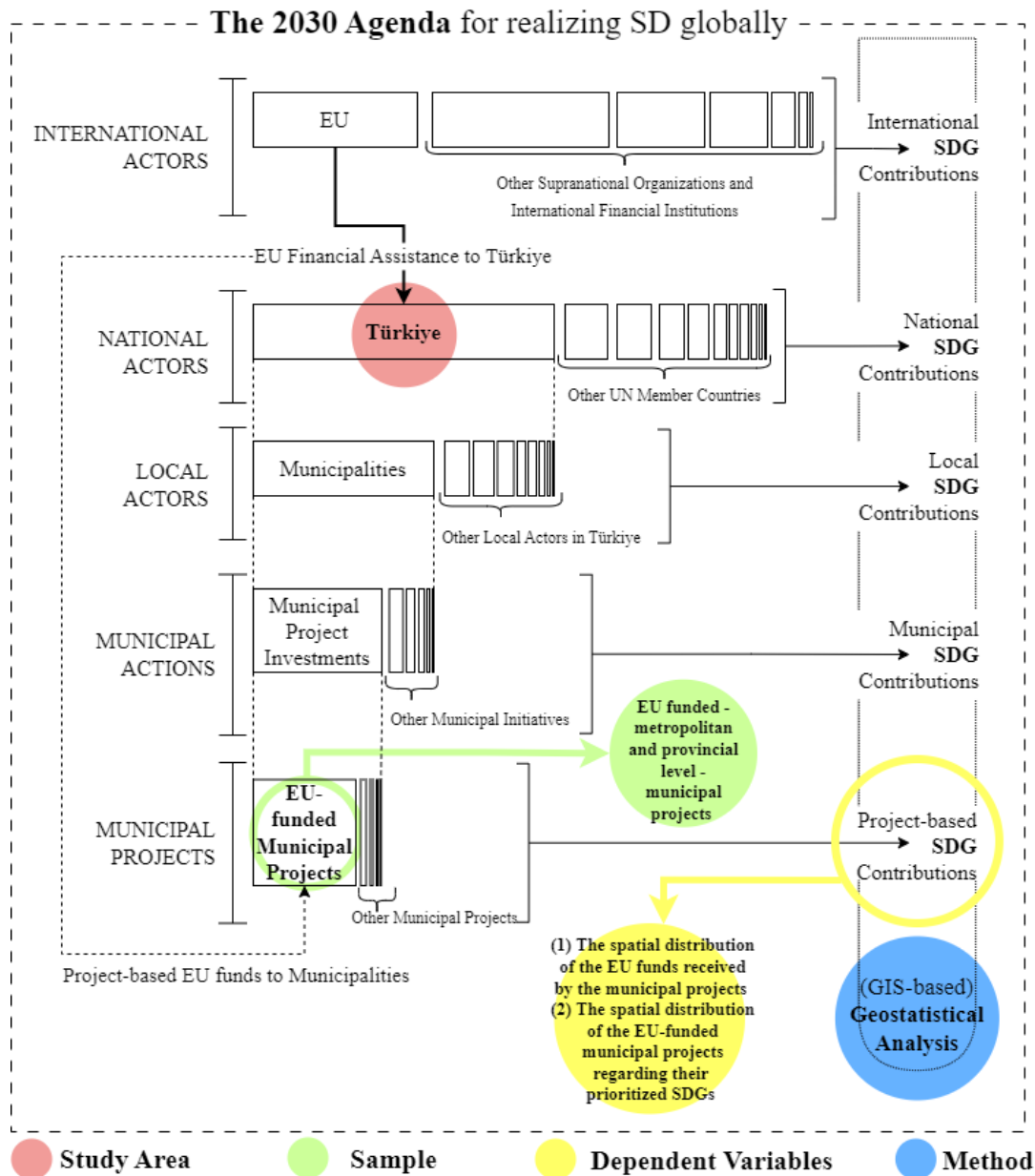


Figure 3.1 The conceptual framework of the research design (produced by the author).

The spatial distribution of the EU funds received by the municipal projects and the spatial distribution of the EU-funded municipal projects regarding their prioritized SDGs are the dependent variables of the research. In this context, Türkiye, one of the developing countries covered by this agenda, has been identified as the study

area. In addition, the support provided by international organizations to developing countries has a critical role, as detailed in SDG 17. The EU is one of the key actors in the international arena contributing to the realization of the SDGs and provides Türkiye with a large amount of financial and technical assistance in various fields due to its candidate status. In this respect, the EU's financial assistance to Türkiye is another focus of this study. Moreover, cities have a huge influence factor in the implementation steps of SD, as previously mentioned in the thesis. Therefore, the project investments of local administrations, which are the most important actors in urban change and which can take the fastest, most democratic and need-based actions in cities, constitute another focus. The EU-funded municipal projects of metropolitan and provincial municipalities in Türkiye are determined as the sample set. Furthermore, it is very important to ensure the use of GIS applications for monitoring and evaluation processes, which – as the thesis argues - have a vital role in the achievement of the SDGs. Accordingly, geostatistical analysis techniques and methods for assessing SDG contributions are the cross-cutting dimensions of this study.

### **3.1.1 Study Area**

Türkiye is determined as the study area in this thesis for a number of reasons. These reasons can be summarized as follows: it has the characteristics that can represent the challenges of developing country content, has a wide economic, geographical and social spectrum, has established the ground for SDGs by making legal and administrative regulations on the SD path and receives significant financial support from the EU due to its candidate status.

Türkiye is a country in the Mediterranean basin, neighboring the countries on the EU eastern border, with a surface area of 780,043 km<sup>2</sup> (MoND, n.d.-a) and 84,680,273 inhabitants, excluding SuTP as of 2021 (TURKSTAT, 2022b). As shown in Figure 3.2, it consists of 81 provinces, 30 of which are metropolitan municipalities and 51 are provincial municipalities. As illustrated in this same figure, provinces with more

than 750,000 inhabitants are metropolitan municipalities. As mentioned in the previous chapter, the financial and technical capacities of municipalities vary depending on the population they serve. Therefore, provinces with lower populations such as Tunceli, Bayburt and Gümüşhane have less financial and technical capacity compared to other provinces, while Istanbul has the most. Understanding the population distribution allows inferences to be made about the capacities of municipalities and is also important for interpreting the impact of SDG contributions provided in the results chapter by understanding how much of the population they address. Accordingly, these metropolitan municipalities, where population, technical and financial capital are concentrated, are expected to receive the largest share of the total budget of EU-financed municipal projects.

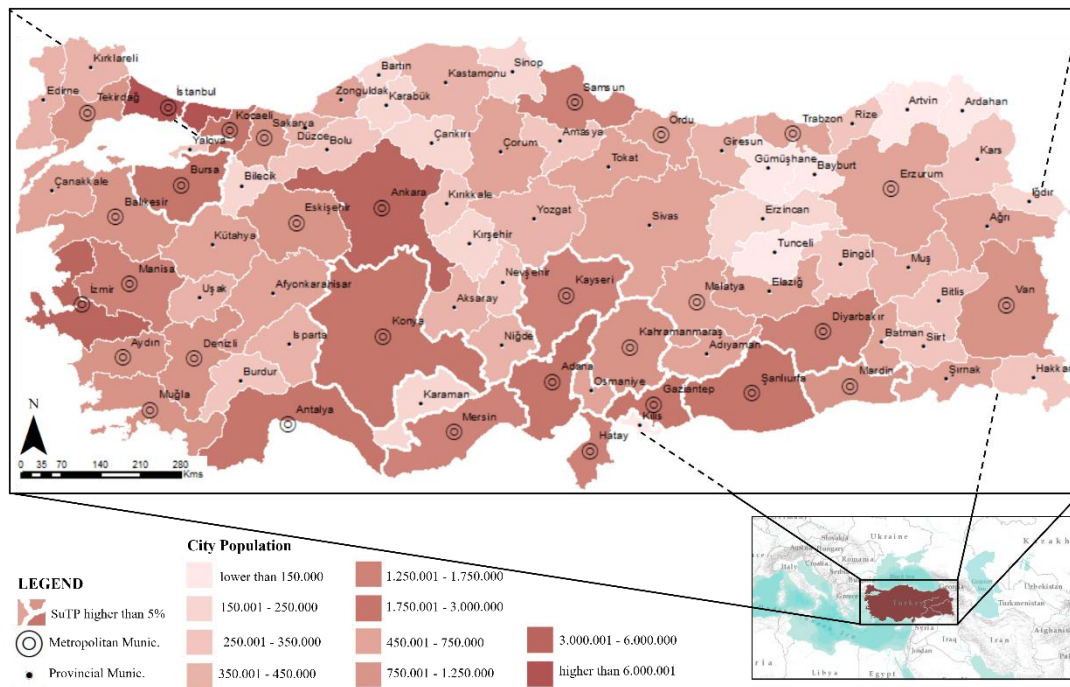


Figure 3.2 The demographic structure and the type of municipalities in Türkiye by province.

*Note:* Figure in this review has been originally produced by the author with reference to the information retrieved from (2022) and TURKSTAT (2022a).

In addition, the EU financial assistance programs FRIT and MADAD are offered to reduce the burden that SuTPs bring to Türkiye, and large sums of financial support

have been and will continue to be provided from these sources. In this context, 61% of SuTPs living in Türkiye, according to DGMM (2022), are concentrated in the south-eastern provinces. In this context, the sudden increase in population due to SuTP strains the carrying capacity of municipal service infrastructures. In this case, fiscal policies related to the SuTP are expected to have an impact on the geographical distribution of the cumulative budget by province in the year of operation. Therefore, some of the backlogs of EU-financed municipal initiatives are anticipated to be concentrated in SuTP-intensive provinces.

### **3.1.2 Limitations of the Research**

As mentioned in the previous chapter, the “2030 Agenda” was adopted in 2015. Therefore, if this date is taken as a starting point, study results are based on data that is less than 8 years old. Considering project life cycles, this period can be considered too short for investments to be reflected in SDG indicators as realization values. This is because construction and infrastructure works are completed over long periods of time, the contributions of capacity-building activities emerge after the internalization phase, and planning investments are realized in subsequent actions. This paper therefore adopts two main approaches to address the disadvantages of this time-based constraint.

First, the MDGs, the predecessor of the SDGs, cover the period between 2000 and 2015. During this period, the EU SDS was renewed in 2006, making it more comprehensive, and the SD approach was adopted as a principle in the Union’s external actions as well as internal ones. Then, in 2007, IPA-I started to be implemented, so the study’s sample set saw a number of SD-oriented ex-ante investments. Hence, the study has chosen 2008 as a starting point considering the fact that projects mature approximately one year later than when IPA-I was activated, a strategy that extends the scope of the time constraint. Therefore, the study considers the period between 2008 and 2014 as the SDG frontier period and the period between 2015 and 2022 as the main SDG implementation period.

Second, in order to avoid the time barrier in the realization of investments in SDG indicators, project effectiveness dates were taken as the basis, not project completion dates. Thus, the SDGs targeted to be contributed through the projects are considered.

Another limitation of the study is related to methodology. As mentioned in the previous chapter, there is still a long way to go in terms of SDG-GIS integration because the geographical dimension of SD has recently emerged as a debated issue in the global arena. Therefore, progress in this area is one of the hottest topics today. In this context, efforts are being made to develop GIS-based geostatistical SDG assessment methods. However, the currently developed methods are weak in providing a methodological background for project-based assessments of actions to be implemented by local authorities. This thesis argues that SDG-GIS integration is vital for achieving global goals without leaving anyone and anywhere behind. Given the questions posed, this thesis focuses on spatial clustering analysis methods to assess municipal investments in the SDGs from a spatial justice perspective. In order to develop further methodologies in the SDG-GIS literature with this approach, a method review was conducted in order to select the appropriate geostatistical methods for the context. As a result of the research, a method set was created from the ones that are suitable for the data generated, that can answer the study questions and that can serve the purpose of this research.

Furthermore, spatial cluster analysis, which has been chosen as the study method, basically functions as an interpretation tool based on visualization. It provides statistical data and maps on spatial clusters depending on the parameters determined in line with the geographical neighborhood associations of numerical values. In other words, the visuals obtained as a result of these analyzes can be interpreted as the mapping of the statistical analysis of the dataset based on geographical associations. Therefore, slightly different results may be obtained if a different method is selected or parameters are changed within the global and local spatial clustering methods. Considering this situation, it would be meaningful to state that the results of the research are obtained within the limitations of the method and the selected parameters.

Accessing the data was another problem experienced by the author of the thesis. As mentioned in the previous chapter, especially in developing countries, there are difficulties in accessing high-quality, accurate, proper, reliable and standardized data. This is the biggest barrier experienced during the data collection phase of the study. Unfortunately, there is no integrated, holistically standardized and customizable province-based geographic data set in Türkiye. Moreover, due to the political structure of municipalities, the data sources available at the municipal level are very limited. In addition, EU-funded project documents and related data can be obtained piecemeal from different sources, leading to gaps in details such as the funding budget allocated to the municipality in some projects. Finally, data on the SDG contributions of EU-funded municipal projects are not available for all projects, leading to gaps in the data set. To overcome the challenges posed by these limitations in data access, this study adopts the following four strategies:

- (1) Due to the lack of integrated, reliable and customizable geographic data, the author digitized the collected data to create a geographic data set.
- (2) Since it is difficult to access municipality-based data, the project data set was created by the author by scanning different publicly available sources. Therefore, the research was limited to the information presented in the projects and documents available online.
- (3) Since the data was obtained from different sources, some gaps were identified in the created data set, especially in the distribution of the investment budget. These gaps are found in technical assistance activities covering more than one municipality; while the total budget is available, the municipality-based breakdown is not. In this case, the author filled the gaps by taking the average of the total budget and distributing it to each beneficiary municipality in case the project components provided the same type and capacity of activity for each municipality.
- (4) Since the SDG contributions of the projects were not presented separately in each of them, the project documents were analyzed one by one. As a result of the review, depending on the project objective, components, outcomes and

referenced SDGs if exist, the SDGs contributed by the project were associated by the author as primary, secondary goals in the light of the SDG definitions given by the UN (n.d.-a).

### 3.2 Methodology

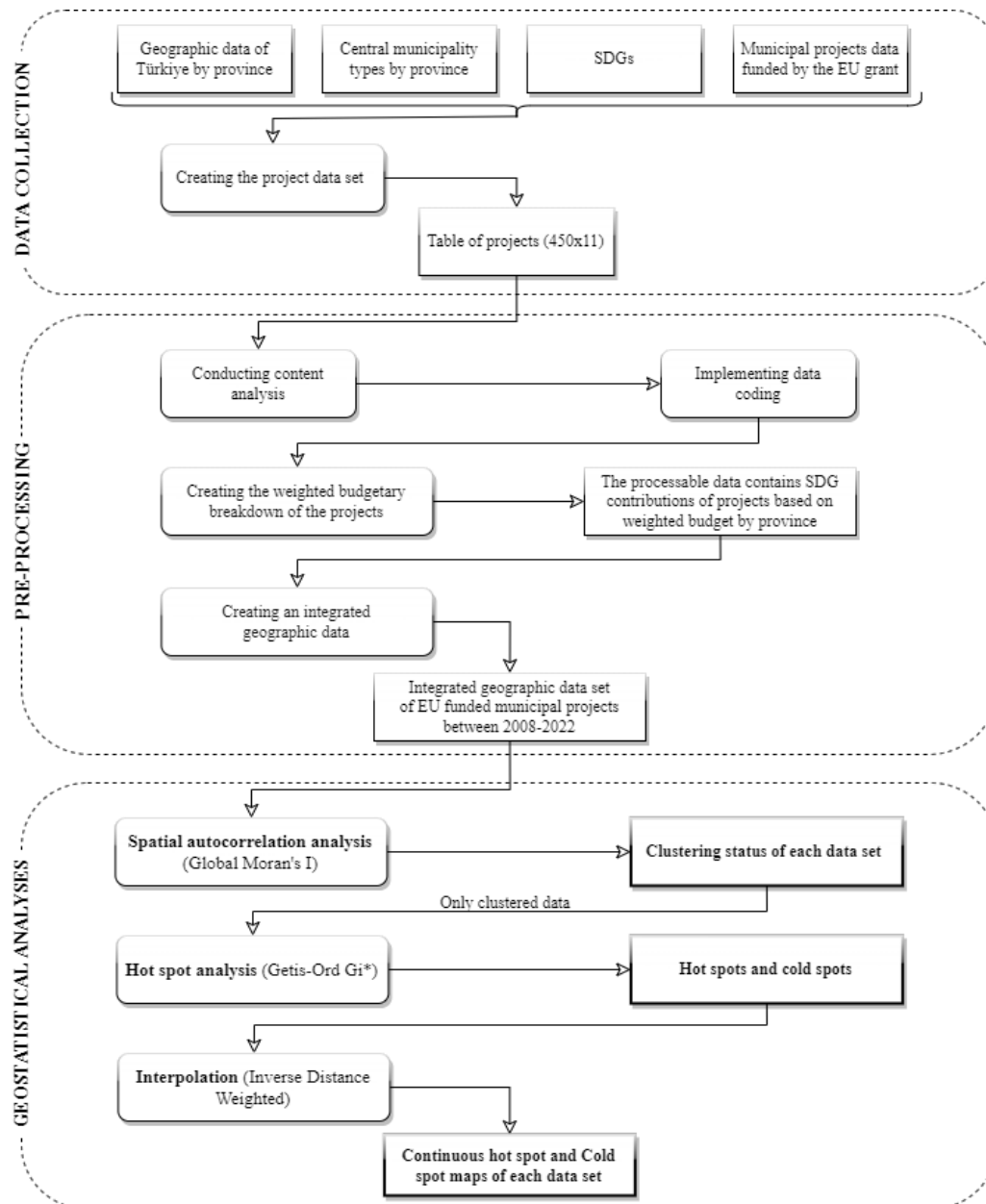


Figure 3.3 The flowchart of the method (produced by the author).



The methodology of the research is based on a geostatistical methodology review within the framework of the research purpose and research questions. In this section, the methods followed to achieve the results of the research questions are presented step by step along with their basic principles. The flowchart of the method is displayed in Figure 3.3. As can be clearly seen in the figure, the research conducted in this study consists of three main phases: data collection, pre-processing and geostatistical analysis. The steps and their flow under each phase are presented in the figure. The methods applied, justification for the choice of methods, basic principles, sub-stages and overview of the collected data are described in detail in the following sections.

### **3.2.1 Data Collection**

Publicly available data were obtained from databases, project documents, award notices for programs and reports, which can be accessed through the official websites of related institutions. Table 3.1 lists the type, date and source of the collected data by data category. As shown in the table, data were collected in four categories. First, Türkiye's geographical vector data was obtained on the basis of provinces in order to be used as a base in the process of converting the projects into geographical data. Second, metropolitan municipality and provincial municipality statuses, which were specified as a sample among local administrations, were obtained. Third, the definitions, sub-targets and indicators of the SDGs of the projects were obtained as a reference for the content analysis of their contribution to the SDGs. Lastly, information on EU grant-funded metropolitan and provincial municipality projects between 2008 and 2022 published on the official websites as of January 31, 2023 was collected.

Table 3.1 Data types, dates and sources by data category.

<b>Data Category</b>	<b>The Content of the Collected Information (with Data Sources and Dates)</b>
Geographic data of Türkiye by province	- The geographic provincial data of Türkiye in shapefile format (MoND, n.d.-b)
Data based on municipalities	- Type of municipality (MoI, 2019)
SDGs	- Definitions of UN SDGs, related targets and indicators definitions (TURKSTAT, 2021; UN, n.d.-a)
Municipal projects data funded by the EU grant	<ul style="list-style-type: none"> <li>- Online project database of EUD (EUD, n.d.-b)</li> <li>- Online grant database of CFCU (CFCU, n.d.)</li> <li>- Online project database of DEU (DEU, n.d.)</li> <li>- International projects' archive of ILBANK (ILBANK, n.d.)</li> <li>- Online project database of international financial institutions (AFD, n.d.; EIB, n.d.-b; UNDP, n.d.; WB, n.d.)</li> <li>- Online project databases of relevant ministries (MoEUCC, n.d.; MoFA, n.d.-d, n.d.-b, n.d.-c; MoTI, n.d.-a, n.d.-b)</li> <li>- Online project database of EC (EC, n.d.-b, n.d.-c, n.d.-a)</li> </ul>

### 3.2.1.1 Project Data Set

From the publicly available sources mentioned in the previous section, project data was obtained with respect to the donor (EU), timeframe (2008-2022), final beneficiary (metropolitan and provincial municipalities) and financial mechanisms (grants) identified in the study. The raw data were combined into a table with 11 columns, part of which is shown in Figure 3.4. Here, it is important to note that some of the column headings (like project definition or type of EU program) were created by the author considering the fact that such information can be used as part of other research studies; in this research, to respond to the research questions posed in this thesis, the author used the information related to the province, project year, prioritized SDGs and the project budget.

Project_Name	Project_Definition	Province	Final_Beneficiary	EU_Prg	Year	OECD_Budet_Pr urpose_Class	OECD_Budet_Sub Propose_Class	Investment/ Activity_Ty pe	Budget (Euro)	Source
AMPAIGNers (Citizens Acting on Mitigation Pathways through Active Implementation of a Goal-setting Network)	Define target lifestyles and scope of action; derive replicable best-practices from relevant case studies; establish a lasting goal-setting network.	Izmir	Izmir Metropolitan Municipality	Horizon Europe	2021	General Environment Protection	Environmental policy and administrative management	Planning	€ 34.225,00	CORDIS PROJECT DATABASE
Developing Voluntary Environmental Protection Programs	Systems such as sewerage, water treatment, garbage treatment separation were examined in detail and ideas	Artvin	Artvin Municipality	IPA	2008	Water Supply & Sanitation	Water sector policy and administrative	Capacity Building	€ 118.863,97	CFCU GRANT DATABASE

Figure 3.4 A screenshot shows a part of the prepared data set.

The lack of an integrated database that includes all projects is the biggest challenge to accessing the data. In order to overcome this situation, a search was conducted on accessible online sources and after identifying the sources containing processable data, the data collection process started. The data collected is limited to the information publicly available in the sources mentioned from the previous section.

While searching different sources, databases and award notices, the relevant filtering tools provided by the website/database were utilized. In order to obtain the information specified in the table, the project documents were examined and each relevant section was marked with different colors on the documents and transferred to the table. In addition, project information presented in different details from different sources was supplemented by extracting it from accessible project documents. In cases where repetitive data was found in different sources, a cross-check was performed to increase the validity of the findings. The sources of the collected data were mentioned in the “Source” column.

Finally, for some projects with technical assistance activities, it was observed that the number of final beneficiaries was greater than one (i.e., there were more than one municipality engaged with technical assistance activities), but the budget breakdowns of these projects were not available. In such cases, the author checked whether the works were of the same nature; in those where no qualitative differences could be identified, the total budget was distributed to beneficiaries on average.

### 3.2.1.2 A General Overview of the Sample Set

The sample set of the research is the EU-funded projects of the metropolitan and provincial municipalities in Türkiye. In this data set, grant-funded metropolitan and provincial municipalities' projects effective between 2008 and 2022 were included. In this context, 450 projects with a total budget of approximately 1647 million EUR were analyzed.

The total budget and number of projects by year are shown in Figure 3.5. In general, it can be said that the investments made are concentrated between 2016 and 2020. Looking at the values with the highest share in the distribution, it can be seen that about 22% of the total budget of investments is in 2017, about 18% of the number is in 2009 and the highest normalization share is in 2020 with 6 million EUR per unit project. Looking at the values with the lowest share, it can be seen that around 7% of the total budget of investments is in 2021, around 8% of the number is in 2012 and 2014 and the lowest normalization share is in 2021 with 0.48 million EUR per unit project. Moreover, when the normalizations of the budget to the number are taken into account, it can be seen that the projects have different budgetary values.

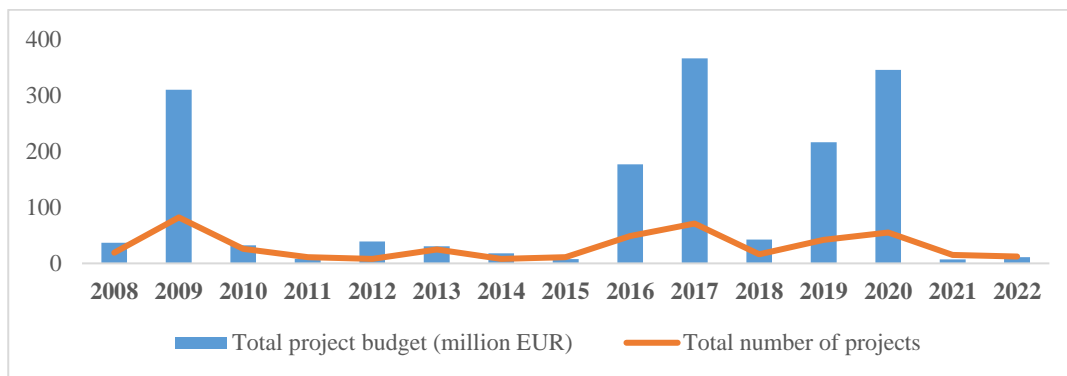


Figure 3.5 The total project budget and the number of projects by year.

Looking at the distribution of projects according to EU grant programs, it is seen that the IPA program has the largest share with a total of 294 projects and approximately 70% of the total budget, as shown in Table 3.2. In addition, the MADAD program

finances the least number of projects with 25, while the program with the lowest percentage in terms of budget is ERASMUS+ with 0.03%. When we look at the normalization of the budget according to the number of projects, the order from high to low is as follows: FRIT, IPA, MADAD, Horizon Europe and Erasmus+. Therefore, it can be argued that investments made in FRIT, IPA and MADAD programs have a higher impact factor in the budget-based spatial distribution. Moreover, the fact that the investments made in FRIT and MADAD programs were activated in the period between 2015-2022 shows that they have the potential to change the balances in the second period of the research in spatial distribution.

Table 3.2 The percent share of the total project budget and the number of projects by EU funding program.

EU funding program name	Number of projects between 2008-2014	Number of projects between 2015-2022	Total number of projects	The share of the total budget
IPA	169	125	294	70,11%
FRIT	0	74	74	23,94%
MADAD	0	25	25	5,14%
HORIZON EUROPE	8	23	31	0,77%
ERASMUS+	2	24	26	0,03%
<b>Total</b>	<b>179</b>	<b>271</b>	<b>450</b>	<b>100</b>

The distribution of the total budget and budgetary share of EU grant programs by NUTS statistical regions in Türkiye is presented in Figure 3.6. The sizes of the pie charts in the map represent the total budget of the project investments in the region and the slices represent the budgetary share of the EU programs in the region. It can be seen that the projects activated between 2008-2022 are concentrated in TRC and TRB regions, while TR5 and TR1 have the lowest share. In addition, projects funded by IPA, FRIT and MADAD programs are also concentrated in TRC and TRB regions in terms of budget.

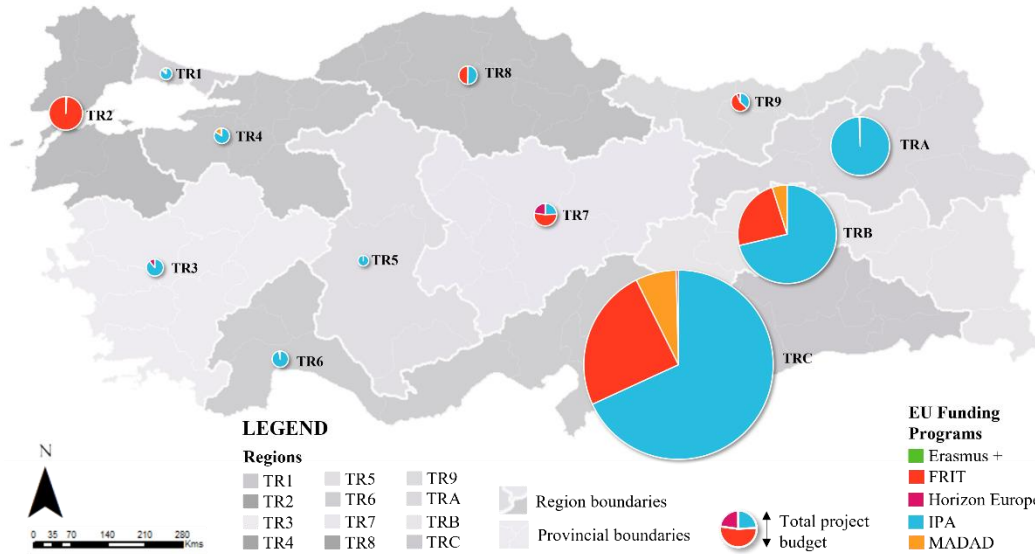


Figure 3.6 The share of EU funding programs based on the total project budget by NUTS statistical regions in Türkiye between 2008-2022.

The budgetary and numerical distribution of the projects in the study by municipality type is shown in Figure 3.7. As stated in the previous sections, it is clearly seen that metropolitan municipalities with high population and capital density have a larger share. Approximately 66% of the total project budget is allocated to metropolitan municipalities and 34% to provincial municipalities. Furthermore, the budgetary normalization per municipality of 30 metropolitan municipalities is around 36 million EUR, while 51 provincial municipalities have a budget of around 11 million EUR. In addition, when looking at unit budgets per project, both metropolitan municipalities and provincial municipalities have around 3.7 million EUR. This is interesting because given that the population served by municipalities is concentrated in metropolitan cities, one would expect project budgets to be higher in these provinces.

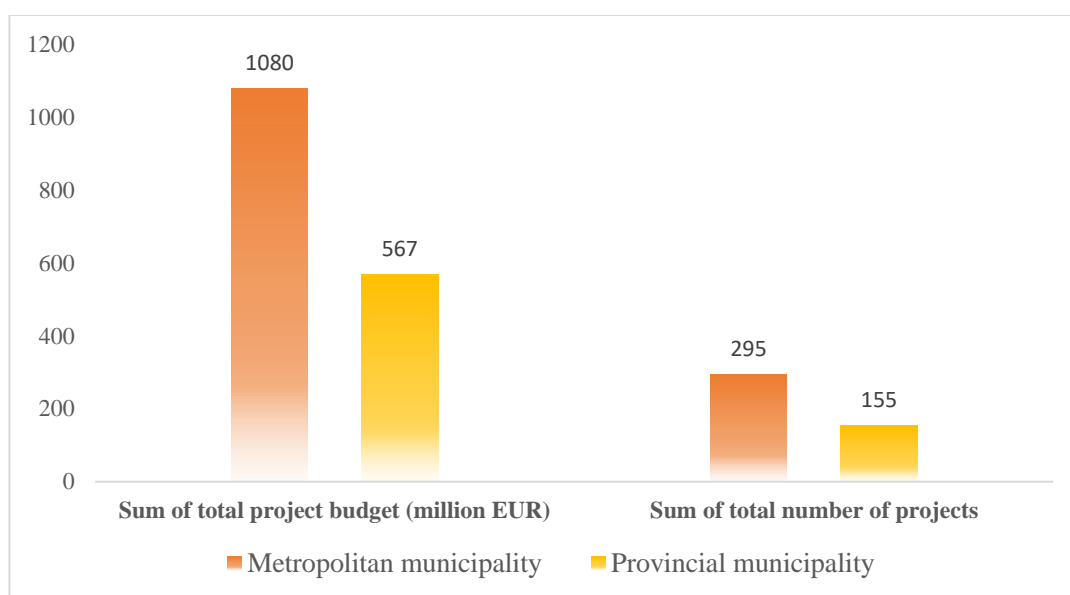


Figure 3.7 The total project budget and the number of projects by municipality type.

The classification of projects by sector is based on the purpose codes updated in the OECD's 2022 report (see, (OECD, 2022)). In this context, the percent share of the total project budget and the number of projects by investment field are shown in Table 3.3. According to the table, project investments were activated in 15 sectors. Out of 450 projects, the highest number of projects is in the water supply and sanitation sector with 112 projects, while the lowest number of projects is in the health and industry sectors with 2 projects. In addition, when we look at the budgetary breakdown, the water supply and sanitation sector have the largest share with almost 90%. As mentioned in the previous chapter on the reasons why local authorities turn to international financing, water supply and sanitation projects are the most demanded areas for international financing due to their high cost among municipal services. It is not surprising that this sector also dominates both numerically and budgetarily in the municipal projects funded by EU grants between 2008 and 2022.

Table 3.3 The percent share of the total project budget and the number of projects by investment field.

Investment field	Number of projects between 2008-2014	Number of projects between 2015-2022	Total number of projects	The share of the total budget
Agriculture, Forestry, Fishing	1	2	3	0,02%
Business and Other Services	3	3	6	0,00%
Education	22	16	38	3,25%
Emergency Response	1	4	5	0,06%
Energy	1	14	15	0,66%
General Environment Protection	15	15	30	0,51%
Government and Civil Society	92	14	106	0,36%
Health	2	0	2	0,02%
Industry	0	2	2	0,90%
Other Multisector	3	16	19	0,40%
Other Social Infrastructure and Services	17	31	48	2,52%
Refugees in Donor Countries	0	47	47	0,28%
Tourism	2	2	4	0,03%
Transport and Storage	2	11	13	1,05%
Water Supply and Sanitation	18	94	112	89,98%
<b>Total</b>	<b>179</b>	<b>271</b>	<b>450</b>	<b>100</b>

The distribution of the projects within the scope of the study by investment type is presented in Table 3.4. Investment types are categorized into 5 classes. Projects that include more than one activity and do not have an apparent weight difference between them are considered integrated projects. According to the table, awareness-raising and capacity-building projects have the largest numerical share with 198 out of 450 projects between 2008-2022, while procurement of goods investments have the smallest share with 13 projects. In budgetary terms, the largest share is construction projects with almost 93%, while the smallest share is procurement of goods projects with 0.7%. As can be seen from the table, construction projects have the biggest impact on spatial distribution according to budget accumulation. Moreover, the largest increase in the number of projects in the post-2015 period compared to the previous one has also been in construction projects. Hence, it can



be expressed that the impact of these projects on spatial distribution will become more effective in the second period.

Table 3.4 The percent share of the total project budget and the number of projects by investment type.

<b>Investment type</b>	<b>Number of projects between 2008-2014</b>	<b>Number of projects between 2015-2022</b>	<b>Total number of projects</b>	<b>The percent share of the total budget</b>
Awareness-raising and Capacity-building	133	65	198	2,715
Construction	16	92	108	93,054
Integrated Project	7	46	53	0,582
Planning	23	55	78	2,849
Procurement of Goods	0	13	13	0,799
<b>Total</b>	<b>179</b>	<b>271</b>	<b>450</b>	<b>100</b>

### **3.2.2 Pre-processing**

This section aims to explain the preparation stages of geographic data sets to be used as input for geostatistical analysis. In this context, the data collected for the spatial analysis of the EU-funded metropolitan and provincial level municipal projects that were activated between 2008 and 2022 were first subjected to pre-processing. At this stage, four basic steps were followed to make the data processable and analyzable to answer the research questions. Under this heading, each step is explained respectively.

#### **3.2.2.1 Content Analysis**

As mentioned before, one of the limitations of this study is that prioritized SDGs of municipal projects and budget breakdowns (for shared projects that are carried out in different municipalities) are not explicitly presented in the project documents and thus, in databases. In addition, project indicators are not created in a one-to-one

correlation with the SDGs. To mitigate this limitation, a content analysis is conducted. The purpose of this section is to explain the content analysis process applied in determining the contribution of projects to the SDGs and clarify the overall results of the analysis.

First of all, the methodology of the final report of the "Sustainable Development Goals Türkiye Mapping Pilot Project" published by UCLG-MEWA (2020) was reviewed. During the preparation process of the report, a joint study was carried out with experts and the attribution of projects' contributions to the SDGs according to their components, objectives and outputs was conducted. In this process, according to the SDG contribution weights determined by the experts, the contributions were presented as the primary, secondary and tertiary goals of the project. However, in this report, it is mentioned that the decisions on SDG contribution rates were differentiated according to the perceptions of different experts. In light of the results of this study, a content analysis was conducted to identify the primary and secondary SDGs that the projects aim to contribute to. The main reason for assigning a two-tier goal was that not all projects referenced the three distinct goals to which they contributed. Therefore, in order to analyze the entire data set in a consistent manner, a two-tier attribution was applied.

The information on which the content analysis is based on the declared data in the project documents that are presented publicly available by the relevant institutions. Therefore, the information presented in the analyzed text defines the limits of the study. The accessible project documents were reviewed and the parts referring to the SDGs were highlighted in different colors for each SDG, as shown in Figure 3.8. Subsequently, the project objectives and outputs were examined and the SDGs published by the UN (n.d.-a) were cross-checked with the relevant sub-targets and indicators. The SDGs referenced in the project objectives and outputs were ranked according to the prioritization weights given in the document.

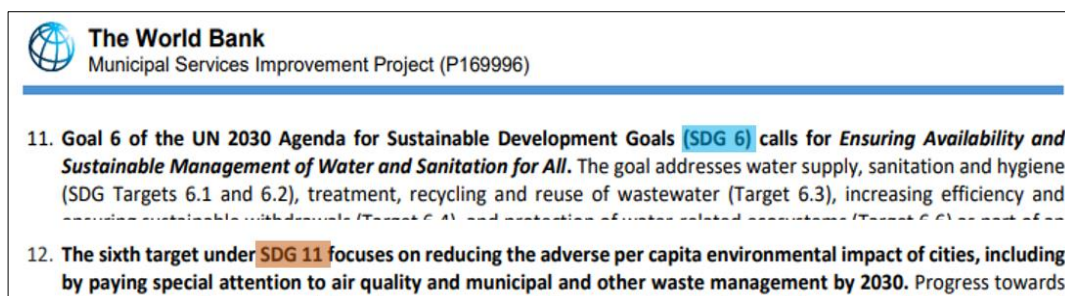


Figure 3.8 A screenshot shows the content analysis highlighting the document (WB, 2020).

All of the primary and secondary objectives obtained from the content analysis were added to the project data set as two separate columns. A project and objective categorization were created to fill the gaps in the projects where the project documents accessed in the database did not provide sufficient references. The description, purpose and outputs of the projects containing gaps were examined in light of this categorization and then cross-checked against the SDG definitions provided by the UN (n.d.-a) and the table was completed.

Figure 3.9 illustrates the results of the content analysis regarding the total project budget and the number of projects by SDGs. This figure shows that SDG6 has the highest budget share with about 60% of the total budget and SDG11 has the second highest share with about 29%, while SDG14 has the lowest share with about 0.004 and SDG15 has the second lowest share with about 0.01. In terms of the number of projects that support a particular SDG, SDG11 is the most addressed (305 out of 450 projects), while SDG3 and SDG14 are the least addressed (2 out of projects for both SDGs). In terms of average budgets per project, SDG6 has the largest share with around 11 million EUR, while SDG14 has the lowest share with around 0.03 million EUR.

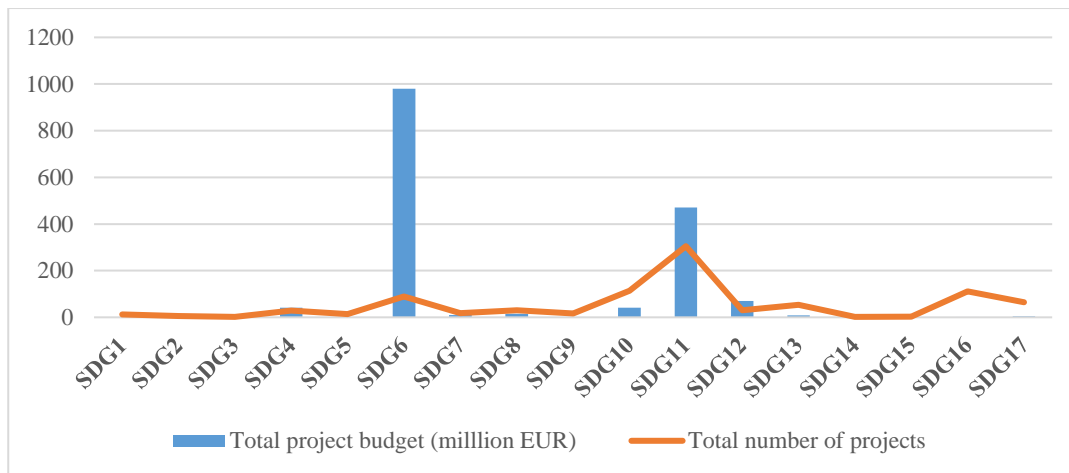


Figure 3.9 The total project budget and the number of projects by SDG.

Table 3.5 shows the primary and secondary SDGs addressed by the number of contributing projects. The x-axis of the table represents the secondary goals and the y-axis presents the primary goals. Furthermore, the cell colors indicate the magnitude of the number of projects from dark to light, white cells indicate no projects. According to the table, the highest numerical value is contributed primarily to SDG6 and secondarily to SDG11 with 89 projects, and similarly primarily to SDG16 and secondarily to SDG11.

Table 3.5 The total number of projects by primary and secondary SDGs: the x-axis represents the secondary SDG concern and the y-axis represents the primary SDG concern.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Σ
1																		0
2																		1
3	2																	4
4																		2
5																		23
6																		13
7																		89
8																		16
9																		10
10																		21
11	10																	4
12																		12
13																		36
14																		21
15																		10
16																		72
17																		24
Σ	12	2	0	6	1	0	2	21	5	78	233	6	42	1	2	22	17	450

Figure 3.10 shows the budgetary contribution of the projects to the SDGs by year of activation. As can be seen in this figure, SDG6 and SDG11 have the most dominant percentages in the investments made in that year. While, in 2011 and 2021, SDG4 has the dominant percentage. Since it is not within the scope of this thesis to examine these SDG shifts by year and their possible drivers, these results are not analyzed in detail. However, SDG6 and SDG11 can be expected to be effective actors in spatial distribution.

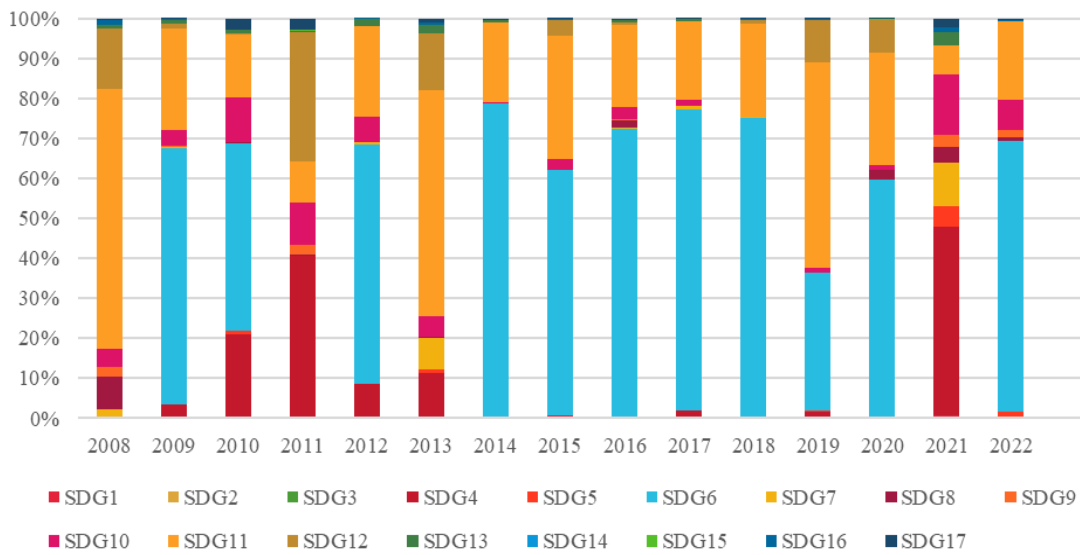


Figure 3.10 The percent share in yearly total project budget by SDGs.

The budgetary distribution of contributions to the SDGs by province is mapped in Figure 3.11. In this map, the height of the bars indicates the size of the total project budget by province, while the colors indicate the proportion of SDGs contributed to the total budget of that province. As can be clearly seen on the map, the total budget is concentrated in provinces located in the south-eastern region of Türkiye. Moreover, when SDG contributions by province are analyzed, SDG6 is the most dominant goal in almost every province that has an apparent share. In addition, SDG11 has the second-largest share in the distribution. The regions where SDG6 and SDG11 are also concentrated are in line with the distribution of the total budget. Finally, there are no provinces in western Türkiye with a visible budget share except Balıkesir, Kütahya, Antalya, İstanbul, İzmir, Bursa and Kocaeli.

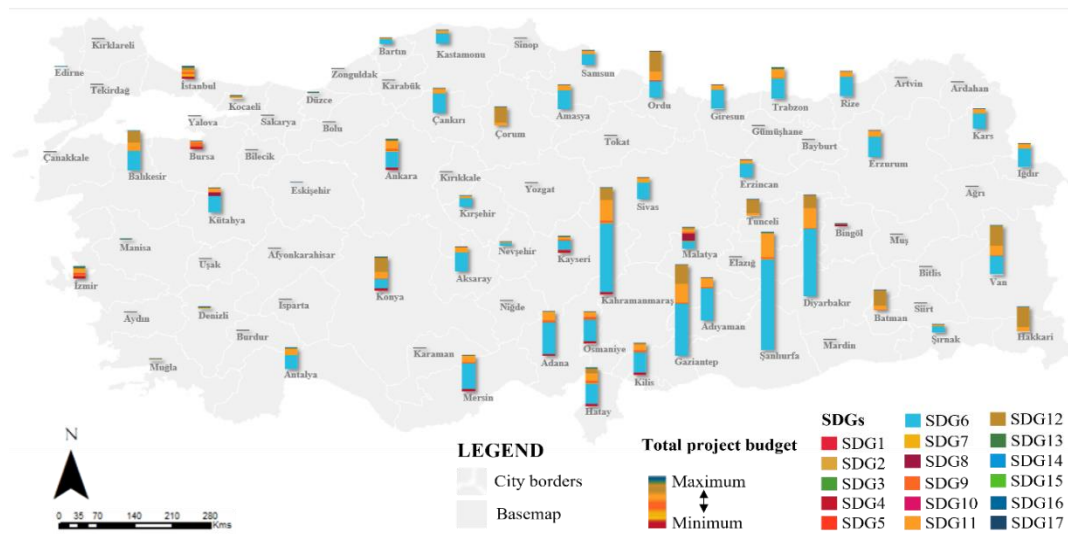


Figure 3.11 The share in the provincial total project budget by SDG.

### 3.2.2.2 Data Coding

While analyzing the table where the data about the projects and their contributions to the SDGs is processed in GIS applications, a data coding was made to optimize the performance depending on the storage size of the data. Eight different tables were created and IDs were determined for each unique entry. These IDs were entered into the main table as foreign keys with distinct colors, as can be seen in Figure 3.12. In this way, connections between the tables were established and maximum performance was achieved during the analysis. In addition, a quality data set was obtained by testing whether a duplicate project was entered during the coding phase.

Project Cod	Project ID	IBBS_III_Province Codes	EU_ID	Year_Project	OECD S ID	I_ID	S_ID	Primary SDG	Secondary SDG	Project_Budget
PR424	PID221	TR310	E5	2015	OS35	I1	S11	SDG10	SDG8	€ 3.517,25
PR395	PID194	TR622	E4	2018	OS31	I1	S03	SDG9	SDG17	€ 4.750,00
PR293	PID176	TR332	E1	2009	OS24	I2	S01	SDG16	SDG11	€ 7.054,67
PR266	PID173	TR423	E2	2017	OS30	I5	S11	SDG17	SDG10	€ 61.728,40

Figure 3.12 A screenshot shows a part of the main coded data set.

### **3.2.2.3 Weighted Budgetary Breakdown of the Projects**

In order to make a budgetary breakdown of the contributions to the primary and secondary SDGs identified for each project, the details provided in the project documents were examined. It was found that budget breakdowns were not provided on the basis of objectives or outputs for each project. This resulted in the inability to specifically identify how much budget each project contributed to which SDG. In order to overcome this limitation, an average budgetary weighting was applied to the prioritized SDGs in light of the information obtained from the project details.

In this stage, the accumulated budget for each SDG was calculated according to the determined weights. For the primary goal entries, the budget weight is set to 0.8 and for the secondary ones, it is set to 0.2. Then, the total budgetary (EUR) contribution of the projects to each SDG and the contribution of the projects to the total were calculated on a provincial basis. As a result, three separate 81x19 data sets were obtained. One data set includes the overall data for the period 2008-2022, while the other two cover the SDG frontier period of 2008-2014 and the main SDG implementation period of 2015-2022 for comparative analysis. In each data set, one column represents the province code, 17 represent the total weighted budget by province for each SDG and the last one represents the total project budget in the province.

### **3.2.2.4 Digitization**

The last step of the pre-processing phase is to create integrated geographic data from the prepared data sets. At this stage, the geographic layers were created using the tools of ArcMap (version 10.8.1) to run the geostatistical analysis, as Figure 3.13 shows. Basically, it consists of the creation of two geographic layers. One is, “Provinces\_polygon”, a polygon data that represents the provincial borders and contains province names and municipality types in the attribute table. The second one is, “Provincial\_Projects\_point” a point data that represents the city centers and

contains province codes and the total budgetary (EUR) contribution of the projects to each SDG and the contribution of the projects to the total, for 2008-2022, 2008-2014 and 2015-2022 periods in the attribute table. The reason why the information on projects is represented as points in the city centers is that only the projects where the central municipalities are the final beneficiaries are included in the scope of the study. Additionally, the data is transformed into the GCS\_WGS\_1984 geographic coordinate system.

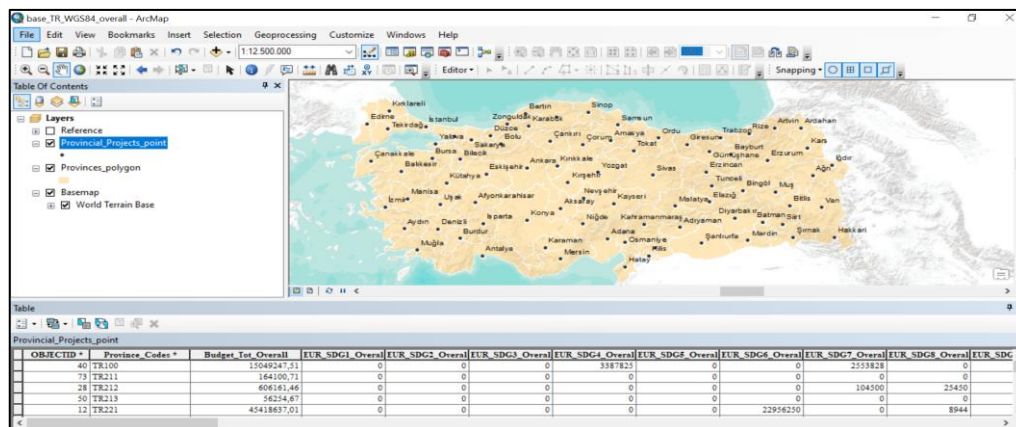


Figure 3.13 A screenshot shows a part of the created geographic data set on ArcMap.

### 3.2.3 Geostatistical Analysis

In line with the purpose and research questions of the study, geostatistical analysis was applied to identify the spatial distribution of municipal projects financed by EU grants between 2008 and 2022. This section aims to present why the methodologies applied were chosen, the mathematical principles behind them, the output values used as a reference for interpretation and how they are implemented.

The basic principle underlying spatial data analysis is that values located close to each other are more related than values located far from each other (Başbozkurt, 2015). Waldo Tobler (1970) expresses this as the fundamental law of geography: "Everything is related to everything else, but things that are close to each other are more related than things that are far away from each other". This correlation cannot



be achieved by applying classical statistical theory (Haining, 2003). Therefore, spatial statistics methods are used to analyze these spatial correlations, where the sample data correspond to locations that represent a point in space (Lesage, 1999). Spatial weight matrices are created to show the magnitude of interactions between the regions included in this analysis (Aral and Aytac, 2018). The reason for using these matrices is to show that the phenomena studied in regions close to each other interact more than in regions far away from each other (Başar, 2009).

Spatial autocorrelation was used to evaluate the spatial correlation between variables by matching location and attribute similarity (Huo et al., 2012). Multidimensional spatial autocorrelation has the advantage of operating in multidimensional space. These types of spatial autocorrelation are associated with positive, random, and negative (Pearson, 1909). Positive autocorrelation occurs when the object has a high association in a cluster (Fischer and Wang, 2011; Griffith, 2003). When a spatial object with a particular property shows no pattern of association, it is known as random autocorrelation (Schabenberger and Gotway, 2005). Negative autocorrelation occurs when spatial objects with a particular property are distributed evenly over a large geographical space (Bharti and Minz, 2022).

Spatial autocorrelation measures and tests differ depending on the scope or scale of the analysis. They are usually divided into global and local scales. At the global scale, all elements of the weight matrix participate in the assessment of spatial autocorrelation, while at the local scale, not all values in the weight matrix are taken into account, but spatial autocorrelation is assessed for one or several related spatial units (Fischer and Wang, 2011). In this study, Global Moran's I method at the global scale and Getis-Ord  $G_i^*$  method at the local scale are performed to reveal the spatial correlation of investments. Finally, the Getis-Ord  $G_i^*$ -score values were interpolated by Inverse Distance Weighting (IDW) method and continuous maps were prepared for easier interpretation. Each of these methods is examined in detail, one by one, in the following sub-sections.

Table 3.6 shows the methods selected to be applied based on the thesis hypothesis/assumptions in the context of the research questions. The assumptions presented in the table were developed for questions 2 and 4. The grounds behind the inference on the spatial clustering of EU-granted municipal projects are based on the information presented in the previous chapter. As such, the assumptions are based on the spatial choices embedded in the Türkiye's development programs, strategies and plans, and the indirect spatial choices specified in the thematic priorities of the EU programs. Regarding question 2, Türkiye's national documents prioritize the southern and eastern regions for development and investment priorities in order to reduce inequalities between regions. In addition, the EU's separate funding allocations for SuTP increase the likelihood of spatial clusters, especially in the southeast region. Therefore, in terms of total budget, EU grants of which municipalities are the ultimate beneficiaries can be expected to be concentrated in the southern and eastern regions of Türkiye.

Specific to question 4, it is more difficult to estimate clusters based on SDGs contributions than the total budget in question 2. This is because the projects that contribute to the SDGs are shaped according to the demands of the municipalities. In this context, it is relatively easier to produce estimates for SDG6, especially since water and sanitation projects are the investment area that municipalities need financing the most. Given that municipalities are demanding water and sanitation projects, to understand where funds will be allocated, it is useful to consider where there is a high likelihood that funds will be allocated due to their location. Accordingly, considering the high water stress in the southeastern region due to climate change and the rapidly increasing population due to SuTP, SDG6 investments can be expected to cluster in this region. It is also likely to be clustered in the southeast of Türkiye at this stage, based on national development and investment decisions and EU program priorities. Estimates for other SDGs are not included in this section as it would be too speculative.

Table 3.6 The link between applied methodologies and the research hypothesis/assumptions related to the research questions, research question numbers refer to the presented questions in Chapter 1.

Sub-Research Questions	Applied Method
(1) The provinces of Türkiye are spatially clustered regarding the total EU budget allocated to support the (metropolitan and provincial) municipalities' projects.	Global Moran's I
(3) There are spatial clusters among the Turkish provinces regarding the prioritized SDGs, particularly SDG6, in the EU-funded (metropolitan and provincial) municipal projects.	
(2) The spatial clusters observed across provinces are located in the southern and eastern parts of Türkiye.	Getis-Ord $G_i^*$
(4) The spatial clusters observed across provinces regarding the prioritized SDGs are located in the southeastern part of Türkiye, particularly for SDG6.	

All the results were stored in a Microsoft Excel<sup>®</sup> spreadsheet and the descriptive parameters were calculated using Microsoft Excel<sup>®</sup>. Global Moran's I values were measured using the software GeoDa (version 1.20.0.36). Getis-Ord  $G_i^*$  values were measured, IDW maps were created, and all maps were produced using GIS software ArcMap<sup>®</sup> (version 10.8.2) with its Geostatistical Analyst extension. In conducting the analysis, EU-financed municipal projects were analyzed based on the total budget by province. Since only central municipalities, which are metropolitan and provincial municipalities, were included in the scope of the study, the analysis was conducted on point data.

### 3.2.3.1 Spatial Autocorrelation Analysis (Global Moran's I)

Moran's Index (Moran's I) is a multi-dimensional spatial autocorrelation statistical technique. This method follows a global measure of spatial autocorrelation based on location and attribute value. Moran's I use network autocorrelation analysis techniques to determine the index value for each point and check whether the pattern

is clustered, dispersed, or random (Bharti and Minz, 2022; Prasannakumar et al., 2011). Moran's I is one of the oldest indicators of global spatial autocorrelation and is still used for determining spatial autocorrelation (Haining, 2003; Jing and Cai, 2010; Mitchell, 2005). Since this method is widely used for spatial autocorrelation (Fischer and Wang, 2011); in this study, global Moran's I (Cliff and Ord, 1981; Moran, 1950) was used as the first measure of spatial autocorrelation.

Moran's I is a correlation coefficient that measures the overall spatial autocorrelation of the data set. In other words, it measures how one object is similar to others surrounding it. If objects are attracted (or repelled) by each other, it means that the observations are not independent. Moran's I is unlike most other correlation coefficients in that it cannot be taken the index at face value. It is an inferential statistic, and it is required to determine statistical significance with a simple hypothesis test by calculating a z-score and its associated p-value before reading the result. Additionally, index values cannot be interpreted directly; they can only be interpreted within the context of the null hypothesis.

Global Moran's I, an index of spatial autocorrelation based on cross-products is mathematically expressed as follows (Bharti and Minz, 2022; Li et al., 2020):

$$Moran's\ I = \frac{n \sum_{i=1}^n \sum_{j=1}^n w_{i,j} z_i z_j}{S_o \sum_{i=1}^n z_i^2} \quad (1)$$

where  $z_i$  is the deviation of an attribute for feature  $i$  from its mean ( $x_i - \bar{X}$ ),  $w_{i,j}$  is the spatial weight matrix of feature  $i$  and  $j$ ,  $n$  is equal to the total number of features, and  $S_o$  is the aggregate of spatial weights:

$$S_o = \sum_{i=1}^n \sum_{j=1}^n w_{i,j} \quad (2)$$

Based on the Moran's I, the statistical significance test is based on normal frequency distribution as follows:

$$z_I = \frac{I - E(I)}{S_{error(I)}} \quad (3)$$

$$E(I) = -1/n - 1 \quad (4)$$

$$S_{error(I)} = \sqrt{E(I^2) - E(I)^2} \quad (5)$$

where,  $I$  is the sample calculated value of Moran's I, and  $E(I)$  is the expected value.

The significance of the index is usually tested in a situation of normal distribution (Li et al., 2020; Mazzulla and Forciniti, 2012). The values of global Moran's I ( $I$ ) range from  $-1$  to  $+1$  (Bharti and Minz, 2022). In the case of the spatial autocorrelation tool, the null hypothesis states that there is no spatial clustering of the values (Prasannakumar et al., 2011). When  $p$ -value  $< 0.05$  (confidence level of 95%) is considered statistically significant (Li et al., 2020), and the  $z$ -score is large (or small) enough and falls outside the desired significance, the null hypothesis can be rejected (Prasannakumar et al., 2011). When the null hypothesis is rejected, the next step is to inspect the value of the Moran's I index. A value of  $+1$  means perfect positive spatial autocorrelation, a value of  $-1$  suggests perfect negative spatial autocorrelation, and a value of  $0$  indicates perfect spatial randomness (Fu et al., 2011; Ishizawa and Stevens, 2007; Tu and Xia, 2008).

In the study, Global Moran's I is first applied to all data sets prepared to answer the research questions. In order to obtain meaningful results, the analysis is not conducted on data sets with a sample size ( $n$ ) is below than 15 in descriptive statistics. For the data sets with appropriate sample size, those for which the null hypothesis is rejected and the spatial pattern is clustered were highlighted in Moran's I results table. And Moran's scatter plots of these sets are presented and used as inputs for the next stage of local scale analysis to understand the location of spatial clustering.

### 3.2.3.2 Hot Spot Analysis (Getis-Ord $G_i^*$ )

Hot spot analysis is a spatial analysis and mapping technique interested in the identification of clustering of spatial phenomena. A hot spot can be defined as an area with a higher concentration of events than the expected number given a random distribution of events. Hot spot detection evolved from the study of point distributions or spatial arrangements of points in space (Chakravorty, 1995). When examining point patterns, the density of points within a defined area is compared against a complete spatial randomness model, which describes a process in which point events occur completely at random. Beyond assessing the density of points in a given area, hot spot techniques also measure the extent of point event interaction to understand spatial patterns.

Several techniques can be used for spatial cluster detection. A review of these methods in the literature shows that, unlike others, Local Moran's I and Getis-Ord  $G_i^*$  statistics can be applied to both point and areal data (Baruch-Mordo et al., 2008; Siebeneck et al., 2009; Sokal and Thomson, 2006). When we look at these two techniques, overall, the power of detecting clusters is high for both statistics. Local Moran's I classifies observed units as part of a cluster or an outlier while Getis-Ord  $G_i^*$  classifies units as either high or low clusters. However, Getis-Ord  $G_i^*$  has a higher classification accuracy compared to local Moran's I (Vidanapathirana, 2021).

Moreover, the choice of spatial analysis method largely depends on the research question and the nature of the data being analyzed. Both the Local Indicators of Spatial Association (LISA) and the Getis-Ord  $G_i^*$  are commonly used spatial clustering methods, but they differ in their approach and assumptions. The LISA method is a bivariate technique that calculates local Moran's I statistics to identify spatial clusters of high or low values of a specific variable. It assumes that the spatial relationship between observations is based on a contiguity matrix and that the variable being analyzed is normally distributed. LISA is often used when the focus is on identifying hot spots or cold spots in a particular variable. On the other hand, the Getis-Ord  $G_i^*$  method is a univariate technique that calculates the degree of

spatial association between a variable and its neighboring observations. It takes into account the spatial relationship between observations and identifies clusters of high or low values that are statistically significant. The Getis-Ord  $G_i^*$  method is often used when the focus is on identifying clusters of a particular variable that are significantly different from the surrounding areas.

In the case of investigating the spatial clustering of EU-funded municipal projects in Türkiye in terms of their contributions to SDGs, the Getis-Ord  $G_i^*$  method would be more appropriate. This is because the focus of the analysis is on identifying clusters of projects that are significantly different in terms of their contributions to SDGs, rather than identifying hot spots or cold spots of a specific variable. The Getis-Ord  $G_i^*$  method is also more robust to non-normal data and can handle a wider range of data types.

Getis – Ord  $G_i^*$ , developed by Getis and Ord, is a statistical technique based on a local measure of spatial autocorrelation (Bharti and Minz, 2022). This hot spot technique is used to identify whether features with high values or features with low values tend to cluster in the study area. This tool works by looking at each feature within the context of neighboring features. The local sum for a feature and its neighbors is compared proportionally to the sum of all features; when the local sum is much different from the expected local sum, and that difference is too large to be the result of random chance, a statistically significant  $G_i^*$  statistic is the result (Getis and Aldstadt, 2004; Ord and Getis, 2010). As a result, if a feature's value is high, and the values for all of its neighboring features are also high, it is part of a hot spot; a feature's value is low and the surrounding values are low, it is part of a cold spot (Prasannakumar et al., 2011).

A mathematical explanation of Getis-Ord  $G_i^*$  local statistic is as follows (Bharti and Minz, 2022; Jana and Sar, 2016):

$$G_i^* = \frac{\sum_{j=1}^n w_{i,j} x_j - \bar{X} \sum_{j=1}^n w_{i,j}}{S \sqrt{\frac{[n \sum_{j=1}^n w_{i,j}^2 - (\sum_{j=1}^n w_{i,j})^2]}{n-1}}} \quad (6)$$

where  $x_j$  is the attribute value for feature  $j$ ,  $w_{i,j}$  is the spatial weight between feature  $i$  and  $j$ ,  $n$  is equal to the number of features and:

$$\bar{X} = \frac{\sum_{j=1}^n x_j}{n} \quad (7)$$

$$S = \sqrt{\frac{\sum_{j=1}^n x_j^2}{n} - (\bar{X})^2} \quad (8)$$

The  $G_i^*$  statistic is a z-score (Giz-score) so no further calculations are required (Prasannakumar et al., 2011). Table 3.7 shows the results of Getis-Ord  $G_i^*$  analysis with their cluster type and confidence levels of statistically significance probability. The resultant Z score identified the states having high or low values of cluster spatially. For statistically significant, positive and larger Giz-scores indicated the more intense the clustering of high values (hot spot) and statistically significant, negative and smaller Giz-scores signified the more intense the clustering of low values (cold spot) (Bharti and Minz, 2022). Additionally, a Giz-scores near zero indicates no apparent spatial clustering (Jana and Sar, 2016).

Table 3.7 Giz-score values of the features and confidence of the assignment to clusters for hot spots and cold spots (Rossi and Becker, 2019).

Cluster type	<i>Gi z-scores</i>	<i>Confidence</i>
Hot spot	> 1.65	90%
	> 1.96	95%
	> 2.58	99%
Cold spot	< -1.65	90%
	< -1.96	95%
	< -2.58	99%



In this study, hot spot analysis is performed to delineate the spatial cluster of EU-funded municipal projects in Türkiye based on Getis-Ord  $G_i^*$  statistic using the fixed distance band in ArcGIS software. According to Moran's I results, hotspot analysis is applied to all data sets with clustered spatial patterns on a global scale and the locations of high and low value clustering on a local scale are determined.

It would be useful to explain here what the hot spots and cold spots present in order to make better interpretations of the study results mean. The clusters identified in the budgetary allocation of EU-funded municipal projects depend not only on the amount of the total budget (EUR) of the projects allocated to that province and the total budget allocated to neighboring provinces but also on spatial proximity/neighborhood relations. Thus, a province that has been identified as a hot spot means that it is allocated a higher EU budget in total, while its neighbor is allocated a higher EU budget also. In other words, hot spots are the provinces where high-high values coexist spatially. Moreover, these correlations are presented under confidence level groups according to their statistical significance. That is a province that appears as a hot spot in the results is not necessarily the province with the highest budget allocation. If the province allocated the most budget is located in a very different spatial location while other high values are concentrated in a certain area, the province with the highest budget may not be a hot spot. The opposite is valid for cold spots. As a result, hot spots and cold spots are used as a tool to understand the locations of concentrated high or low EU budgets allocated to provinces.

### **3.2.3.3 Interpolation (Inverse Distance Weighting – IDW)**

All interpolation methods have been developed based on the theory that points closer to each other have more correlations and similarities than those farther (Setianto and Triandini, 2015). Interpolation methods such as IDW and Kriging have been extensively used in the literature (Mirzaei and Sakizadeh, 2016). In the comparison of these two methods, Panhalkar and Jarag (2016) declared that the IDW is even superior and more precise as compared to Kriging (El-Zeiny and Elbeih, 2019; Paul

et al., 2019). Therefore, the IDW method was chosen as the interpolation method in this study, considering its advantages and the fact that it is a widely preferred method in literature.

The spatial interpolation was conducted using IDW interpolation available in the “ArcGIS Geostatistical Analyst” toolbar. IDW interpolation is a technique, which is largely used in mapping variables. It is an exact and convex interpolation method that fits only the continuous model of spatial variation. The basic principle of IDW interpolation is using a weighted linear combination set of sample points, it counts on the two statistical and mathematical methods in order to create surfaces and calculate the predictions of unmeasured points (Khouni et al., 2021).

The general equation used for the IDW is as follows (Khouni et al., 2021; Setianto and Triandini, 2015):

$$\hat{Z}(x_0) = \frac{\sum_{i=1}^N \frac{Z(x_i)}{d_i^n}}{\sum_{i=1}^N \left(\frac{1}{d_i^n}\right)} \quad (9)$$

where,  $Z$  is the interpolated value of a grid node,  $Z_i$  are the neighboring data points,  $d_i$  are the distance of sample point to estimated point,  $N$  is the coefficient that determines weight based on a distance and  $n$  is the total number of predictions for each validation case.

In the study, the Giz-score values obtained from the Getis-Ord  $G_i^*$  hot spot analysis conducted for the detection of spatial clusters at the local scale are interpolated with IDW. Thus, continuous surfaces were obtained during the mapping of budgetary concentrations of EU-funded municipal project investments. The interpolated raster maps are presented together with the point vector data of the Giz-scores obtained in the previous step. In this way, enriched maps where both hot spots and cold spots are clearly presented and concentrations can be read at first glance have been obtained.

## CHAPTER 4

### RESULTS

This chapter presents the results of the study. Its sections are organized in parallel with the research questions of the thesis; except the final section, each section presents one sub-research question. Chapter 3 discusses the methods used to answer each sub-research question. Whenever it is necessary, sections start with a summary of the descriptive statistics. The final section, "Concluding Remarks," summarizes the results of the study.

When providing the results, SDGs are mentioned with their codes. As it was mentioned in Chapter 2, the motto of these global goals (given by the UN) is as follows: "SDG1: No Poverty", "SDG2: Zero Hunger", "SDG3: Good Health and Well-being", "SDG4: Quality Education", "SDG5: Gender Equality", "SDG6: Clean Water and Sanitation", "SDG7: Affordable and Clean Energy", "SDG8: Decent Work and Economic Growth", "SDG9: Industry, Innovation and Infrastructure", "SDG10: Reduced Inequalities", "SDG11: Sustainable Cities and Communities", "SDG12: Responsible Consumption and Production", "SDG13: Climate Action", "SDG14: Life Below Water", "SDG15: Life on Land", "SDG16: Peace, Justice and Strong Institutions" and "SDG17: Partnerships for the Goals".

#### **4.1 Spatial Clustering Pattern Among the Turkish Provinces Regarding the Total EU Budget Allocated**

This section presents the results of the first question of the study, which is about whether the provinces of Türkiye are spatially clustered regarding the total EU budget allocated to support the metropolitan and provincial municipalities' projects. The results of this question will help us better understand the spatial pattern of the investments made in Türkiye.

Table 4.1 shows the number of cities (total 81) having projects in the three examined periods defined in this thesis: the period between 2008 -2014 ( $P_1$ ), 2015-2022 ( $P_2$ ) and 2008-2022 ( $P_0$ ). In the data set with 81 entries for each, the budget is defined as 0 in provinces where there are no projects. Sum and mean values show that most of the investments took place in  $P_2$  (12843,4 EUR). Also, the minimum values indicate that all provinces were invested during  $P_1$  ( $n=81$ ), while there were provinces that were not invested during  $P_2$  ( $n=72$ ). Skewness values show that these three data sets are positively skewed. Kurtosis values are "leptokurtic" in all three periods, that is, there is a profusion of outliers in all three periods.

Table 4.1 Descriptive statistics of the projects' provincial total budget by the three defined periods of the study (100.000 EUR).

Period	Number of cities having project (n)	Mean	Standard Error	Standard Deviation	Sample Variance	Kurtosis	Skewness	Minimum	Maximum	Sum	Confidence Level (95 %)
2008-2022 ( $P_0$ )	81	203,4	31,5	283,4	80322,2	5,6	2,2	0,1	1334,5	16471,3	62,7
2008-2014 ( $P_1$ )	81	44,8	12,9	116,0	13448,0	16,7	3,7	0,1	743,0	3627,9	25,6
2015-2022 ( $P_2$ )	72	158,6	26,0	234,0	54733,0	7,5	2,5	0	1216,3	12843,4	51,7

Table 4.2 presents the Global Moran's I results separately for all three period data sets. The results show that there is statistically significant ( $z > 2.58$  and  $p < 0.01$ ) spatial clustering ( $I > 0$ ) at 99% confidence level for  $P_0$  and  $P_2$ . However, there is no statistically significant ( $p > 0.05$ ) clustering or dispersion in the period  $P_1$ . Thus, EU-funded municipal projects are randomly distributed by provinces in terms of budget in  $P_1$ , while a spatial concentration is observed in  $P_2$ . The projects have a larger share in  $P_2$  than in  $P_1$ , both numerically and in terms of budget (see Table 4.1). Therefore, it is not surprising that  $P_0$  also shows a clustered result, which is the spatial pattern seen in  $P_2$  (since most of the investments took place in  $P_2$ ). Hence, the spatial location of the budgetary distribution of the projects activated after 2015 shows that there are spatial concentrations in certain areas, i.e. some regions have benefited from grants at a higher or lower share than others. This is similar to the case for  $P_0$  identified by the study. As a result, a local analysis will be conducted for the two periods with a

clustered spatial pattern to identify where clusters are located, but not for  $P_1$  where no clusters were identified.

Table 4.2 Results of Global Moran's I for the projects' provincial total budget by the three defined periods of the study.

Period	Moran's Index (I)	p-Value (p)	z-Score (z)	Pattern
2008-2022 ( $P_0$ )	<b>0,357017</b>	<b>0,000021</b>	<b>4,250392</b>	<b>Clustered</b>
2008-2014 ( $P_1$ )	-0,040233	0,730165	-0,344907	Random
2015-2022 ( $P_2$ )	<b>0,436536</b>	<b>0</b>	<b>5,232237</b>	<b>Clustered</b>

Moran's scatter plots of the budgetary distributions of the projects in  $P_0$  and  $P_2$ , which have clustered spatial patterns, are presented in Figure 4.1. The distributions generally have a similar structure in both periods, and it is seen that there are high-high (over the average) positive correlation outliers in both periods. There are 5 outliers in  $P_0$ , these are Şanlıurfa, Kahramanmaraş, Diyarbakır, Gaziantep and Mardin, respectively. In  $P_2$ , there are 7 outliers, respectively, Kahramanmaraş, Gaziantep, Şanlıurfa, Mardin, Hatay, Mersin and Diyarbakır. These outlier cities can also be defined as the provinces that received the highest budgetary share in the relevant period.

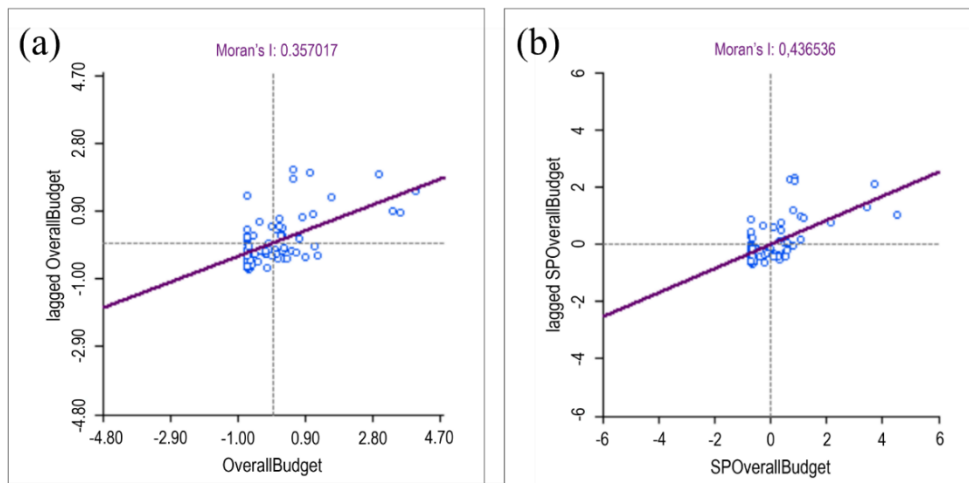


Figure 4.1 Global Moran's I scatter plots for the projects' provincial total budget by the defined periods of the study, only the ones which are spatially clustered at the global scale: (a) between 2008-2022, (b) between 2015-2022.

## **4.2 Location of the Clusters in the Provinces of Türkiye Regarding the Total EU Budget Allocated to the Municipalities**

This sub-section presents the results of the hot spot analysis (Getis-Ord  $G_i^*$ ) conducted to answer the second question: “Where are the clusters observed across the provinces in different time periods?”.

The results are presented, in Figure 4.2, as the synthesis maps of hot spot analysis and IDW interpolation results of the overall EU-funded municipal projects' budget by province for  $P_0$  and  $P_2$ . Based on these results, it can be said that hot spot and cold spot distributions have a similar structure in both periods. The spatial clusters that emerged in  $P_2$  maintained their general outlines in  $P_0$ , indicating that the projects activated in  $P_1$  did not have a dominant spatial distribution. In both periods for which the results are presented, hot spot (high-high relation) provincial centers are concentrated in the south-eastern region of Türkiye, while cold spot (low-low relation) provincial centers are concentrated in the western region of Türkiye. This is due to the budgetary shares of the provinces in  $P_1$ . The provinces that are hot spots at a statistically significant level ( $p\text{-value} \leq 0.05$ ) in both periods are Mersin, Niğde, Nevşehir, Kayseri, Adana, Sivas, Kahramanmaraş, Osmaniye, Hatay, Kilis, Gaziantep, Adıyaman, Şanlıurfa, Malatya, Erzincan, Tunceli, Elazığ, Diyarbakır and Mardin. It can be said that a higher budget share of municipal projects benefiting from EU grants has been activated in this region compared to other provinces. Additionally, the provinces that are cold spots with  $p\text{-value} \leq 0.05$  in  $P_0$  and  $P_2$  are İstanbul, Kocaeli, Yalova, Sakarya, Düzce, Karabük, Bolu, Bilecik, Bursa, Balıkesir, Manisa, Kütahya, Eskişehir, Ankara, Kırıkkale, Afyonkarahisar and Uşak. Apart from the common ones, there are two different cold spots with  $p\text{-value} \leq 0.05$  and they are İzmir and Zonguldak in  $P_0$  and Çankırı and Bartın in  $P_2$ . It can be stated that a lower budget share of municipal projects benefiting from EU grants has been activated in this western region compared to other provinces. Overall, there is a clear spatial clustering of metropolitan and provincial municipalities' projects financed by EU grants which are concentrated in the south-eastern region of Türkiye.

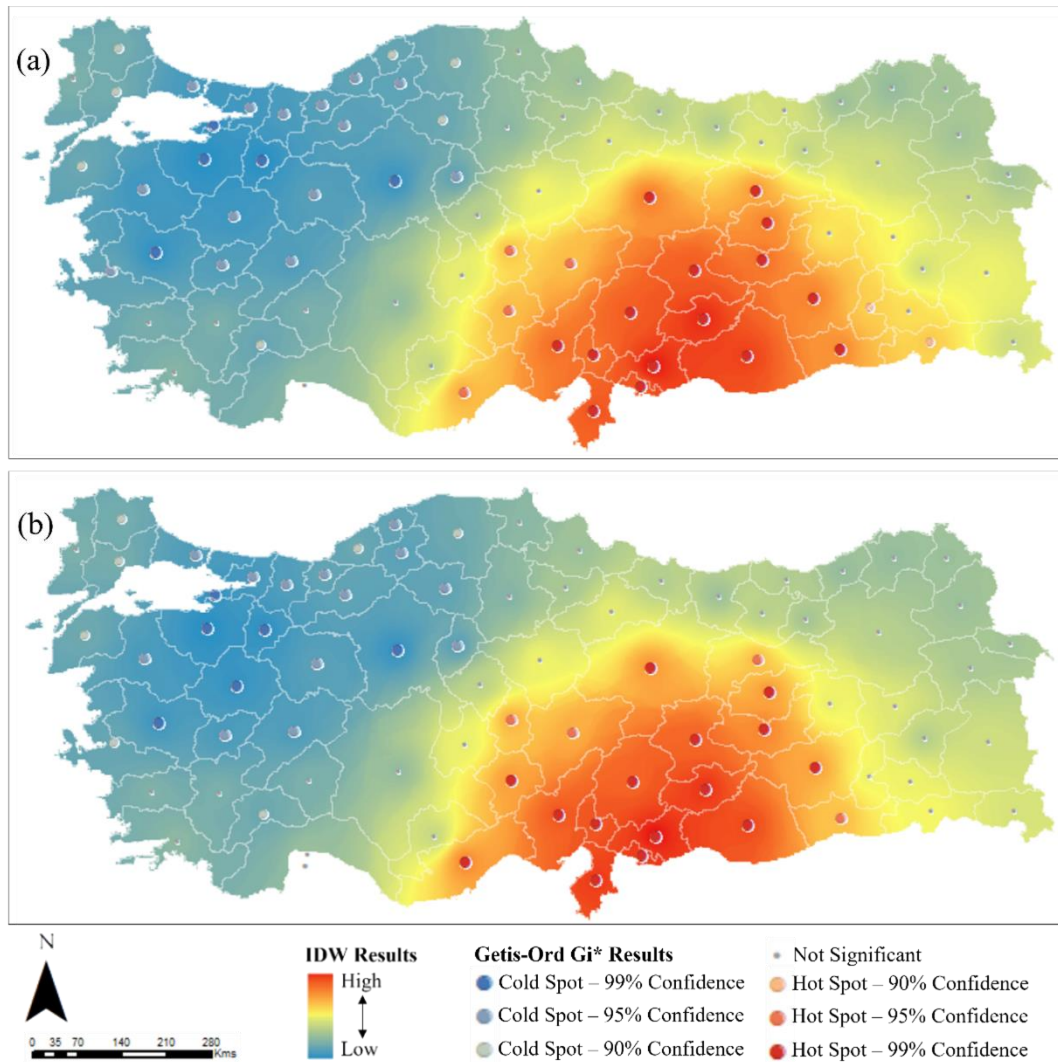


Figure 4.2 The synthesis maps of hot spot analysis and IDW results of the overall budget of the EU-funded municipal projects by province: (a) between 2008-2022, (b) between 2015-2022.

### 4.3 Spatial Clustering Pattern Among the Turkish Provinces Regarding the Prioritized SDGs

This section presents the results of the third question of the study, which deals with whether there are spatial clusters among the Turkish provinces regarding the prioritized SDGs in the EU-funded (metropolitan and provincial) municipal projects. In this part, the total budget of the projects' contributions by province is analyzed

over three periods. This section presents the results separately for each period under the following sub-headings. Point vector geospatial data with 81 entries is used for each period, including the total budget (EUR) by the province of EU grant-funded projects active during these time periods.

### 4.3.1 The Period Between 2008-2022 (P<sub>0</sub>)

Table 4.3 Descriptive statistics of the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2022 (100.000 EUR).

SDG	Number of cities having projects (n)	Mean	Standard Error	Standard Deviation	Sample Variance	Kurtosis	Skewness	Minimum	Maximum	Sum	Confidence Level (95 %)
SDG1	11	0,07	0,02	0,18	0,03	3,85	2,32	0	0,76	5,72	0,04
SDG2	4	0,02	0,02	0,15	0,02	66,09	7,92	0	1,33	2,02	0,03
SDG3	2	0,03	0,02	0,20	0,04	44,90	6,65	0	1,51	2,50	0,04
SDG4	23	5,04	1,33	11,93	142,30	2,12	2,02	0	33,88	407,94	2,64
SDG5	10	0,22	0,08	0,73	0,54	18,24	4,14	0	4,21	17,46	0,16
SDG6	43	120,96	21,62	194,61	37874,55	7,51	2,51	0	1026,45	9797,68	43,03
SDG7	15	1,16	0,40	3,60	12,98	26,43	4,59	0	25,54	93,98	0,80
SDG8	24	1,92	1,17	10,49	109,95	49,31	6,74	0	84,00	155,55	2,32
SDG9	15	0,25	0,10	0,93	0,87	44,41	6,13	0	7,41	19,91	0,21
SDG10	62	5,18	1,13	10,16	103,24	3,83	2,09	0	47,65	419,84	2,25
SDG11	81	40,89	6,27	56,42	3183,14	5,29	2,16	0,01	266,63	3312,16	12,48
SDG12	25	25,82	6,93	62,40	3894,17	3,92	2,32	0	225,49	2091,71	13,80
SDG13	25	1,00	0,31	2,80	7,85	15,15	3,80	0	16,02	81,16	0,62
SDG14	2	0,01	0,01	0,05	0,00	39,01	6,31	0	0,35	0,65	0,01
SDG15	3	0,02	0,02	0,16	0,02	80,09	8,93	0	1,40	1,54	0,03
SDG16	81	0,26	0,05	0,46	0,21	14,73	3,25	0,06	2,99	21,17	0,10
SDG17	55	0,50	0,05	0,49	0,24	-0,73	0,72	0	1,64	40,35	0,11

Table 4.3 shows that projects with SDG6, SDG11 and SDG12 received the largest budgets from the EU, while projects with SDG14, SDG2 and SDG3 received the smallest budgets. It also shows that there were provinces which did not receive any projects for 17 SDGs (except SDG11 and SDG16; please see the minimum values in the table). In other words, SDG11 and SDG16 were the only two SDGs that were realized in all provinces. Skewness values show that all of the 17 SDGs data sets are



positively skewed. Kurtosis values are "leptokurtic" in all data sets, that is, there is a profusion of outliers in all. These outliers will be examined in Moran's scatter plots in the further sub-section. Lastly, further analyses are conducted for each data set as the sample size is sufficiently large ( $n \geq 15$ ). However, since the number of provinces ( $n$ ) where projects contributing to SDG1, SDG2, SDG3, SDG5, SDG14 and SDG15 are realized less than 15, the analysis is not conducted for these SDG sets.

Table 4.4 presents the Global Moran's I results for the projects' provincial budgetary contribution to the prioritized SDGs in P<sub>0</sub>. The results show that there is statistically significant ( $z > 2.58$  and  $p < 0.01$ ) spatial clustering ( $I > 0$ ) at 99% confidence level for SDG4, SDG6, SDG10 and SDG11 data sets. Hence, the spatial location of the budgetary distribution of the projects' contributions to these four SDGs shows that there are spatial concentrations in certain areas, i.e., some regions have benefited from grants at a higher or lower share than others. However, there is not statistically significant ( $p > 0.05$ ) clustering or dispersion in SDG7, SDG8, SDG9, SDG12, SDG13, SDG16 and SDG17. Thus, EU-funded municipal projects are randomly distributed by provinces in terms of budget in these data sets.

Table 4.4 Results of Global Moran's I for the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2022.

SDG	Moran's Index (I)	p-Value (p)	z-Score (z)	Pattern
<b>SDG4</b>	<b>0,22742</b>	<b>0,006939</b>	<b>2,699773</b>	<b>Clustered</b>
<b>SDG6</b>	<b>0,315408</b>	<b>0,000133</b>	<b>3,820634</b>	<b>Clustered</b>
SDG7	-0,05236	0,591045	-0,537322	Random
SDG8	-0,019879	0,896995	-0,129459	Random
SDG9	-0,065906	0,381984	-0,874246	Random
<b>SDG10</b>	<b>0,311418</b>	<b>0,000229</b>	<b>3,684574</b>	<b>Clustered</b>
<b>SDG11</b>	<b>0,310824</b>	<b>0,000205</b>	<b>3,712527</b>	<b>Clustered</b>
SDG12	0,065928	0,372058	0,892625	Random
SDG13	0,011853	0,764598	0,299448	Random
SDG16	0,001387	0,86483	0,170229	Random
SDG17	0,078756	0,312911	1,009133	Random

Moran's scatter plots of the projects' provincial budgetary contributions to the prioritized SDGs, only the ones which are spatially clustered at the global scale, in  $P_0$ , which have clustered spatial patterns, are presented in Figure 4.3. When we look at SDG4, we see that there are basically two types of distributions and there are no intermediate values. There are 12 outliers in this distribution and they are as follows: İstanbul, Adana, Ankara, Bursa, Kahramanmaraş, Mersin, Osmaniye, Kilis, Hatay, Kayseri, Konya and İzmir. The distributions generally have a similar structure in SDG6 and SDG11, and it is seen that there are high-high (over the average) positive correlation outliers in both. This similarity is not surprising since SDG6 refers to a part of SDG11 due to the component of infrastructure in the context of sustainable cities. There are 7 outliers in the distribution of SDG6: Şanlıurfa, Kahramanmaraş, Diyarbakır, Gaziantep, Mardin, Adıyaman and Adana. SDG11 has 5 outliers: Şanlıurfa, Kahramanmaraş, Diyarbakır, Gaziantep and Mardin. Finally, when we look at the distribution of SDG10, there are 15 outliers: Bursa, Ankara, İstanbul, İzmir, Adana, Kahramanmaraş, Kilis, Osmaniye, Hatay, Şanlıurfa, Mardin, Malatya, Adıyaman, Batman and Gaziantep. These outlier cities can also be defined as the provinces that received the highest budgetary share in the relevant period. In these four datasets where spatial clustering is identified on a global scale, Kahramanmaraş is a common outlier. This means that the budgetary contribution of EU-funded municipal projects allocated to Kahramanmaraş to SDG4, SDG6, SDG10 and SDG11 is higher than the average. Moreover, budgetary contributions to the SDGs presented in these four datasets are concentrated in provinces located in the south-eastern region of Türkiye. The fact that all of the outliers in projects contributing to SDG6 and SDG11, which have a higher budgetary weight than all SDGs, are located in this region have a high impact factor in hot spot analyses conducted at the local level. This also affected the overall result of the accumulated budget by province as the distribution of SDG6 and SDG11 is similar to Moran's scatter plots presented in the previous section.

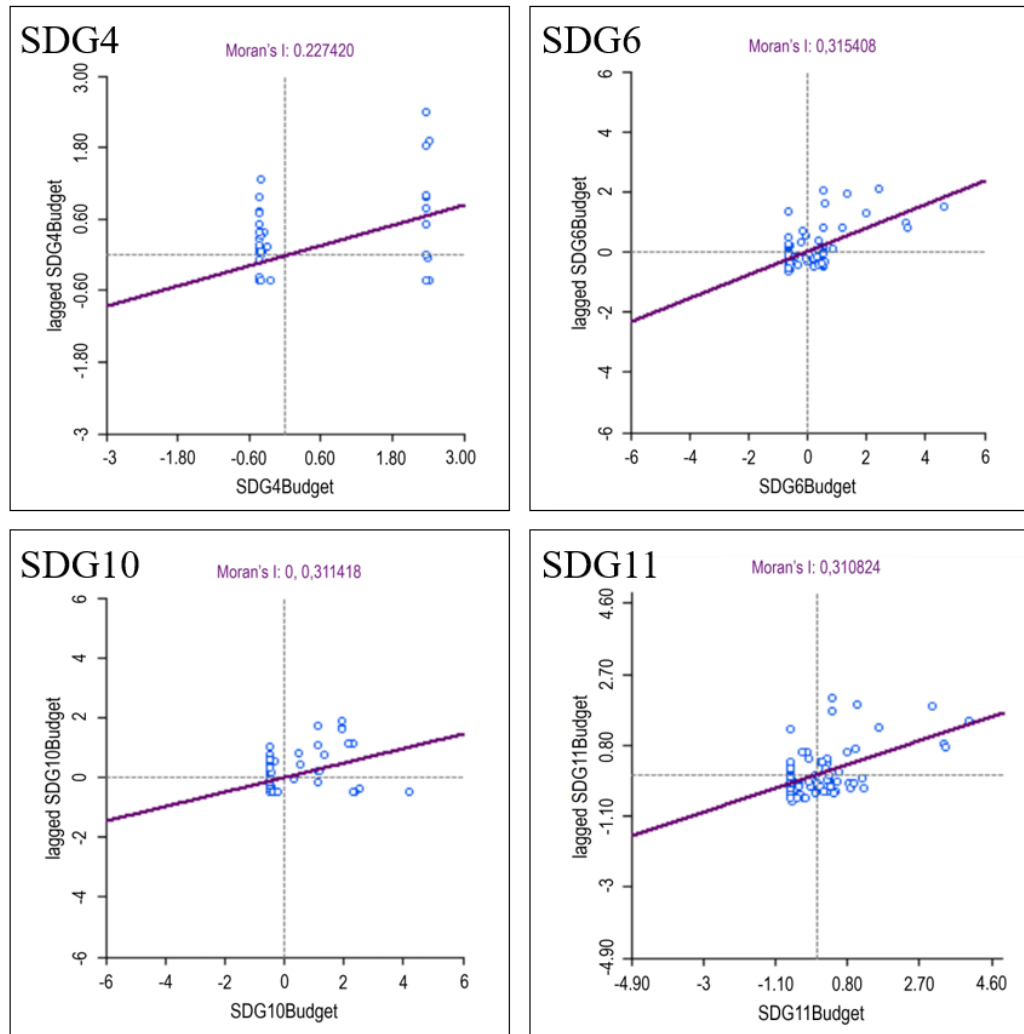


Figure 4.3 Global Moran's I scatter plots of the projects' provincial budgetary contributions to the prioritized SDGs, only the ones which are spatially clustered at the global scale, between 2008-2022.

### 4.3.2 The Period Between 2008-2014 (P<sub>1</sub>)

Table 4.5 shows the descriptive statistics of the data sets of the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2014. The values show that there is no project which contributes to SDG14. Sum and mean values show that, similar to P<sub>0</sub>, SDG6, SDG11 and SDG12 have the largest budgetary contribution, while SDG15, SDG1 and SDG2 have the smallest except SDG14. Also,

the minimum values indicate that, similar to  $P_0$ , only the projects having SDG11 and SDG16 targets were realized in all 81 provinces. Skewness values show that 16 data sets, except SDG14, are positively skewed. Lastly, Kurtosis values are "leptokurtic" in all data sets, that is, there is a profusion of outliers in all. These outliers will be examined in Moran's scatter plots in the further sub-section. Lastly, further analyses are conducted for each data set as the sample size is sufficiently large ( $n \geq 15$ ). Therefore, only SDG8, SDG11 and SDG16 data sets are used as input in Moran's I analysis.

Table 4.5 Descriptive statistics of the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2014 (100.000 EUR).

SDG	Number of cities having project (n)	Mean	Standard Error	Standard Deviation	Sample Variance	Kurtosis	Skewness	Minimum	Maximum	Sum	Confidence Level (95 %)
SDG1	2	0,01	0,01	0,05	0,00	44,90	6,65	0	0,38	0,63	0,01
SDG2	1	0,02	0,02	0,15	0,02	81	9	0	1,33	1,33	0,03
SDG3	2	0,03	0,02	0,20	0,04	44,90	6,65	0	1,51	2,50	0,04
SDG4	12	0,09	0,04	0,32	0,10	29,07	5,15	0	2,21	7,05	0,07
SDG5	9	0,21	0,08	0,73	0,53	18,99	4,22	0	4,21	17,11	0,16
SDG6	14	29,73	10,02	90,22	8140,11	19,49	4,00	0	592,09	2408,47	19,95
SDG7	2	0,02	0,02	0,16	0,03	77,67	8,75	0	1,44	1,65	0,04
SDG8	15	0,09	0,03	0,25	0,06	17,24	3,90	0	1,44	7,05	0,06
SDG9	10	0,14	0,05	0,46	0,21	9,05	3,26	0	1,86	11,29	0,10
SDG10	12	1,06	0,50	4,49	20,12	16,27	4,22	0	20,70	86,22	0,99
SDG11	81	9,43	2,57	23,17	536,73	16,18	3,58	0,01	148,04	763,84	5,12
SDG12	7	3,68	2,57	23,13	534,99	39,51	6,34	0	161,76	297,82	5,11
SDG13	5	0,02	0,01	0,11	0,01	42,74	6,19	0	0,87	1,87	0,02
SDG14	0	0,00	0,00	0	0	0	0	0	0	0	0
SDG15	2	0,00	0,00	0,01	0,00	64,73	7,87	0	0,10	0,13	0,00
SDG16	81	0,24	0,04	0,40	0,16	8,96	2,66	0,06	2,37	19,12	0,09
SDG17	8	0,02	0,01	0,08	0,01	14,27	3,90	0	0,43	1,82	0,02

Table 4.6 presents the Global Moran's I results for the projects' provincial budgetary contributions to the prioritized SDGs in  $P_1$ . The results show that there is no statistically significant ( $z > 2.58$  and  $p < 0.01$ ) spatial clustering ( $I > 0$ ) for the data sets having a sufficient sample size. Therefore, no spatial clustering is detected in

the answer to question 1 presented in the previous section, nor is it detected in the analysis based on budgetary contributions to the prioritized SDGs in P1. This suggests that EU-funded metropolitan and municipal projects activated in P<sub>1</sub> have a random spatial pattern across provinces in Türkiye. Moreover, it can be argued that this period does not have a major impact on the overall budget allocation and budgetary allocation of contributions to the prioritized SDGs across provinces. Due to the lack of a dataset with a sufficient sample size and clustered pattern in this period, further analysis at the local level is not conducted for the projects' provincial budgetary contribution to the prioritized SDGs in P<sub>1</sub>.

Table 4.6 Results of Global Moran's I for the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2014.

SDG	Moran's Index (I)	p-Value (p)	z-Score (z)	Pattern
SDG8	-0,069198	0,478758	-0,708301	Random
SDG11	-0,044357	0,693015	-0,394767	Random
SDG16	0,01908	0,71022	0,37156	Random

### 4.3.3 The Period Between 2015-2022 (P<sub>2</sub>)

Table 4.7 shows the descriptive statistics of the data sets of the projects' provincial budgetary contributions to the prioritized SDGs in P<sub>2</sub>. Results show that there is no project which contributes to SDG3. Sum and mean values show that SDG6, SDG11 and SDG12 have the largest budgetary contributions, similar to P<sub>0</sub> and P<sub>1</sub>, while SDG5, SDG14 and SDG2 have the smallest except SDG3. Also, the minimum values indicate that there are cases (provinces) where none of the SDGs were realized. Skewness values show that 16 data sets except SDG3 are positively skewed. Lastly, Kurtosis values are "leptokurtic" in all 16 data sets, that is, there is a profusion of outliers in all. These outliers will be examined in Moran's scatter plots in the further sub-section. Lastly, further analyses are conducted for each data set as the sample

size is sufficiently large ( $n \geq 15$ ). Thus, SD4, SDG6, SDG10, SDG11, SDG12 and SDG13 data sets are used as input in Moran's I analysis.

Table 4.7 Descriptive statistics of the projects' provincial budgetary contributions to the prioritized SDGs between 2015-2022 (100.000 EUR).

SDG	Number of cities having project (n)	Mean	Standard Error	Standard Deviation	Sample Variance	Kurtosis	Skewness	Minimum	Maximum	Sum	Confidence Level (95 %)
SDG1	10	0,06	0,02	0,17	0,03	3,53	2,33	0	0,51	5,10	0,04
SDG2	4	0,01	0,01	0,05	0,00	58,00	7,31	0	0,40	0,68	0,01
SDG3	0	0	0	0	0	0	0	0	0	0	0
SDG4	15	4,95	1,33	11,93	142,22	2,13	2,02	0	33,57	400,89	2,64
SDG5	3	0,00	0,00	0,02	0,00	36,14	6,06	0	0,16	0,35	0,01
SDG6	35	91,22	17,74	159,62	25479,41	7,11	2,49	0	776,60	7389,21	35,30
SDG7	13	1,14	0,40	3,61	13,00	26,44	4,60	0	25,54	92,34	0,80
SDG8	9	1,83	1,17	10,50	110,21	49,29	6,75	0	84	148,51	2,32
SDG9	5	0,11	0,09	0,83	0,69	78,32	8,79	0	7,41	8,62	0,18
SDG10	61	4,12	0,88	7,92	62,80	2,31	1,90	0	27,17	333,62	1,75
SDG11	51	31,46	5,14	46,28	2142,14	6,97	2,38	0	232,82	2548,32	10,23
SDG12	19	22,15	6,59	59,35	3522,55	5,63	2,65	0	225,49	1793,89	13,12
SDG13	23	0,98	0,31	2,76	7,63	15,42	3,82	0	15,87	79,28	0,61
SDG14	2	0,01	0,01	0,05	0,00	39,01	6,31	0	0,35	0,65	0,01
SDG15	1	0,02	0,02	0,16	0,02	81	9	0	1,40	1,40	0,03
SDG16	9	0,03	0,01	0,12	0,01	36,02	5,89	0	0,86	2,06	0,03
SDG17	52	0,48	0,05	0,48	0,23	-0,85	0,69	0	1,57	38,53	0,11

Table 4.8 presents the Global Moran's I results for the projects' provincial budgetary contributions to the prioritized SDGs in  $P_2$ . The results show that there is statistically significant ( $z > 2.58$  and  $p < 0.01$ ) spatial clustering ( $I > 0$ ) at 99% confidence level for SDG4, SDG6, SDG10 and SDG11 data sets, similar to  $P_0$ . This similarity suggests that the spatial pattern of investments activated in  $P_2$  affects the  $P_0$ . The spatial location of the budgetary distribution of the projects' contributions to these four SDGs shows that there are spatial concentrations in certain areas, i.e., some regions have benefited from grants at a higher or lower share than others. However, there is no statistically significant ( $p > 0.05$ ) clustering or dispersion in SDG12,

SDG13 and SDG17. Thus, the EU-funded municipal projects are randomly distributed by province in terms of budget in these data sets.

Table 4.8 Results of Global Moran's I for the projects' provincial budgetary contributions to the prioritized SDGs between 2015-2022.

SDG	Moran's Index (I)	p-Value (p)	z-Score (z)	Pattern
<b>SDG4</b>	<b>0,22974</b>	<b>0,006411</b>	<b>2,72598</b>	<b>Clustered</b>
<b>SDG6</b>	<b>0,374209</b>	<b>0,000007</b>	<b>4,493695</b>	<b>Clustered</b>
<b>SDG10</b>	<b>0,616901</b>	<b>0</b>	<b>7,090834</b>	<b>Clustered</b>
<b>SDG11</b>	<b>0,386332</b>	<b>0,000004</b>	<b>4,630313</b>	<b>Clustered</b>
SDG12	0,099376	0,197954	1,287404	Random
SDG13	0,0009409	0,787209	0,269937	Random
SDG17	0,109835	0,176448	1,351772	Random

Moran's scatter plots of the projects' provincial budgetary contributions to the prioritized SDGs, only the ones which are spatially clustered at the global scale, in  $P_2$ , which have clustered spatial patterns, are presented in Figure 4.4. All these scatter plots show a distribution similar to the structure in  $P_0$ . When we look at SDG4, there are 12 outliers in this distribution and they are as follows: Ankara, Bursa, Kahramanmaraş, Adana, Hatay, Mersin, Konya, Kilis, Osmaniye, İzmir, Kayseri and İstanbul. There are 6 outliers in the distribution of SDG6: Kahramanmaraş, Şanlıurfa, Gaziantep, Mardin, Mersin and Adıyaman. SDG11 has 7 outliers: Kahramanmaraş, Gaziantep, Şanlıurfa, Mardin, Trabzon, Hatay and Diyarbakır. Finally, when we look at the distribution of SDG10, there are 12 outliers: Kahramanmaraş, Bursa, Adana, Kilis, Osmaniye, Hatay, Şanlıurfa, Mardin, Malatya, Adıyaman, Batman and Gaziantep, Batman and Gaziantep. These outlier cities can also be defined as the provinces that received the highest budgetary share in the relevant period. Such a similarity in both the structure of the distribution and the outliers to that of  $P_0$  indicates that the investments activated in  $P_2$  have had a significant impact on the overall spatial distribution.

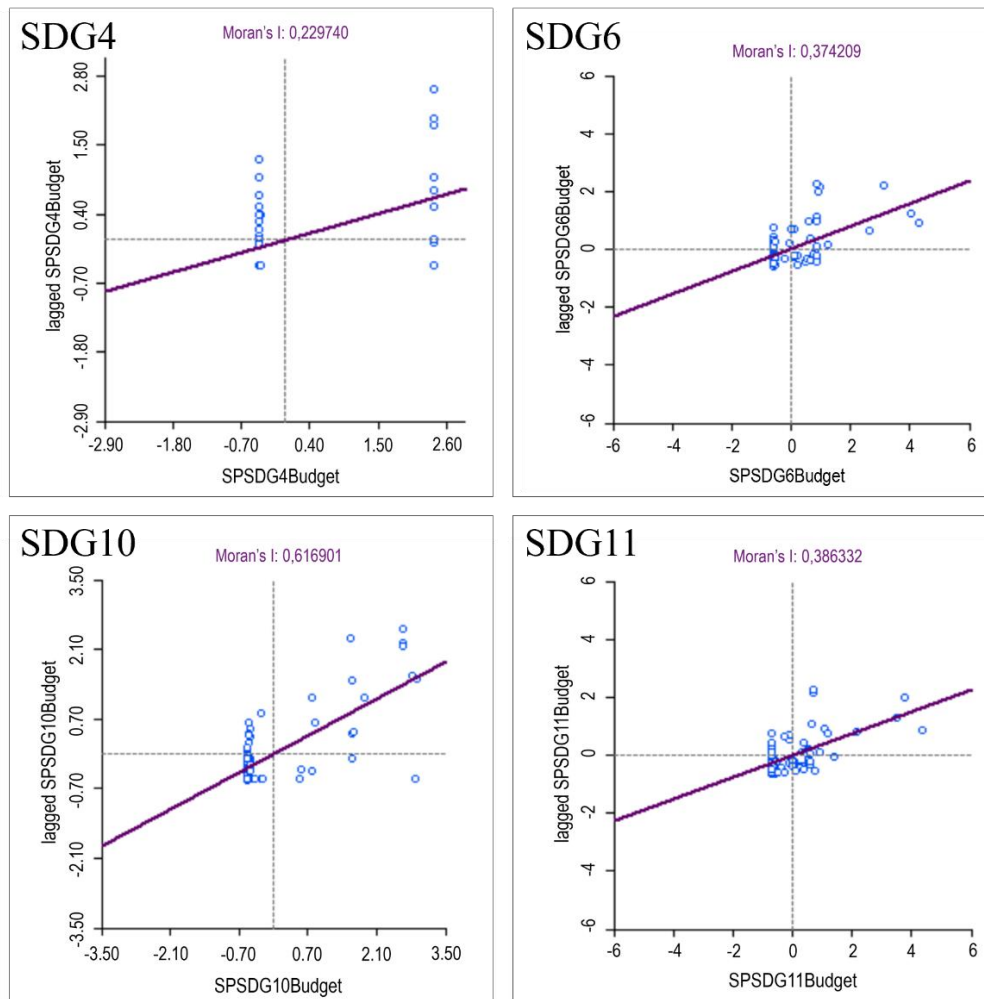


Figure 4.4 Global Moran's I scatter plots of the projects' provincial budgetary contributions to the prioritized SDGs, only the ones which are spatially clustered at the global scale, between 2015-2022.

#### 4.4 Location of the Spatial Clusters in the Provinces of Türkiye Regarding the Prioritized SDGs

This sub-section presents the results of the hot spot analysis (Getis-Ord  $G_i^*$ ) conducted to answer the fourth question of the study: "Where are the clusters observed in Türkiye regarding the prioritized SDGs?". According to the results obtained in the previous section, the data sets that are spatially clustered are identified in  $P_0$  and  $P_2$  at the global scale. Moreover, the SDGs with clustered spatial



patterns in both periods are SDG4, SDG6, SDG10 and SDG11. Therefore, in this section, hot spot analysis is applied separately for both periods in these datasets at the local scale.  $P_1$  is not analyzed as there is no data set with any clustered spatial pattern with a sufficient sample size. The results of the analyzed data sets are presented separately according to their periods in the following sub-sections.

#### **4.4.1 The Period Between 2008-2022 ( $P_0$ )**

Figure 4.5 illustrates the synthesis maps of  $P_0$ . In all SDGs for which the results are presented, hot spot (high-high relation) provincial centers are concentrated in the southern and south-eastern regions of Türkiye. The results for SDG4 and SDG10 show that there are differences with respect to the total budget allocated for the period that emerged in the result of the second question. The fact that these SDGs do not have a large share of the budgetary distribution as mentioned earlier is the reason behind these differences. In SDG4 and SDG10, hot spots are concentrated in the central southern region of Türkiye, while cold spots are concentrated in the eastern and north-eastern regions. In the SDG4 dataset, the provinces that are hot spots with  $p\text{-value} \leq 0.05$  are Mersin, Karaman, Aksaray, Nevşehir, Kayseri, Niğde, Adana, Hatay, Osmaniye, Kahramanmaraş, Gaziantep, Adıyaman and Kilis. The cold spots with  $p\text{-value} \leq 0.05$  are: Bayburt, Erzurum, Erzincan, Bingöl and Muş in SDG4. In the SDG10 dataset, the provinces that are hot spots with  $p\text{-value} \leq 0.05$  are Niğde, Kayseri, Adana, Hatay, Osmaniye, Kahramanmaraş, Malatya, Adıyaman, Gaziantep, Kilis and Şanlıurfa. The cold spots with 95% confidence level are: Sinop, Trabzon and Erzurum in SDG10. Based on these results, it can be stated that hot spot and cold spot distributions have a similar structure in SDG6 and SDG11. In SDG6 and SDG11 datasets, the provinces that are hot spot with  $p\text{-value} \leq 0.05$  are Mersin, Adana, Sivas, Kahramanmaraş, Osmaniye, Hatay, Kilis, Gaziantep, Adıyaman, Malatya, Erzincan, Tunceli, Elazığ, Şanlıurfa, Mardin and Diyarbakır. The cold spots of SDG6 and SDG11 have a similar distribution and have in common: İstanbul, Kocaeli, Yalova, Balıkesir, Manisa, Uşak, Afyonkarahisar, Kütahya, Bilecik, Eskişehir, Sakarya,

Düzce, Zonguldak, Bolu and Ankara. In terms of differences, in addition to these common ones, Çanakkale in SDG6 and Kırıkkale in SDG11 are cold spots.

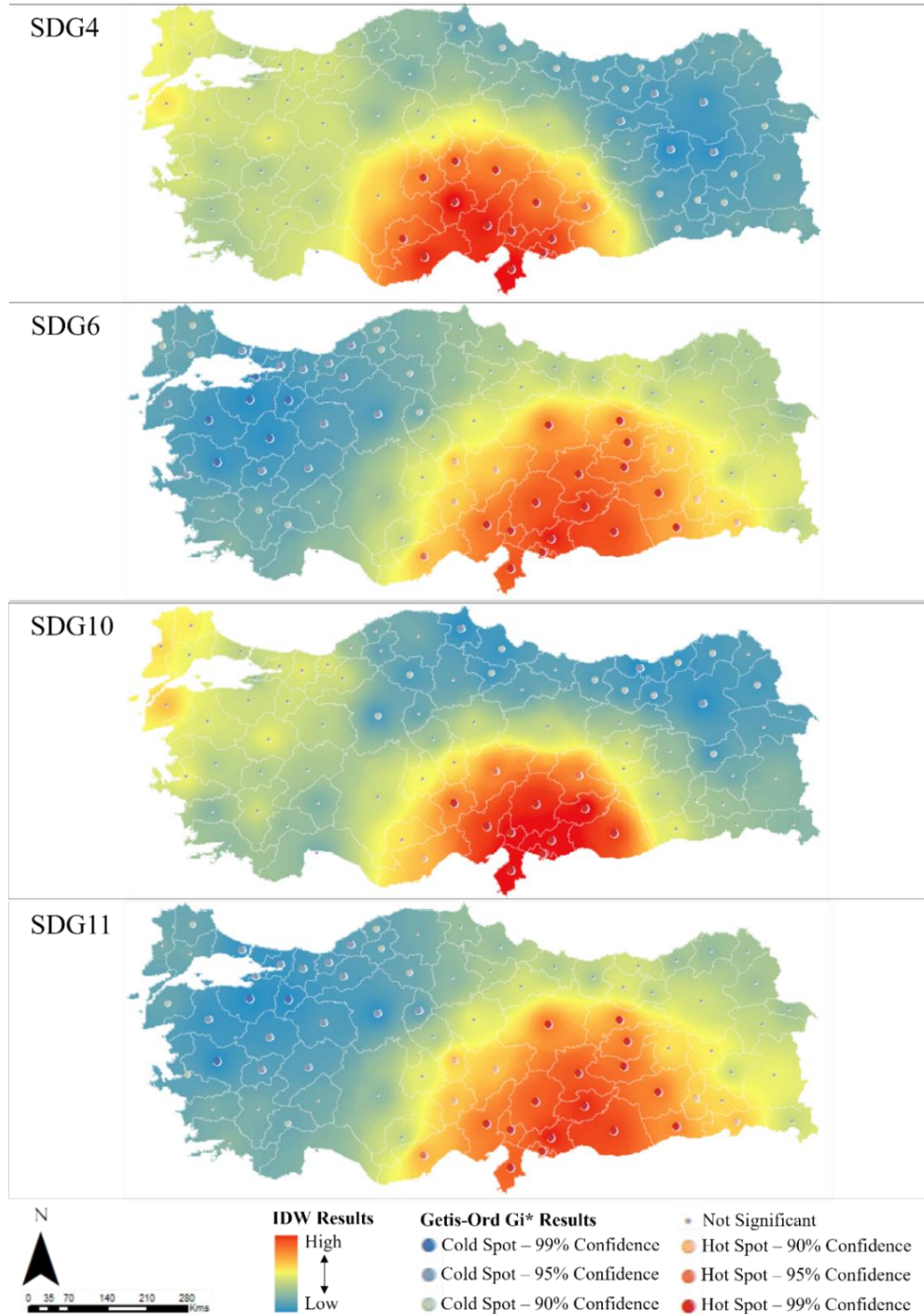


Figure 4.5 The synthesis maps of hot spot analysis and IDW results of the projects' provincial budgetary contributions to the prioritized SDGs between 2008-2022.

#### 4.4.2 The Period Between 2015-2022 (P<sub>2</sub>)

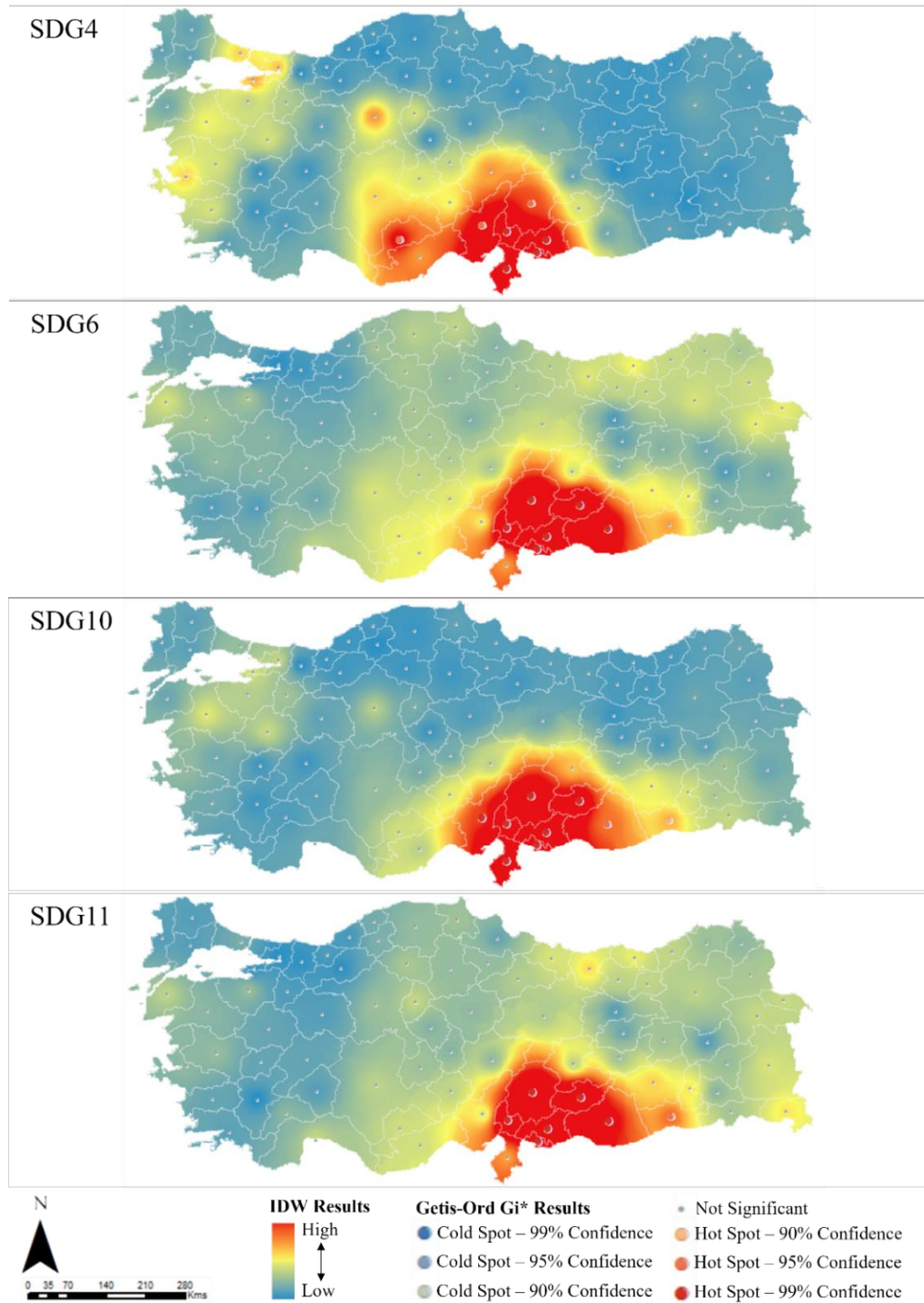


Figure 4.6 The synthesis maps of hot spot analysis and IDW results of the projects' provincial budgetary contributions to the prioritized SDGs between 2015-2022.

Figure 4.6 presents the synthesis maps of hot spot analysis and IDW interpolation results of the projects' provincial budgetary contributions to the prioritized SDGs between 2015-2022. According to this figure, hot spot (high-high relation) provincial centers are concentrated in the southern and south-eastern regions of Türkiye. These concentrations are narrower than in the 2008-2022 period. The results show that SDG6, SDG10 and SDG11 hotspots are concentrated in this area with a similar structure. Moreover, unlike the 2008-2022 period, no cold spot (low-low relationship) was identified in SDG4, SDG6, SDG10 and SDG11 in the 2015-2022 period. Additionally, the provinces that are hot spot at a statistically significant level ( $p < 0.05$ ) in these four SDG data sets are Kahramanmaraş, Osmaniye, Gaziantep, Kilis. Apart from the common ones, hot spots at 95% confidence level are Hatay, Karaman, Adana in SDG4; Adıyaman, Şanlıurfa in SDG6; Adana, Hatay, Adıyaman, Şanlıurfa in SDG10 and Adıyaman, Şanlıurfa, Mardin in SDG11.

#### **4.5 Concluding Remarks**

Results show that, first, no clustering was detected in the spatial pattern of the EU budget allocated to the municipalities in the 2008-2014 period. In other words, a random distribution was observed across the Turkish provinces during this period. In other periods between 2008-2022 and between 2015-2022, the flow of the total budget is concentrated in the high-high relation (hot spot) in the south-eastern region of Türkiye, while the low-low relation (cold spot) is located in the western region. This suggests that the spatial distribution of projects activated between 2008-2022 was affected by the spatial choices in the post-2015 period.

Weighted budgetary breakdowns based on SDGs were analyzed to look at the spatial distribution of budgetary contributions to SDGs across the provinces. In the 2008-2014 period, no spatially clustered pattern could be detected in total budget allocations and no spatially clustered pattern could be detected on the basis of SDGs. This shows that there is actually no spatial selection towards a specific area in the SDG frontier period. However, in the post-2015 period, which is defined as the main

SDG implementation period in the study, spatial clustering was detected in SDG4, SDG6, SDG10 and SDG11 data sets. The clustering of high values (hot spots) in this distribution is concentrated in the southern and south-eastern of Türkiye, while the clustering of low values (cold spots) is not observed. This suggests that the budgetary concentration of projects is a result of spatial selection. Moreover, the absence of cold spots means that only higher-budget projects show a certain spatial relatedness. Finally, in the 2008-2022 period, the same four SDGs have similar concentrations in similar areas. However, these clusters are not as sharp as in the 2015-2022 period. In fact, due to the budgetary distribution of pre-2015 projects across provinces, hot spots are spread over a wider area and cold spots are also observed. Furthermore, when we look at the total budgets of the projects contributing to the SDGs on the basis of SDGs, it is seen that SDG6, which refers to water and supply, and SDG11, which refers to sustainable cities, have the largest share. Therefore, the spatial selection of SDG6 and SDG11 projects identified in the post-2015 period affected the total budget.



## CHAPTER 5

### CONCLUSION

While the last decades of the Anthropocene have seen unprecedented economic growth and progress on key development issues, these achievements have masked major fault lines in conventional development models (WBCSD, 2021). These failures are leading to a bulging list of environmental and social burdens that pose growing threats and make the world a less fit place to live. In sum, the planet is facing a climate emergency, nature is in trouble and people are being left behind. The SDGs, unanimously adopted by UN member states in 2015, set 17 targets for the world to achieve by 2030 (Omer and Noguchi, 2020). They are globally accepted, time-bound universal goals, established as the only systematic, comprehensive approach to global warnings that are also seen as signals of extinction. Therefore, a global mobilization has been declared and the whole world has rolled up its sleeves to contribute to these goals toward a sustainable future.

This study is based on the idea that it is necessary to manage the SDGs with more strategic approaches. The SDGs have been chosen as the focus that constitutes the main framework of the study. The SDGs are an improved, more comprehensive version of the MDGs (Lafortune et al., 2018; Vandemoortele, 2018), since they apply equally to both developed and developing nations and allow each to adopt and implement the goals in a way that best fits their specific needs and objectives (UN, 2015b). In this respect, the SDGs provide a level playing field for developing countries in the global development agenda (Leal Filho et al., 2019) and present a once-in-a-generation chance to revitalize the discipline of global sustainability studies (Leal Filho et al., 2018).

Focusing on contributions to the SDGs, this study aimed to contribute to future research and practice through a geostatistical assessment of EU-funded municipal

projects in Türkiye in terms of their contributions to the SDGs. To this end, the research is centered on the question of how EU-funded grants allocated to municipal projects with SDGs are spatially distributed across provinces in Türkiye. In order to find the answer to this main question, four guiding questions were identified. These questions examine whether there is a spatial clustering in the distribution of (a) the total project budget and (b) the budget of prioritized SDGs in the funded projects across provinces. If clusters were observed, the thesis also questioned where such clusters are located and how the clusters vary from one time period to another.

Additionally, “the real and long-term impact of SDGs in developing countries will require serious efforts by international institutions and active support of developed countries in SDG implementation” (Khalid et al., 2021). Contributions to the lessons learned from the pre-2015 goals may be further developed under the new SDG focus areas, thus optimizing the steps toward a better and fairer life. Therefore, studies on developing countries, to which this agenda assigns different targets than the MDGs, have a very vital position. Türkiye is selected as the study area of this thesis because it offers appropriate conditions for these studies to be carried out. These conditions can be summarized as follows in light of the information reached in Chapter 2: it has characteristics that can represent the challenges of developing countries, has a wide economic, geographical and social spectrum, has established the groundwork for SDGs by making legal and administrative regulations on the SD path and receives significant financial support from the EU due to its candidate status.

Findings show that the total budget allocated to the municipalities (both metropolitan and provincial) is concentrated in the south and southeast regions of Türkiye in the 2008-2022 period. When this situation is analyzed in two sub-periods, it is seen that while spatial clustering could not be detected in the pre-2015 period, the location of the hot spots in the post-2015 period supported the 2008-2022 results. The hot spots represent the provinces that, while benefiting from above-average EU grants, are also the ones whose spatially close neighbors benefit from higher budgets. The clustering of hot spots in the allocation of the total EU budget is in the region covering the provinces of Mersin, Niğde, Nevşehir, Kayseri, Adana, Sivas, Kahramanmaraş,



Osmaniye, Hatay, Kilis, Gaziantep, Adıyaman, Şanlıurfa, Malatya, Erzincan, Tunceli, Elazığ, Diyarbakır and Mardin. Conversely, the spatial clustering of cold spots, which express the spatial relationality of low-low values, is located in the western region of Türkiye, which covers the provinces of İstanbul, Kocaeli, Yalova, Sakarya, Düzce, Karabük, Bolu, Bilecik, Bursa, Balıkesir, Manisa, Kütahya, Eskişehir, Ankara, Kırıkkale, Afyonkarahisar and Uşak.

Furthermore, when we look at the distribution of the EU regarding the prioritized SDGs in the funded projects, a result similar to the spatial pattern of the total allocated budget is obtained. In the period 2008-2014, no clustering was detected in the distribution of the total budget and no clustering was detected in the prioritized SDGs. In the 2008-2022 and 2015-2022 periods, spatial clustering is observed in SDG4 on education, SDG6 on water and supply, SDG10 on reducing inequalities and SDG11 on sustainable cities. The locations of hot spots of these SDGs are located in the southern and south-eastern parts of Türkiye, as is the case for the total allocated budget. Moreover, no cold spots were identified in the SDGs prioritized by projects activated after 2015. This shows that high-budget projects have a clear spatial selection in the period between 2015 and 2022.

## **5.1 Discussion of the Findings**

Since the investments made in the period between 2015-2022 have a larger budgetary and numerical share compared to the investments made in the period between 2008-2014, it is expected that the post-2015 period will have a greater impact on the total results. However, the fact that the 2008-2022 period, which is the total research period, has such an identical spatial pattern with the post-2015 period signals a surprising policy transformation. Until 2015, EU funding was allocated without a clear spatial correlation, but after 2015, there was a sharp turn towards spatial dependence, which was not entirely expected.

Questioning the potential reasons behind this clustering may be speculative given the methodology of the study. However, it would be useful to draw conclusions in light of the information gathered in the literature review in Chapter 2. Considering the evaluation criteria specified in the EU grant project selection processes, it can be stated that the relevance of the projects to the program's scope has a significant impact on the possible breakdown. In fact, the concentration of the majority of financing in the southern and southeastern regions of Türkiye does not appear to be directly proportional to the population sizes shown in Figure 3.2. It has been stated that the magnitude of the population served has a direct impact on the technical and financial capacities of the municipalities. Consequently, the spatial relationship that could not be established between population densities and the spatial clustering observed cannot also be established for technical and financial capacity.

The clustering of EU-funded municipal projects in the southern and southeastern parts of Türkiye suggests that these regions have been successful in attracting international funding for local development projects. The political underpinnings behind this situation are the national development decisions taken to address regional inequalities, as mentioned in Chapter 2. Therefore, the concentration of EU investments in the south and south-east of Türkiye supports the priorities set out in many national documents, notably the DPs. In addition, the map of provinces with a dense SuTP population, shown in Figure 2.4, coincides with the locations where the EU budget is spatially concentrated, particularly after 2015. This supports the hypothesis regarding the spatial allocation of funds to reduce the burden of the SuTP population.

The spatial clustering of the budgetary contribution to the SDGs prioritized by the municipal projects, as observed by provinces, is another topic of discussion. Water and supply investments, as well as other infrastructure investments, are identified as the primary areas in which municipalities require international financing in Chapter 2. It is remarkable, however, that the spatial concentration of budgetary investments in SDG6 and SDG11 is limited to the southern and southeastern regions of Türkiye, given that the need for these investments is a prevalent occurrence among

municipalities. This situation can be explained by the previous paragraph's reference to the need for municipal service capacity expansion due to the severity of the SuTP. In addition, it may be possible to demonstrate compatibility with drought maps, which are not included in the thesis, given the geographical characteristics of the region. In addition, the spatial distribution of SDG4 (investments in education) and SDG10 (support for combating inequalities) is not completely compatible with Türkiye's level of development. In addition to the southeastern region of Türkiye, the eastern and northeastern regions are also likely to be affected by struggles against unfavorable circumstances. Therefore, it appears that the SuTP concentrations in these regions best explain this phenomenon.

It bears repeating that the time-based, methodological, and data access constraints described in Chapter 3 had an impact on the analyses performed and the results organically obtained in this study. Due to the author's difficulties in gaining access to the data, the study was unable to be conducted on the basis of indicators. In addition, there is no consensus that all completed initiatives are included in publicly accessible data sources. The absence of precise information in the project documents regarding the association of projects with the SDGs is also a problem. In the investigation, numerous steps were taken to mitigate the negative effects of these limitations. Nonetheless, the study was restricted to the data declared in publicly available data sources and project documentation. A data set to be compiled by contacting the relevant entities, particularly the municipalities, which was not possible due to the study's schedule constraints, could have produced more realistic results. Nonetheless, this study demonstrates how, in addition to quantitative analysis, geographic analysis can make an important contribution to understanding the overall structure.

One of the potential outcomes of this clustering of EU-funded municipal projects is an increase in the technical capacity of project management activities in the metropolitan and provincial municipalities in these regions. As the project owners gain experience in managing and implementing these projects, they are likely to develop skills and knowledge in project management, financial management, and

monitoring and evaluation. This can increase their corporate capacity and make them more competitive in future grant project application processes. In addition, EU-funded municipal projects often require a high level of technical expertise and compliance with complex regulations and standards. Successful implementation of these projects can provide valuable experience and technical skills that can be transferred to other projects and activities. This can create a positive feedback loop, where increased technical capacity leads to more successful project implementation, which in turn leads to further capacity-building opportunities.

Furthermore, increasing technical capacity in the metropolitan and provincial municipalities in the southern and southeastern parts of Türkiye can also help to address regional disparities in development. This can contribute to more balanced regional development, which is an important goal for both Türkiye and the European Union. Overall, the clustering of EU-funded municipal projects in these regions has the potential to increase technical capacity in project management activities, which can lead to more successful implementation of future projects and contribute to more balanced regional development.

## **5.2 Implication for Future Research and Practice**

As a result of the results obtained in the study, implications for future research and practices are presented by the author in this sub-heading. First, the implications for future research based on the findings of the study are as follows:

- The location of the spatial clusters identified in the budgetary distribution of municipal projects activated in the 2008-2022 and 2015-2022 periods has the potential to generate new debates in different areas. In fact, the location of EU budget allocations, which are particularly concentrated in the southeastern region of Türkiye, overlaps with the SuTP-intensive regions presented in Chapter 2. Moreover, in the post-2015 period, FRIT and MADAD funds specific to SuTP have also been implemented. This raises the

question of whether the distribution of EU grants for municipal service projects is driven by SuTP-oriented migration policies. Studies on SuTP have generally focused on social issues. However, this study raises the possibility that funding for SuTP for social issues may also have an impact on the spatial selection of technical projects such as urban infrastructure projects. Hence, this study provides an important baseline for future studies, especially in the policy field, analyzing the interrelationships of pre- and post-SuTP projects.

- Another finding of the study is that EU grants have shifted towards investments prioritizing different SDGs over time. However, the analysis that could deepen this finding could not be elaborated on as it requires following a very different methodology. The author believes that a temporal analysis of these breakdowns over time could make a significant contribution to the literature. Such a study would provide a holistic approach to the field by combining formulations that can understand time-dependent trends with the spatial trends presented in this study.
- Studies on the possible drivers behind these spatial trends are another important issue in order to evaluate the results obtained in this thesis in terms of causal relationships. In particular, research using GIS-based methodologies such as Geographic Weighted Regression (GWR) will provide valuable contributions to the literature as it will cover geographical correlations.
- Due to time limitations, metropolitan and provincial municipalities were analyzed as the sample set of the study. In future studies, a research design on the spatial distribution of project-based EU financing utilized by district municipalities can provide important outputs to see the whole picture in Türkiye. In this context, the results and methodology of this thesis can be considered the basis. The resulting spatial distribution at a sub-scale can be evaluated in comparison with the results of this study.
- In addition to this study on EU grants, it would be meaningful to follow a similar methodology and conduct a study on projects financed by loan

mechanisms from international sources. In this way, data can be obtained to make comparative assessments between these results, which show the spatial clustering of grants, and the results of loans.

- In this study, it is seen that GIS-based analyses provide very important information on the targeted SDGs. However, due to data access problems experienced by the author, research at the level of SDG indicators could not be conducted. In addition to the results of this thesis, it is thought that a study on the basis of indicators can provide inferences about the sub-divisions that may affect the design of municipal projects.
- In this study, data sets were created by utilizing the information in the award notices of project financings. This means that it is a study that takes into account the designs of the projects they aim to realize. However, it brings with it the risk that the scope or location of the project may change with the amendments that may be made to the contracts over time. There is even the possibility that projects may be canceled and financing allocated to other sources. Therefore, considering the project life cycles, a similar study on the completion status of the projects in the 2008-2022 period, on which this study is based, at least five years later could be another topic for further research. This would be an important contribution to the literature in order to make comparative assessments in terms of the spatial distribution of the targeted project designs and the actual final status.
- During the literature review, the author revealed that no study has ever discussed how decisions are made during SGD prioritization in the project-writing process. For instance, we do not know whether particular SDGs are mentioned to attract grants to the municipality or whether SGDs are mentioned because of their close linkages with the goals of the projects. More studies are needed that share the experiences of decision-makers in project-writing processes, especially regarding the identification of SGDs.

Second, the implications for practice in light of the study results are as follows:

- The spatial clustering of urban infrastructure projects falling under SDG6 and SDG11 has been found to be in the southeastern region of Türkiye. This is where municipalities are most in need of alternative financing due to the high cost of such projects. Therefore, it may be beneficial for provinces in this region to be aware of this trend and try their chances in favor of EU grants before they are burdened with the repayment of loans.
- Provinces in western Türkiye are less able to benefit from EU grants, especially for SDG4, SDG6, SDG10 and SDG11. It is very important for these provinces to take this disadvantage into account in their project preparation processes. A transfer of resources to prepare their projects on other topics in line with the standards of EU grants could lead to more effective results. Thus, they can channel their resources in terms of labor, time and finance to areas with higher probability.

To conclude, these conclusions summarize the contributions of the study both in terms of creating new discussion agendas for future research and presenting results that can form the basis for these discussions. Here, the unique place of the study in the field is not limited to the conclusions it reveals. In fact, these spatial dependencies identified through geographical analysis prove the importance of analyzing the geographical dimension in the evaluation processes of the SDGs. As a result, the integration of GIS in the field as a decision-support mechanism for taking the right actions toward SD has the potential to make critical contributions.





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